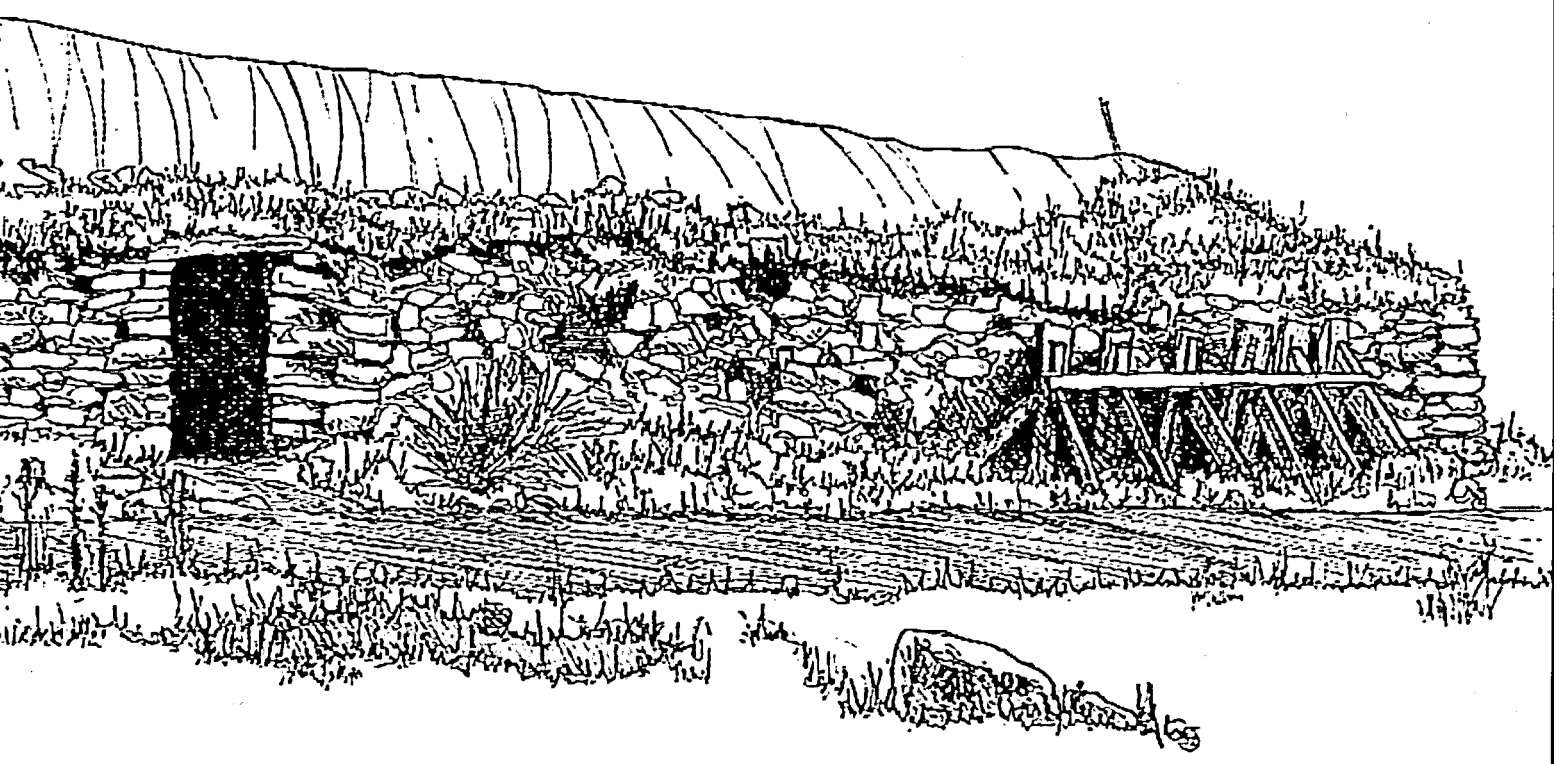
The Hebridean Blackhouse

A guide to materials, construction and maintenance



Historic Scotland Technical Advice Note 5

HISTORIC SCOTLAND

HISTORIC SCOTLAND TECHNICAL ADVICE NOTES

No. 1 ***Preparation and use of Lime Mortars***

No 2 ***Conservation of Plasterwork***

No 3 ***Performance Standards for Timber Sash and Case Windows***

No 4 ***Thatches and Thatching Techniques: A Guide to Conserving Scottish Thatching Traditions***

No 5 ***The Hebridean Blackhouse: A Guide to Materials, Construction and Maintenance.***

Available from:

Historic Scotland
Technical Conservation, Research and Education Division
Scottish Conservation Bureau
Longmore House
Salisbury Place
Edinburgh
EH9 1SH

Tel: 0131 668 8606

Fax: 0131 668 8869

The Hebridean Blackhouse

A Guide to Materials, Construction, and Maintenance

Prepared by:

Bruce Walker
Christopher McGregor

Commissioned by:
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Historic Scotland

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EDINBURGH, 1996

HISTORIC SCOTLAND

FOREWORD

When I first encountered the Hebridean Blackhouse at No 42 Arnol, Lewis, during the early 1970s, I was about to enter a close association with a building which was to last almost 25 years.

As a Property in Care of Historic Scotland on behalf of the Secretary of State for Scotland, the Blackhouse has been maintained by the state since 1962. It was my privilege to lead that programme for over 10 years. During that time the sophistication of the building's design and its functionalism always impressed.

It had been restored from its ailing state and given a major new lease of life as a visitor attraction. It was, however, kept as intact as it could be so that its purpose, characteristics and form could be readily appreciated by all those who viewed it.

As with all buildings, the cycle of routine maintenance occasionally gives way to the need for a more omnibus overhaul. Such a need arose during Spring-Summer 1990 when a full programme of works had to be devised and pursued. This approach also provided an ideal opportunity to undertake a fuller and more intense analysis of the structure and its detail than was possible during the major 1960s work programme.

By combining practical hands-on experience with academic research and analysis, this Guide sets out to present a deeper understanding of an extremely cultured piece of architecture, despite its outward appearance. It is offered to practitioners as an aid to interpretation and understanding in anticipation that it will provide an effective model for others to follow in the care and preservation of similar indigenous building types.

INGVAL MAXWELL
Director, TCRE
Historic Scotland
December 1995

ACKNOWLEDGEMENTS

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The authors are also indebted to Dr Denys Pringle, Principal Inspector of Ancient Monuments and Peter Donaldson, Principal Architect, Historic Scotland, Edinburgh: Robert McIlwraith, Area Superintendent: James Rankine, Superintendent of Works: Eddie Bain, Gavin Douglas, Willie Forsyth, Colin Grant, Bruce Henry, Paul Lobar, Mark McArthur, Martin McKenzie, Reinhold Murdoch, Ronnie Murray, John Nesbit and David Robertson, Historic Scotland, Fort George: Chrisetta Smith and Mary McLeod, Historic Scotland Custodians: Richard Langhorne, Stornoway Museum: Susan McLennan, Western Isles Enterprise: Stuart Bagshaw, Stornoway: Duncan MacDonald, Brogar: and Norman McRitchie, Barvas for their faith, patience, understanding, knowledge, skills and assistance in returning this building to its original form.

Special thanks to Betsy Cann and Dorothy McBain for preparing the typescript.

SPECIAL NOTICE

This document refers to a particular house in a particular community. Each community has its own variations in constructional techniques and practices also in building layout and form. The techniques, practices, layout and form also vary with the age of the building being considered. It is important that all these variations are established prior to the use of this document in other townships or for other ages of blackhouse.

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1
INTRODUCTION

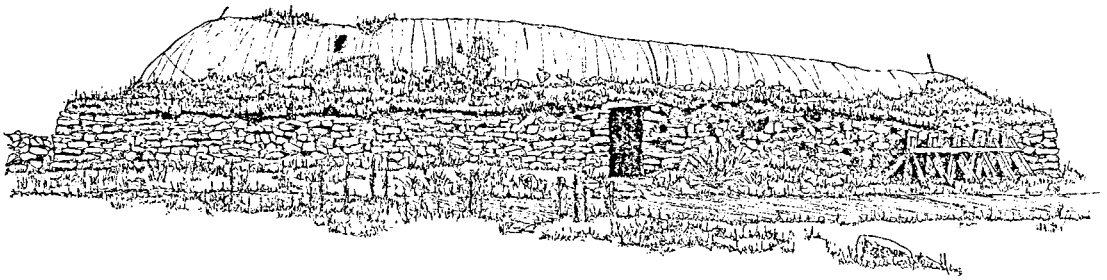
The study is based on the Historic Scotland blackhouse at 42 Arnol, Barvas, Lewis. It is an extremely important building both in Scottish and European terms. Blackhouses of this type were once plentiful in the Highlands and Islands of Scotland but by 1917 had reduced to 4,400 occupied examples in Lewis with occasional survivals elsewhere. 42 Arnol is one of the last complete examples of these long, low, narrow bodied, chimneyless byre-dwellings where the human occupants and the cattle shared the same door and the same internal volume. It also represents one of the final stages in the development of an ancient building type built to entirely different principles to those in general use today.

The construction of this house as late as 1885 and its continued occupation until 1965 when it was purchased for the Nation by the Secretary of State for Scotland, mean that the traditions associated with its form, construction and maintenance are still alive in the experience, and folk memory of the Arnol community. **Without this information and input by members of the community it would have been impossible to restore the house and produce this publication.**

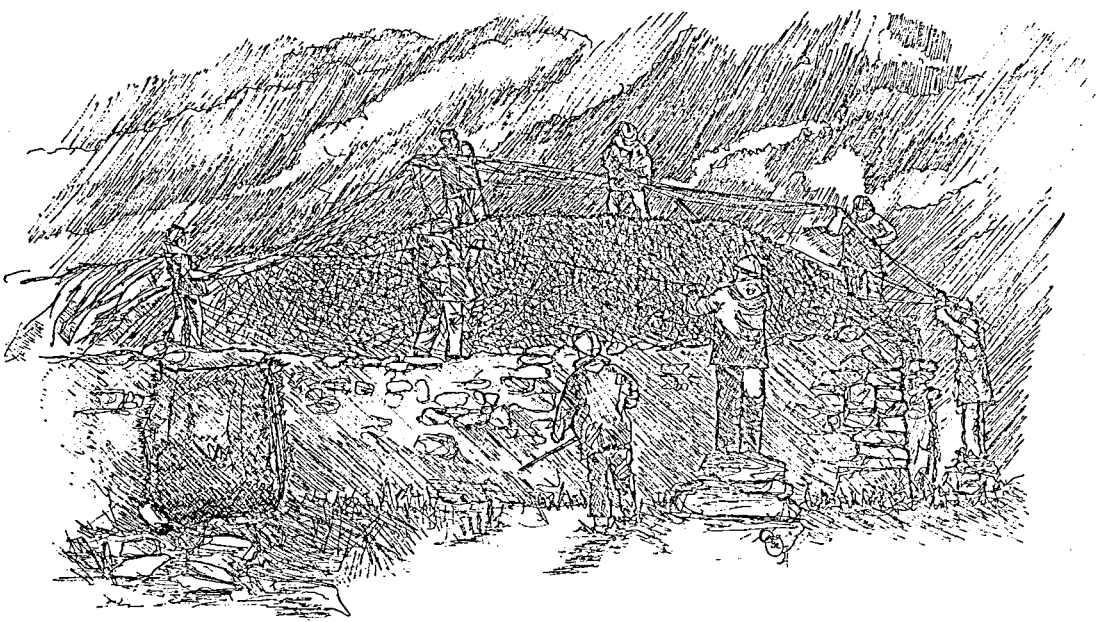
The building fits neatly into a distinctive North Atlantic and Arctic region building tradition characterised by narrow bodied interconnecting parallel ranges with individual roofs resting on mutual walls. Earlier forms, often described as creel houses, were built of turf and lined with wattle or timber and may well have been cruck framed using timber or even whalebone for the main structural frame. In this respect the blackhouse is remarkably similar in form, concept and construction to the turf-walled cruck-framed wattle or timber lined buildings of the Sea-Samme of Finnmark, Norway, and the timber-lined turf-walled farmhouses of Iceland and Shetland. All four building types are related to the turf-walled dwellings found at one time throughout Europe but more specifically with building types formerly common in Alaska, Faroes, Greenland, Denmark, Norway, and Scotland. It is also interesting to note that a typical blackhouse plan, almost identical to the one surveyed at Carloway, Uig, Lewis by Captain FLW Thomas RN in 1856, was excavated by Norwegian archaeologists at L'Anse aux Meadows (Duck Bay), Newfoundland. This building has been dated to the Viking migration period of circa 1000AD. Unfortunately, there has been little historical study or published archaeological excavation of this building type in Scotland but a number of foreign archaeological excavations suggest that this particular building tradition is at least 1000 years old. Documentary sources and, to a lesser extent the archaeological evidence, show a number of distinct regional variations responding to timescale, geological, geographical and economic influences.

Against this background, it is important to understand that each community in Lewis has its own approach to building construction, form and maintenance, conditioned by local circumstances. Even within this framework, each house is unique in some respects as it responds to site conditions. The information within this publication is, therefore, based on the form, construction and maintenance techniques used in the Arnol township and more particularly at 42 Arnol.

Normally, in describing a building one starts with the overall appearance and built form and progresses to the detailed constructional techniques. Blackhouse construction is so different from other forms of traditional construction and the principles governing the design appear so unorthodox, to our current ideas on dwelling house construction, that in this case the normal approach has been reversed. An understanding of the constructional elements should make the explanation of their relationships and the significance of the built form, easier to understand.



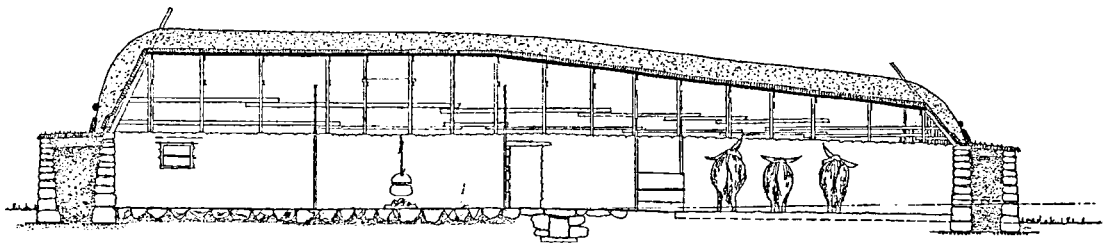
42 Arnol from the east, circa 1968



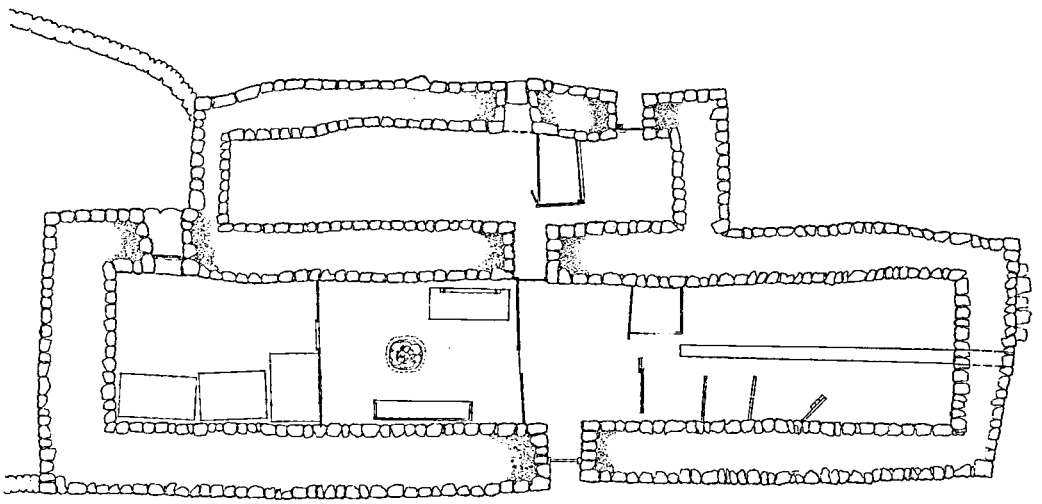
Roof being netted to secure thatch from approaching squall

2
CONSTRUCTIONAL TECHNIQUES

Longitudinal section



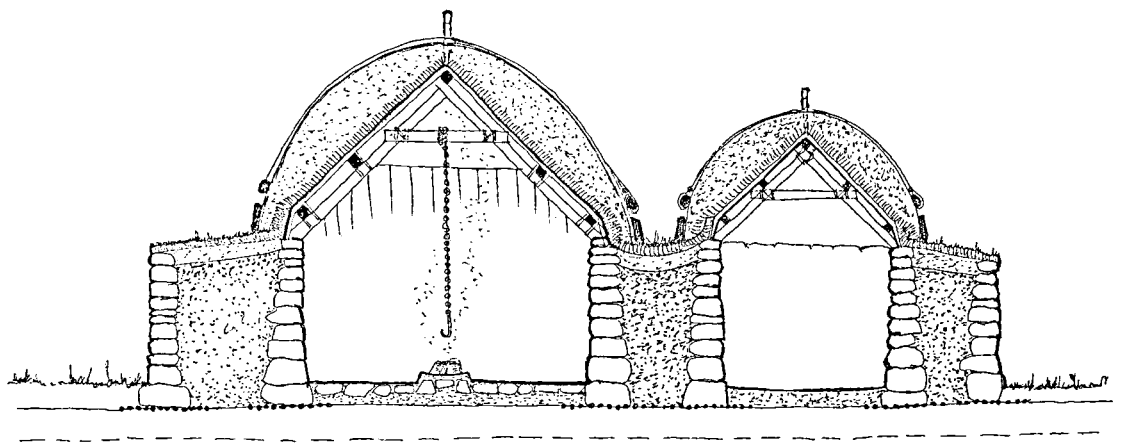
Plan



2.01 Site Preparation

To prepare the site for building the top soil is removed from the entire area of the structure. This exposes a layer of blue clay (a decomposed granite comprising kaolin, a fine white clay, quartz crystals and flakes of felspar and mica) about a foot below ground level. Shallow trenches are cut in the surface of the clay and lined with stonework. These tie into the croft's drainage system and are designed to carry surface water away from the building. Blue clay, however, forms a treacherous surface on which to build the masonry faces of the walls, therefore, a friction course is created by hammering evenly-sized small rounded pebbles into the surface of the clay. The friction course is approximately a foot wider than the base of each masonry skin. Similar friction courses were used in medieval masonry construction.

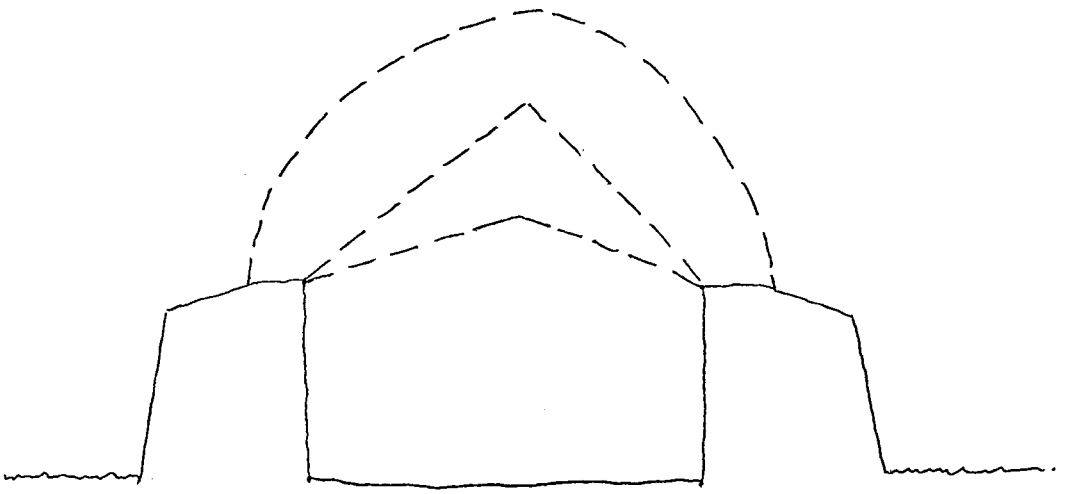
Cross-section



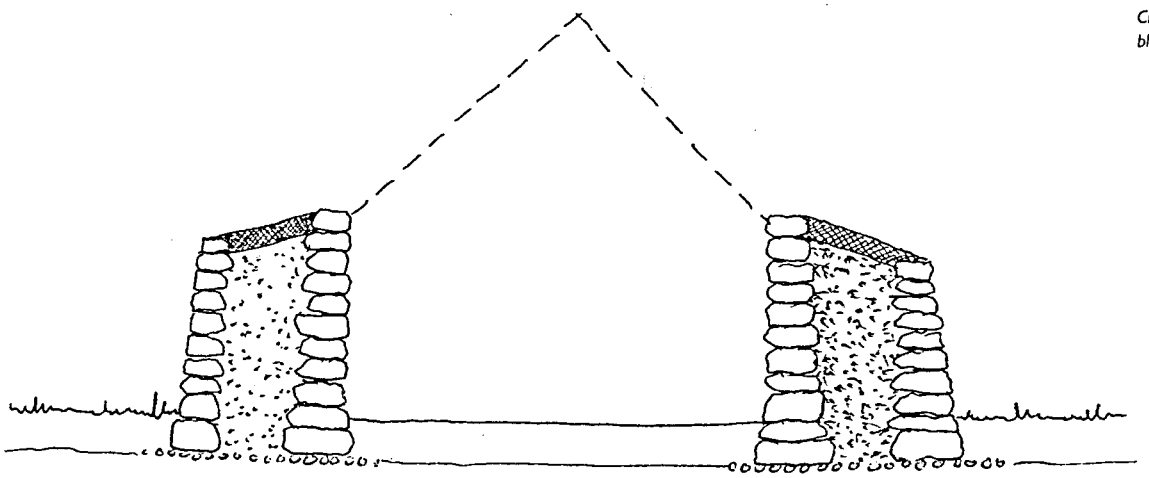
2.02 Walls

The walls of the blackhouse are constructed as two masonry faces to a tempered-earth core. The overall thickness of the walls varies from five to seven feet. (1.5 to 2.1m). The masonry skins are built as dry-stone construction utilising whatever stone is available on or near the croft. In this case, the natural stones are boulders of gneiss and schist. The stones are set as uncoursed rubble graded with the largest stones at the base and the smallest at the top of the wall. Traditionally the only pinnings used in the construction of the drystone faces of the outer walls are on the inner surfaces against the tempered earth. Their function is to prevent individual stones from rocking or pivoting within the wallface. Pinnings on the outer face are normally minimal and the large numbers in the face of the wall at present do nothing for the structure. The wall continually sheds these face applied pinnings and these should not be replaced. The tempered-earth core is made-up from the top soil excavated from the site, mixed with peat dust, blue clay and the ash from the fire. This is compacted between the masonry faces as they are built. Pieces of iron, old horse shoes, and other metal objects are added to the core material for luck. The commonly held belief that the core has to be kept wet to eliminate draughts and that the stone skins are built to channel the water inwards is totally erroneous as water passing down through the core washes out the earth fill through the dry masonry joints leaving the wall structurally unstable. The wall core is sealed at the wallhead using blue clay about four to six inches (100 to 150mm) thick and finished flush with the top of the masonry skins at both sides of the wall.

The walls vary in height from 5 to 6 feet (1.5 to 1.8m) the outer skin is slightly lower than the inner to provide a distinct weathering to the outside. The tops of mutual walls are dished to the centre but fall to either end of the mutual section. This provides a



Diagrammatic cross section of blackhouse



Cross-section of blackhouse walls

surface drain for the rainwater from the roof. The walls are built to running levels, that is, following the line of the ground. The wallhead is adjusted to sweeten the line and ensure a clean run-off for excess surface water.

Doorways are spanned with flagstone type lintels sealed with blue clay at the joints. The window to the room, inserted in the 1940s, has a similar single lintel spanning across the inner skin of masonry. At one point, on the outside face of the wall forming the end wall of the byre, there is a series of cantilevered stones forming a rough narrow staircase. This is used to gain access to the wallhead for the maintenance of the thatch and to allow hens to reach the access hole to the roost in the byre.

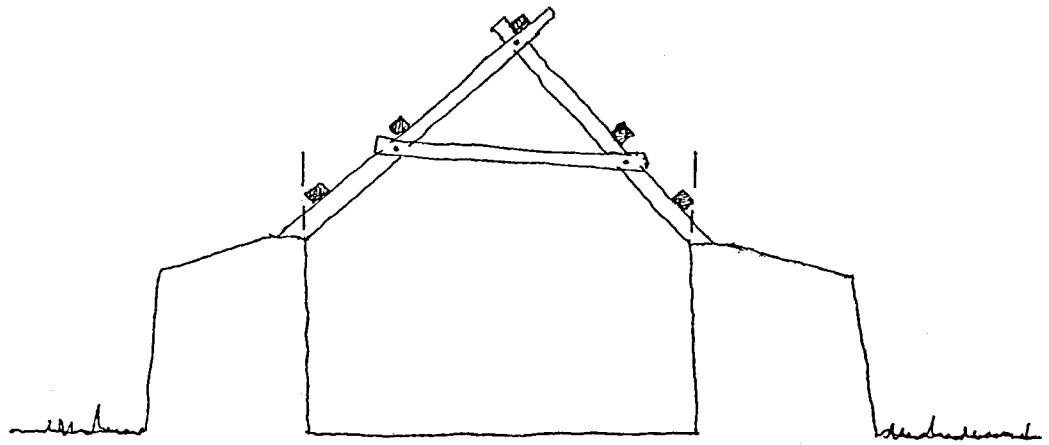
Historically the wallhead was out of bounds to all heavy animals such as sheep and to the inhabitants except for access to attend to the roof covering. Access was only effected in damp weather when the clay was wet enough not to crack under the weight of the thatchers and not soft enough to sink and encourage ponding.

2.03 Roof Structure and Wallhead Turf

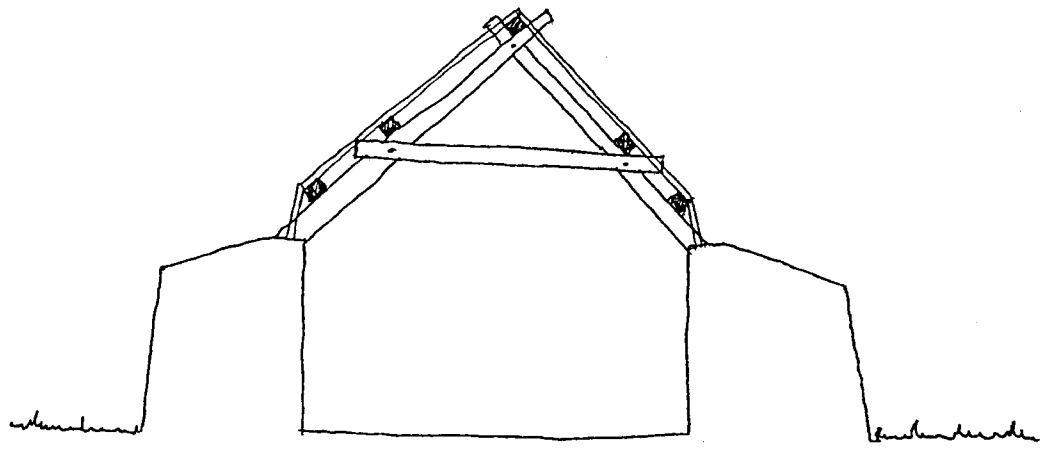
The roof structure consists almost entirely of driftwood or wood taken from shipwrecks. The roofs of the other blackhouses in Arnol formerly contained oars, spars, planks, hatches, farlins, ribs and foreign hardwoods. Whale bones, particularly shoulder blades, were also incorporated in some of the structures. A pit-saw was used to reduce whole timber (washed ashore or found in peat bogs) to usable scantlings. Timbers were seldom shortened but tended to be used in the lengths found.

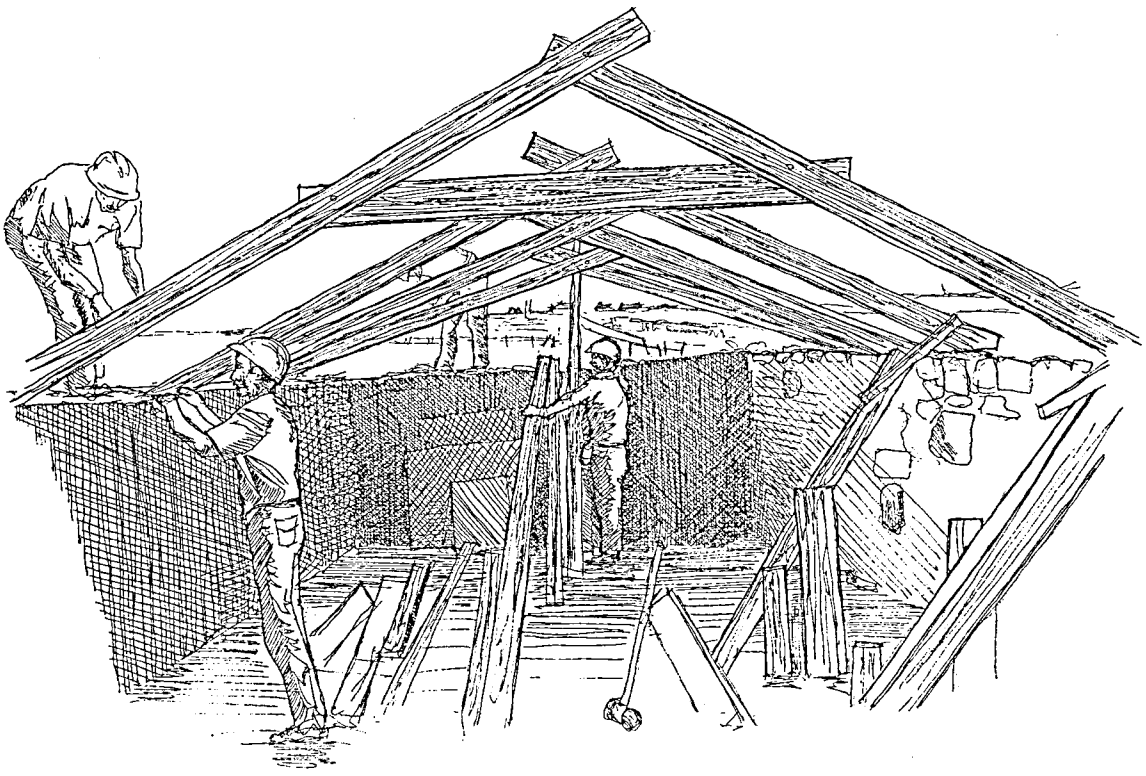
The roof structure at 42 Arnol is a series of A-frame trusses rising from the inner skins of the walls. The feet of the trusses stand on stones raised slightly above the level of the blue clay weather coat, thereby keeping them drier than if they were standing in a hollow or built into clay. The trusses support purlins over which is formed a slatted surface. The base-purlin runs on a line just inside the inner-face of the wall. The ridge-tree sits in the cradle formed by the crossed rafters. The intermediate purlin is situated

Cross-section showing truss and purlin

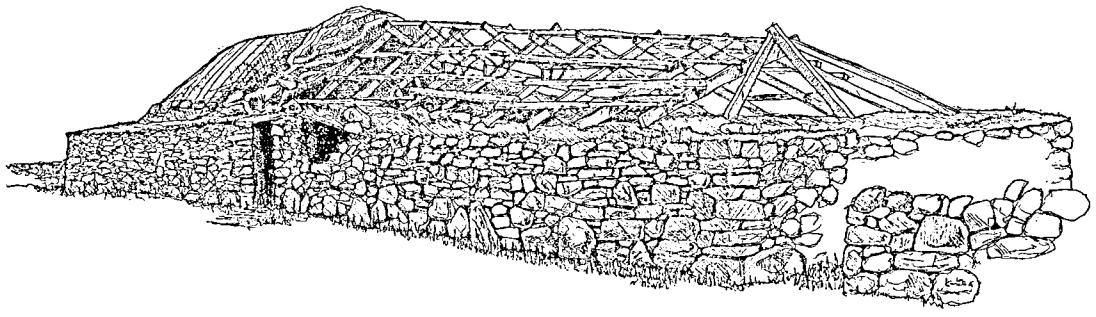


Cross-section showing slats over purlin

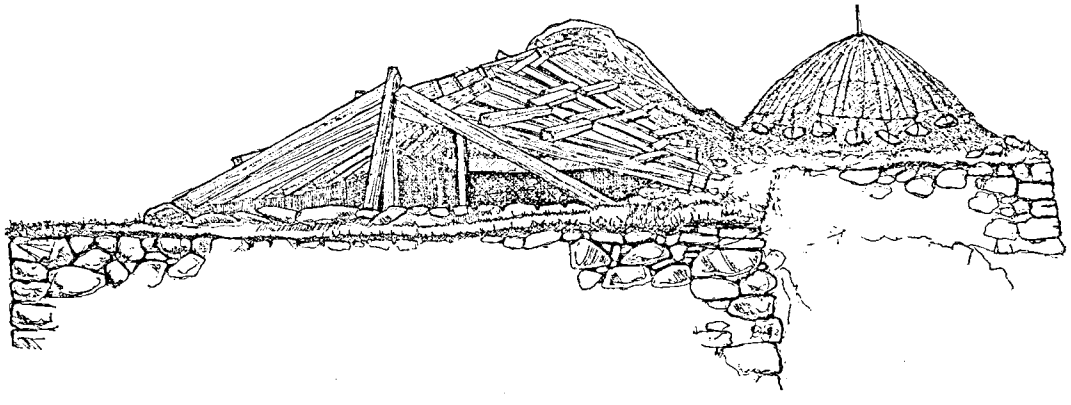




Trusses at lower end of byre roof

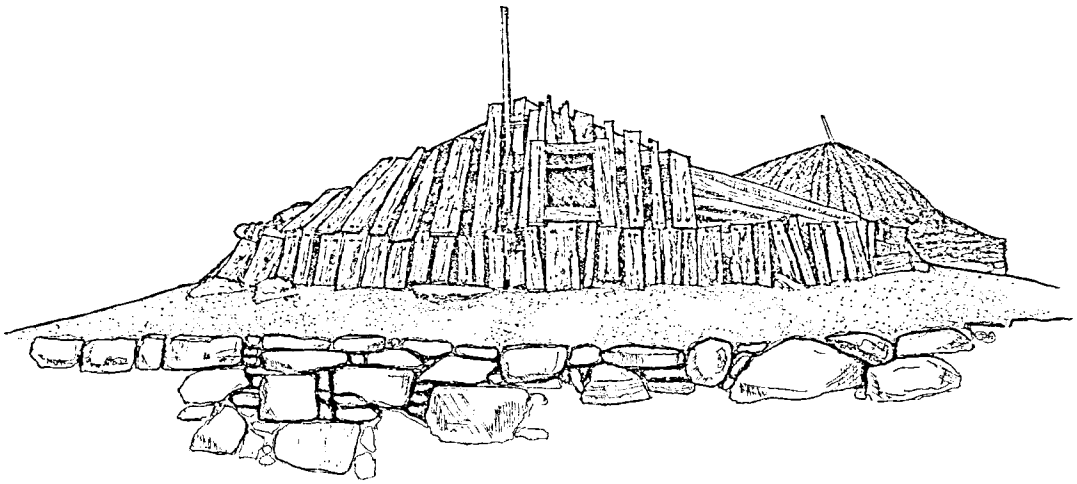


Framework of byre roof from south east

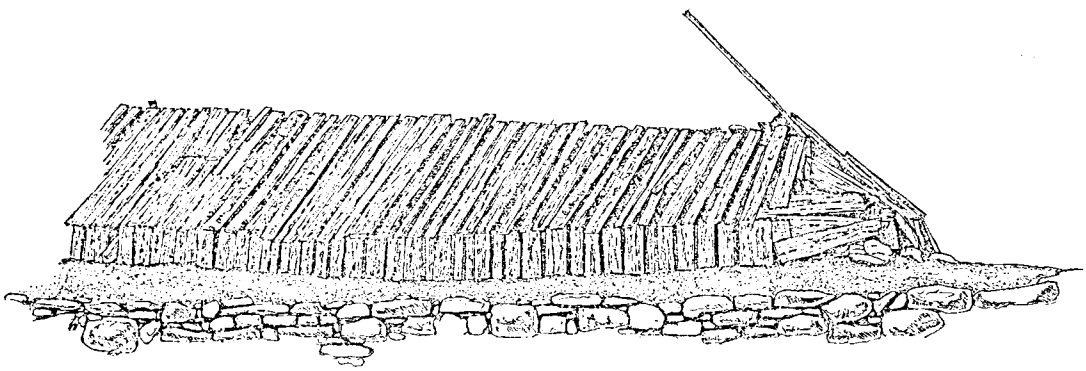


Framework of byre roof from south

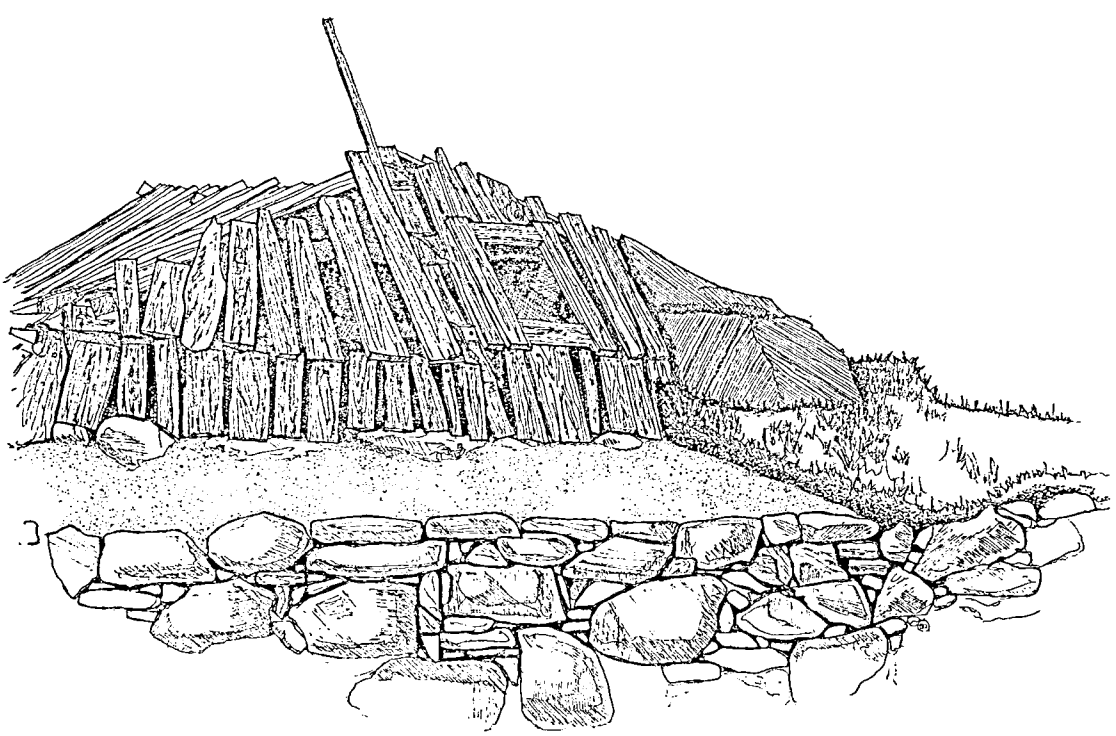
Hipped-end of byre roof



Byre roof showing soldier course at base of roof



Hipped end of byre roof showing application of wallhead-and roof turves



about one third of the way from the base purlin to the ridge tree. The greater span between the intermediate purlin and the ridge tree often led to structural failure of the slatted surface. This structural weakness was forced on the blackhouse builders through shortage of timber but the judicious use of rope helped to reduce potential damage to a minimum should the slats give way. A structural weakness of this type is not acceptable in a building open to the public and a second intermediate purlin has been introduced into the reconstructed roof.

The roofs of the barn and the house have a forty-five degree pitch but the roof of the byre end of the building gradually reduces from forty-five degrees where connected to the house to about twenty degrees at the bottom end. This slope is further accentuated by the byre wallhead following the line of the ground which slopes away from the entrance.

The irregular nature of the wallheads means that only the first and last truss of the house and the last truss of the byre can be prefabricated on the ground and raised into place. The rest are set up to correspond to a line linking the apex of the three trusses listed above. Coir rope is used to hold these trusses temporarily until the correct line is established. The timbers are then bored and pegged or nailed and clenched. The coir binding is left insitu after the permanent fixing is completed. A similar technique has been found recently in a roof at 11 Melvaig, Gairloch, Ross-shire but using rope made from tangle (a form of blade-like seaweed) instead of coir.

The purlins are similarly held with coir prior to permanent fixing with either pegs or nails.

The inclined slatted surface is applied between the ridge-tree and the bottom purlin. The spacing of the slats depends on the amount of timber available on that particular croft. If the slats are widely spaced straw rope, heather rope or coir is used to help support the roof turves or thatch.

The hipped ends of the roofs are cobbled together to support the return of the purlins round the end of the roof. If done with a series of rafters it produces an awkward step in the timber at the apex of each gable which fills surprisingly naturally during the slatting and turfing process.

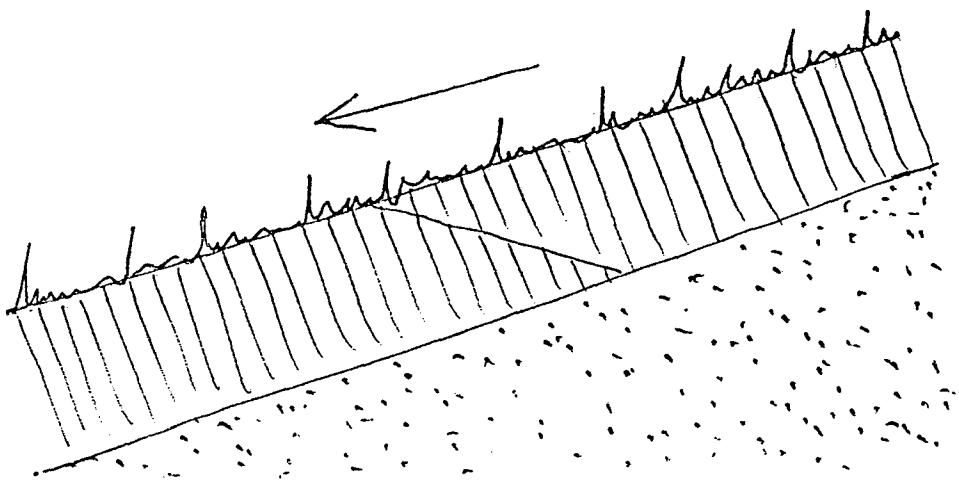
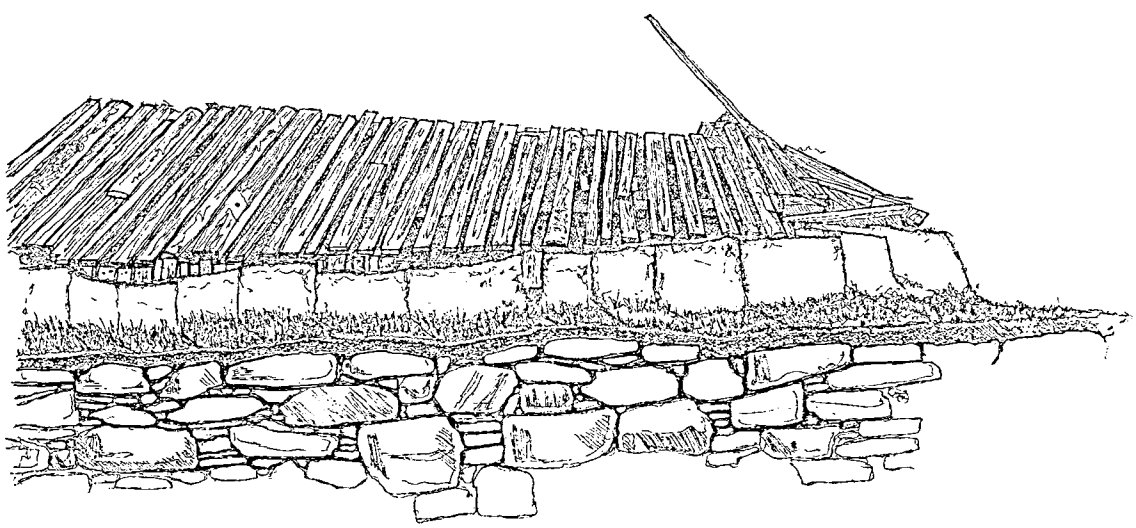
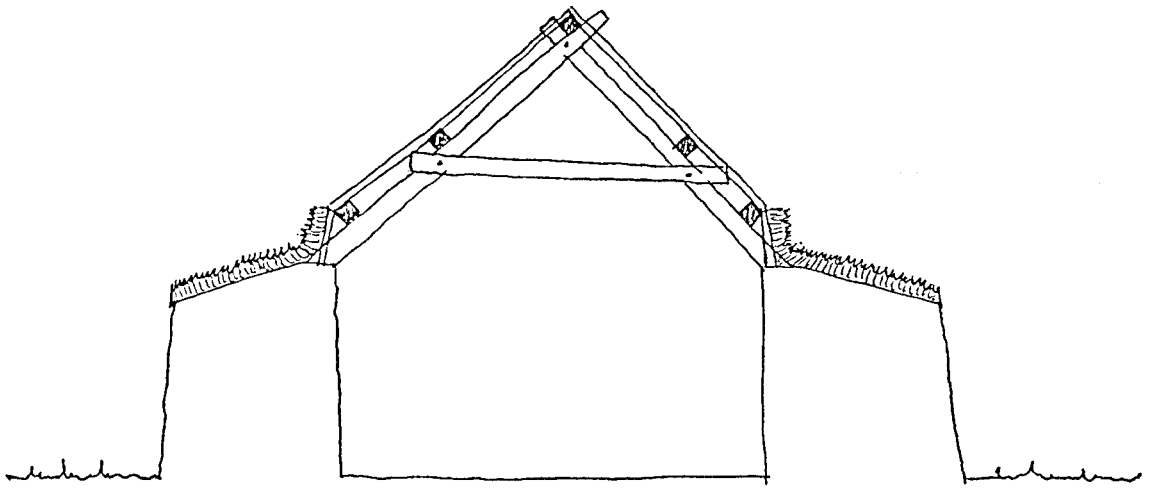


Diagram showing method of forming joints in wallhead-turves



Sketch showing wallhead-turves in position

Section showing position of wallhead-turves



At the apex of each hip a thatching stick is fixed to one of the hip rafters and projects about three to four feet (0.9 to 1.2m) beyond the apex. This has to be securely fixed as it carries the entire weight of the roping round that particular hipped end.

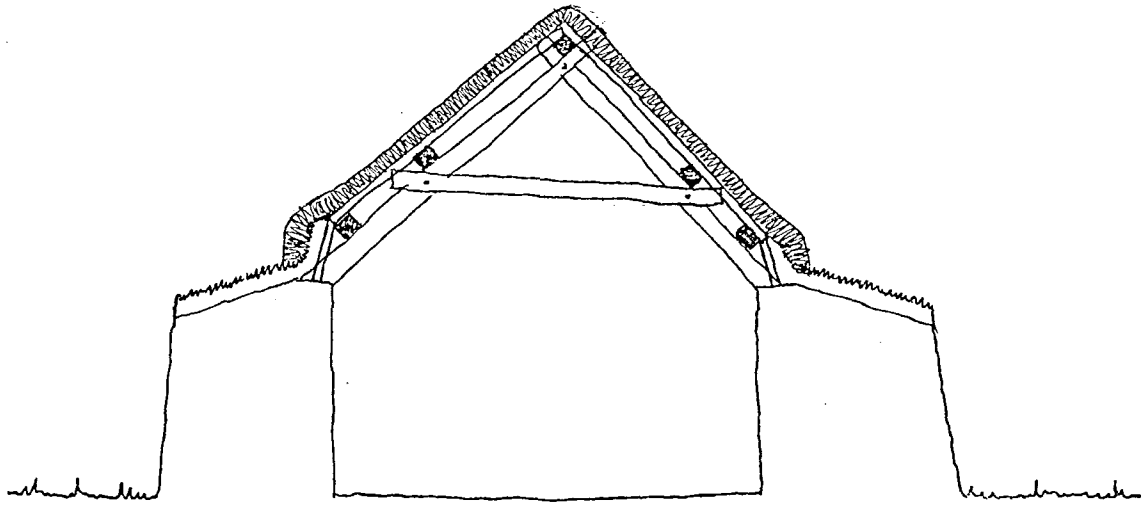
An upstand of short slats is formed between the bottom purlin and the wallhead of the inner masonry skin. This almost vertical surface has several functions. It forms a surface against which the wallhead turves turn up and the roof turves turn down. This double turf course forms a kicking board against which the thatcher works. It also provides a vertical surface to the edge of the thatch against which the wallhead thatch-stones stand and the roping thatch-stones hang. In addition, the upstand is at the part of the roof most prone to rot. The short and easily replaceable timbers form a sacrificial part to the roof and allow easy replacement without the need to disturb the thatch.

After the roof is slatted the wallhead turves are laid. It is important to ensure that the turves are of uniform thickness and are cut from an area of grass where there is a well-matted root system. The turves are as large as can be lifted and are thicknessed after cutting to avoid bumps and hollows in the finished surface. Joints between individual turfs are mitred against the weathering of the wallhead to encourage surface water to flow over the joint rather than into it. Similar mitred joints are used across the width of the wall. The top end of each turf is turned up the slatted upstand to finish level with the bottom of the slatted roof surface. Care has to be taken to form tight joints and to achieve as even a surface as possible to prevent ponding on the wallhead which encourages water penetration into the wall core. This green turf has to be applied to the wallhead the same day as it is cut from the sward to ensure that the root system stitches the joints and grips the surface of the blue clay.

The original windows in the blackhouse at 42 Arnol are rooflights set into the base of the slatted surface of the roof or into the slatted upstand. These are simple rectangular frames with a sheet of glass set into a check at the top and sides but carried over the bottom member. Earlier blackhouse windows were made with a timber frame over which was stretched an oiled calf skin. Both types are fixed to trimmers between the purlins.

The roof turves at Arnol are heather turf, whereas other townships in the area use grass turf. Again, in selecting the turf it is important to ensure a well matted root system. The turves are cut with a flaughter spade or breast plough or with an ordinary delving spade inclining in from cut edges either side. Both techniques produce turves thicker in the centre and tapering slightly to either side. This tapering helps reduce the thickness at the lapped joints creating a slight ridge at the joint but not enough to break the turf. The turves are placed on the roof, face down and are held in place by friction sometimes assisted by heather or straw ropes running across the surface of the spars. With more spars in the present roof and no heather rope the turf was nailed with slaters nails to prevent their slipping during the thatching. On reflection, this was probably unnecessary.

Traditionally, the area of roof turfed was governed by a number of factors interconnected with, and finely balanced to suit, the individual croft. The unturfed thatch filtered soot from the smoke that passed through it. The soot laden thatch made an excellent top dressing for the potato crop. The area of unturfed roof related directly to the area under potatoes but only insofar as there was enough straw available for re-thatching each year. The amount of straw available depended on the amount of dung available from the crofter's cattle: the number of cattle depended on the availability of fodder,



Section showing position of roof-turves

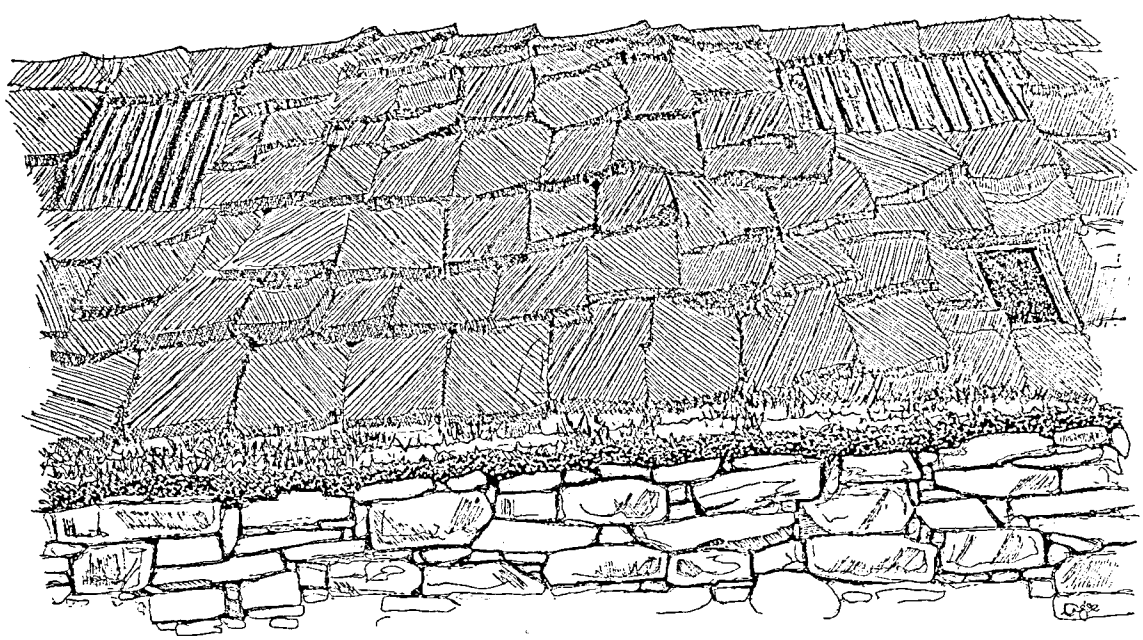
supplemented in the winter by potatoes and the potato crop depended on the soot top dressing from the stripped thatch. It is apparent, therefore, that the exact balance had to be finely tuned to the conditions existing on each individual croft. The size and composition of each crofter's family also had a bearing as large families could command more community support because they, in turn, could produce a large workforce for reciprocal arrangements.

The minimum area of turf on any roof comprises the ridge turf and soldier course at the wallhead. Ridge turf is essential to form a walkway for the thatcher and his assistant making it possible for them to pass each other when the thatch is still loose. It also makes the unthatched ridge less slippery. The turf at the soldier course is necessary as a kicking board for the thatcher. It also assists should any of the soldier course members fail and require replacement from inside the roof.

2.04 Thatching

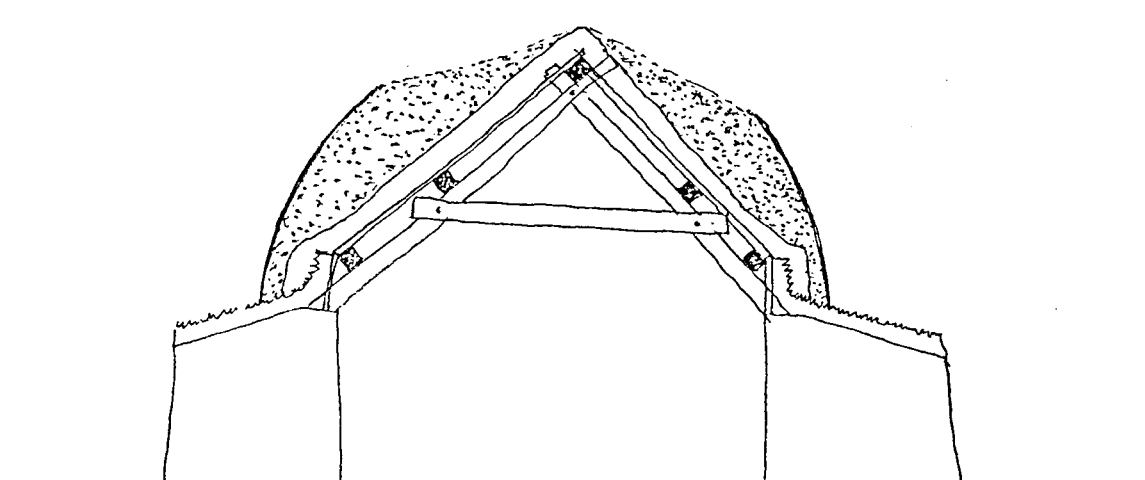
Traditionally, thatching was a community activity and the larger the workforce available the easier and faster the work proceeded. This was especially true when the net was applied because the comparatively heavy second-hand drift nets had to be supported clear of the thatch before being gently lowered into position. The lighter nylon net used in the Historic Scotland rethatching makes it possible for the net to be applied by only six men. The net is held clear of the roof on extended pitch forks then is gently lowered into position.

A six man team is the minimum requirement for many of the other thatching activities. When



Turves on roof showing windows and smoke vents

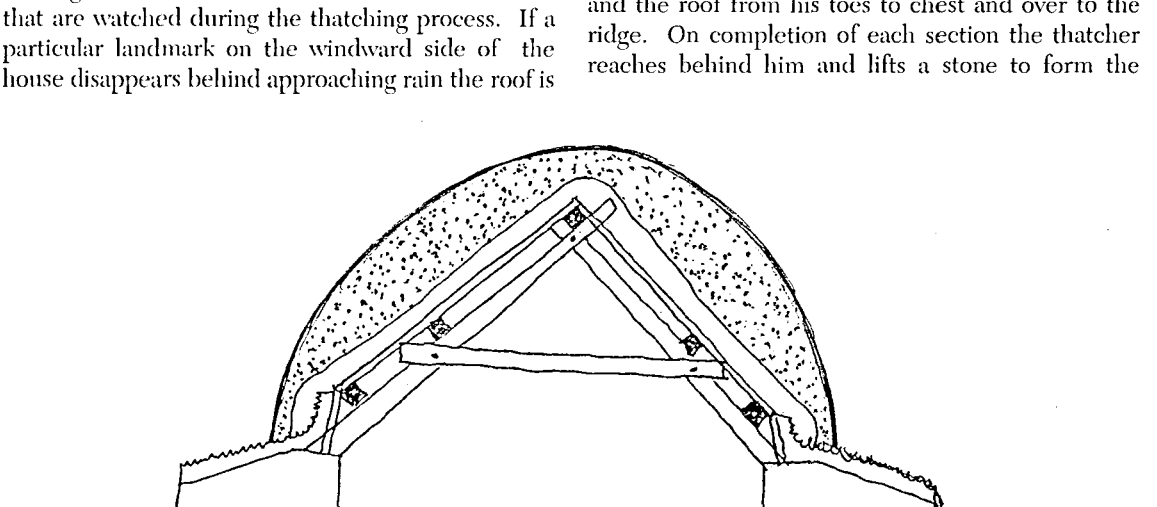
Section showing amount and form of thatch applied from wallhead



thatching the roof pitch the arrangement is two men thatching with three men breaking open the bales and carrying the straw to the fourth man who supplies the thatchers from the wallhead. When working on the ridge, one man thatches, one man on the ridge catches the straw and passes it to the thatcher, two men on the wallhead throw the bundles of straw to the man on the ridge and two men break down the bales and supply the men on the wallhead. When roping the thatch it is necessary to have one man on the ridge, directing two men one on each wallhead. Thatching can only be undertaken in still weather or in a light breeze - anything stronger can result in the thatch being lost. If the weather is showery, it is essential to secure the thatch prior to each shower as wind speed rises just prior to the rain starting. Each house has its own series of landmarks that are watched during the thatching process. If a particular landmark on the windward side of the house disappears behind approaching rain the roof is secured immediately. As soon as the wind drops the thatching continues whether the rain stops or not.

Thatching starts at the hipped end where the roof net is laid out ready to unfold should the roof have to be secured quickly. The thatcher stands with his toes against the upturned wallhead turf at the edge of the roof. Straw is handed to the thatcher in armfuls and he sprinkles this on the roof starting at his feet and compacting it between the roof slope and his shins. As the thatch begins to build up above his knees he leans towards the roof slope continuing the sprinkling and compacting process working up the body as he leans further into the roof eventually using a broom handle to assist him in the compacting and to achieve the desired line. This continues till a fully compacted section exists between the thatcher and the roof from his toes to chest and over to the ridge. On completion of each section the thatcher reaches behind him and lifts a stone to form the

Section showing form of completed thatch

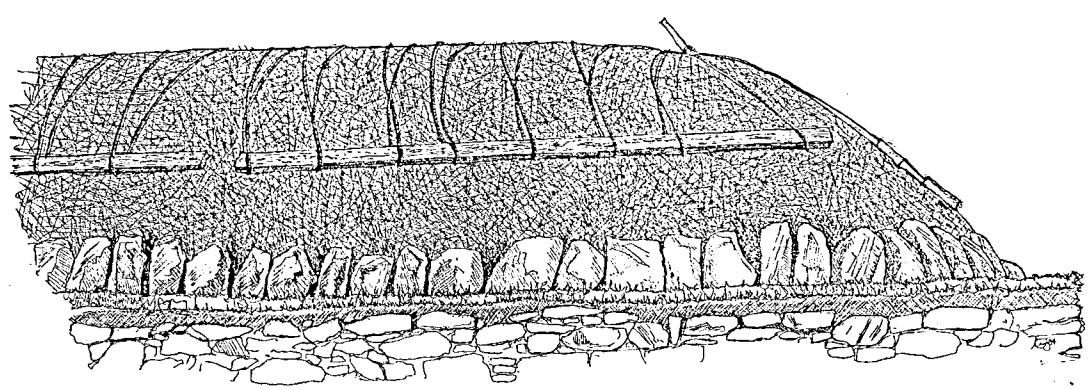


soldier course round the base of the thatch. Each stone is placed and kicked against the thatch to hold it in position and prevent its moving during the remainder of the thatching process. The assistant thatcher begins the same process immediately to the left of the thatcher. The thatch can only be completed to the same height as the thatcher's chin and a line over to the ridge. When this is done both thatchers move one place to the left, the assistant thatcher beginning the process again as the principal thatcher finishes the section that the assistant has just vacated. It is essential that the same thatcher completes the whole roof as the final shape of the roof is dependant on the thatcher's technique and body shape as he is using his body as a form of flexible template. This process continues round the entire roof eventually marrying up with the starting section. A short ladder is used to gain access from the wallhead to the ridge at the steep end of the roof. The thatcher then walks along the ridge to start thatching at the crow stick above the folded net. The assistant who stands behind him catches the bundles of straw thrown by the men on the wallhead. The straw is passed to the thatcher who sprinkles it on the ridge in front of him using the broom handle to compact the straw and marry the crown to the slope of the roof. The thatch at the crown is finished to the knee height of the thatcher or higher over the shallow pitch of the byre gradually reducing to knee height over the house. After the thatching is completed the roof is covered with the net and the soldier course of stones is repositioned over the edges of the net.

2.05 Roping

At this stage the roof is temporarily roped to allow it to settle prior to the final roping. The temporary roping starts at one hip. A plank is held in position above the soldier course and a length of coir is attached to one end. The coir is then passed over the crow-stick, back down the roof, round the plank, back round the crow-stick and so on till the coir is tied off at the other end of the plank. This is repeated right round the roof passing the coir back and forward across the ridge of the house to planks on either side of the roof. The roping is controlled by the principal thatcher who stands on the ridge with the ball of coir under his arm. He passes sufficient coir down to either side keeping the strain on the rope by standing on the last tightened strand. When the temporary roping is completed the roof is left to settle. As this happens the net should be constantly checked and tightened under the soldier course to prevent the thatch bulging over the top of the stones. Hollows in the thatch should be teased out, after lifting the net, and beaten back to the line of the roof. Temporary roping of this type is used as a conservation tool to reduce the length of time spent on the roof. Traditionally, large planks such as scaffold boards were not available and the technique described below for final roping would have been used for each phase.

After the roof has settled the permanent roping is carried out. This is undertaken in the same way as the temporary roping but is much more accurate in terms of line and spacing. The roping starts at the crow-stick. The rope is tied to the stick by the master thatcher and a length of coir paid out to one of the two men fixing the stones. The man inserts a stone into the curve of the rope and the rope is tensioned by the thatcher until the stone is approximately four to six inches (100 -150mm) above the soldier course. The tension is held by the thatcher's foot. The man on the wallhead flips the stone over sideways to make a half-hitch on the rope and the thatcher lowers a length of coir to the other wallhead man who repeats the process. As the two wallhead men work round the hip the thatcher takes total control. He becomes the only person who can assess if the balance of the stones is correct. He is also the person who determines the line of the ropes over the ridge. The process is carried on along the whole length of the roof and the coir is tied off on the opposite crow-stick. After the roping is satisfactorily completed and the thatcher is satisfied with the line of the roof, the horizontal roping takes place. Here the thatcher attaches the coir to a large stone at one side of a roof window, using a clove-hitch with a half-hitch, the



Sketch showing temporary roping

Diagrams showing system of roping round the hipped end of the roof

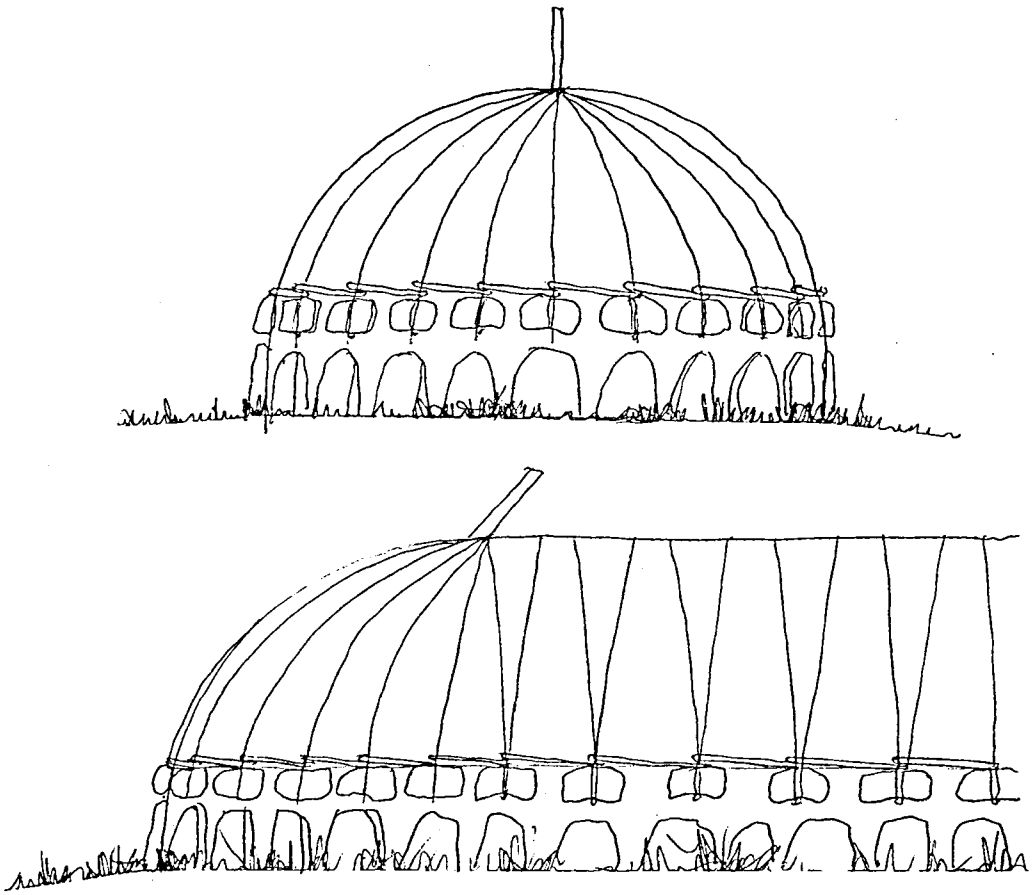
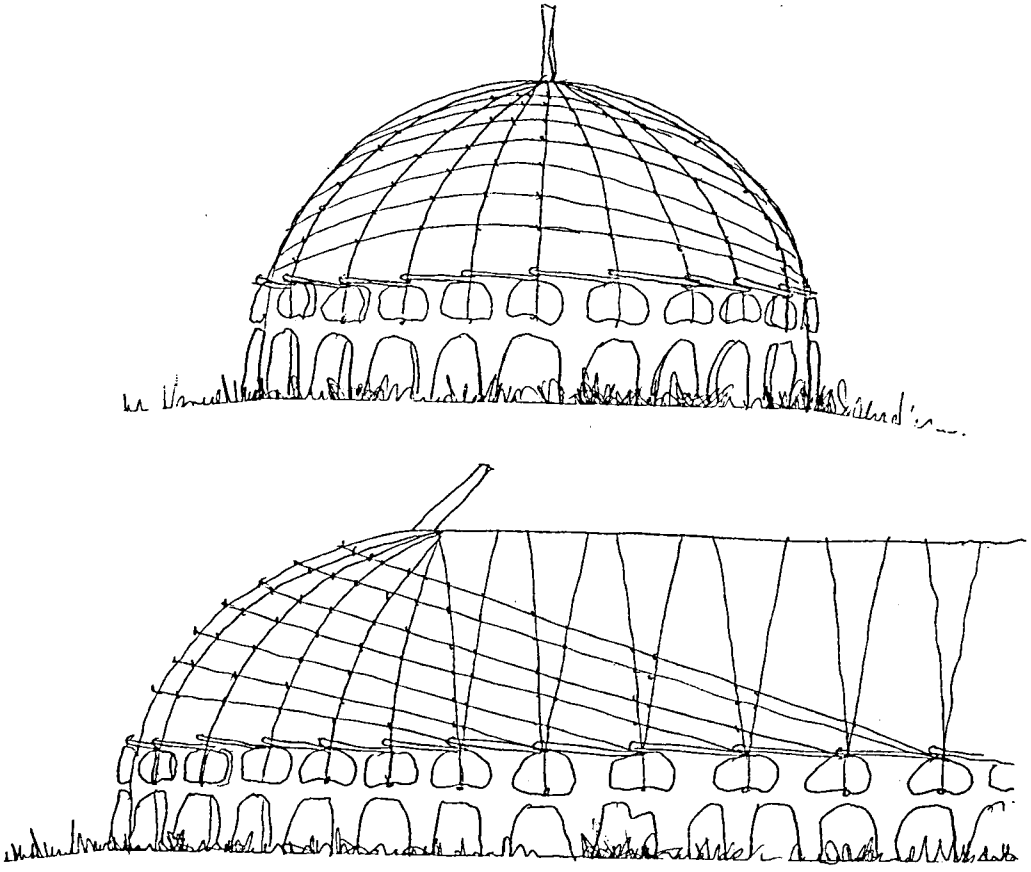
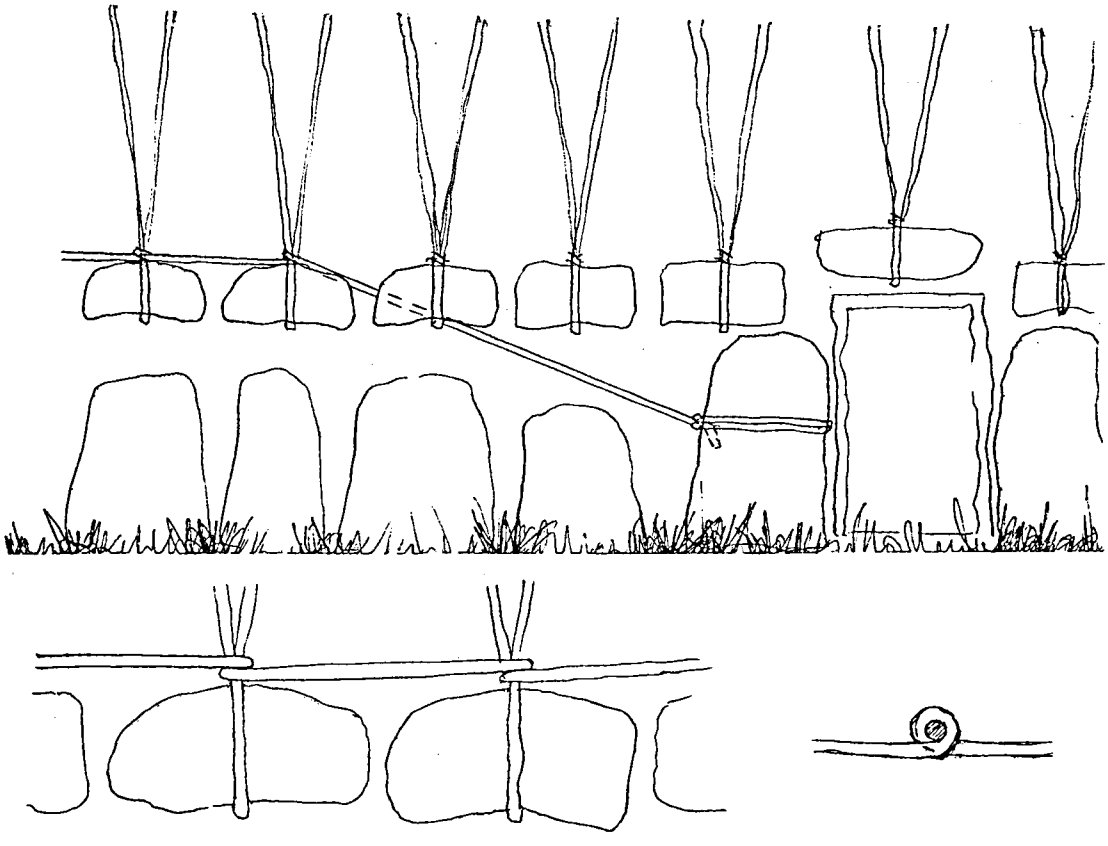


Diagram showing Arnol system of hip-roping



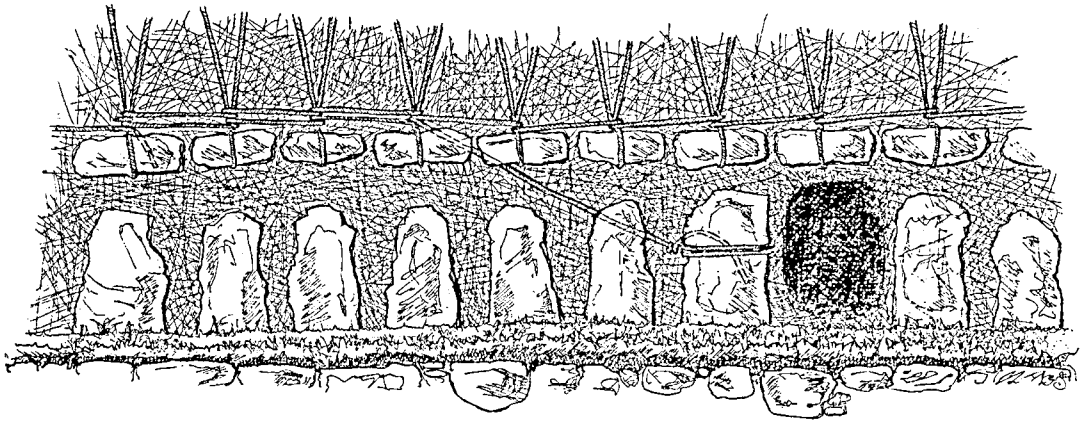
loose end being tucked behind the stone. The coir is angled up to a hanging stone about three stones to the left and is taken in a turn round the vertical coir just above the stone. This is repeated all the way round the roof ensuring that the turn is formed in the same way each time with the loop towards the roof and the main coir running horizontally. It is taken three stones past the first stone to be fixed and the end secured and tucked in under the hanging stone. This leaves the hip roping to complete.

The hip roping is done in much the same way as roping the bottom of the vertical ropes but it runs at an angle round the hip to secure this vulnerable area. The coir is placed in the centre of the hip about a foot (300mm) above the hanging stones and taken to each side to the base of the first vertically hanging rope clear of the crow stick. It is tied off at this part and the coir is held in position by having been passed through a series of turns taken in the vertical ropes. These can be adjusted to give a true line to the hip rope. The process is repeated about six inches (150mm) above the first hip-rope running parallel to it and being tied off at the horizontal rope as before. This is repeated up the whole of the hip. The spacing



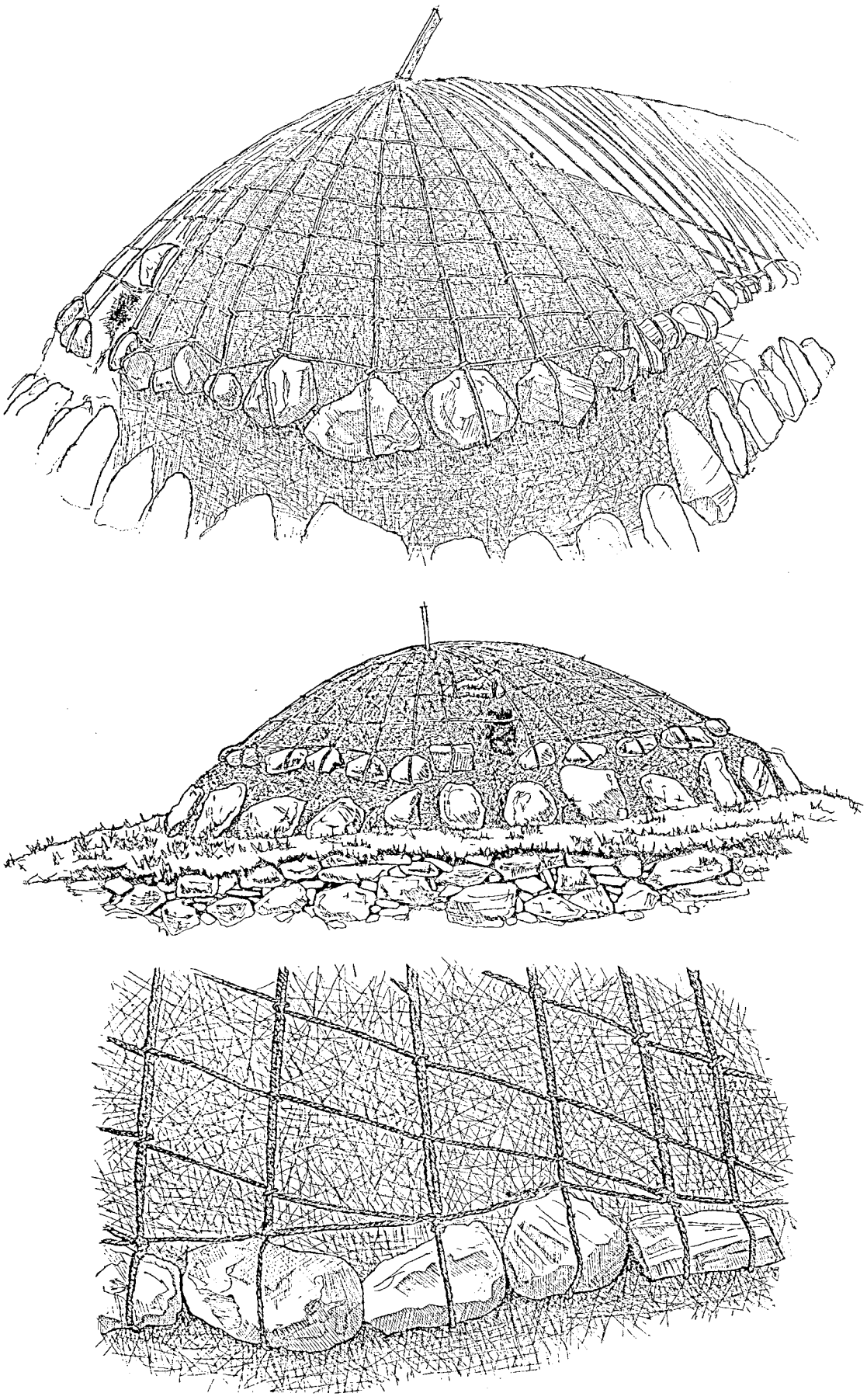
Diagrams showing method of forming the ground rope as a horizontal tie above the hanging stones.

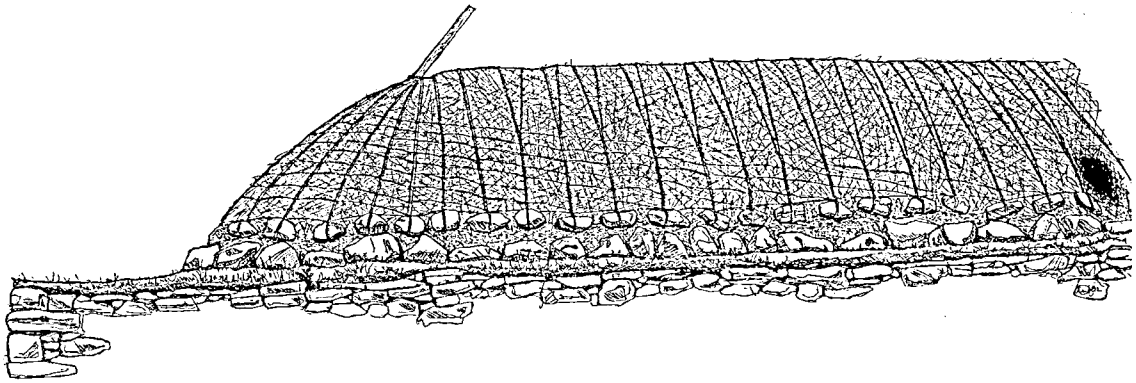
Start of process.



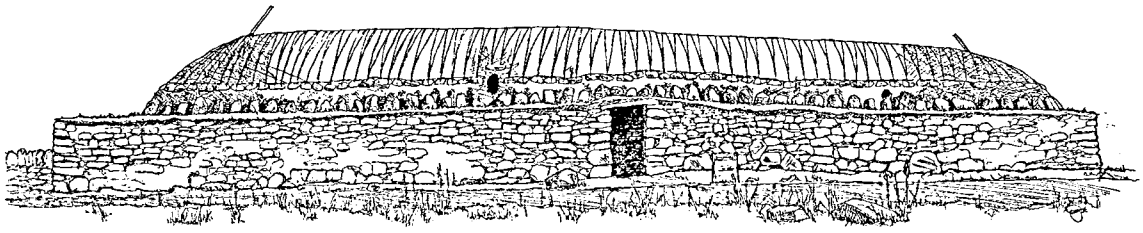
Completion of process.

Sketches showing completed roping system





Sketches showing completed roping system



42 Arnol after 1990 reconstruction

3
MATERIALS

3.01 Stone

The stones used are those readily available on or near the croft although special stones for lintels, steps and other specific shapes may have to be obtained from a greater distance.

When locals are asked the question, "how did you calculate the number of stones required to build a house?" the common reply is "collect a heap of stones that looks sufficient then double that amount". Some informants replace "double" with "triple" but all are agreed that the number is much greater than imagined at the outset.

The stones for the walls are graded from base to wallhead and are built drystone as two separate skins with the pinnings to the inner surfaces. This results in the outer surfaces having a somewhat open appearance with gaps that provide nesting sites for various types of birds.

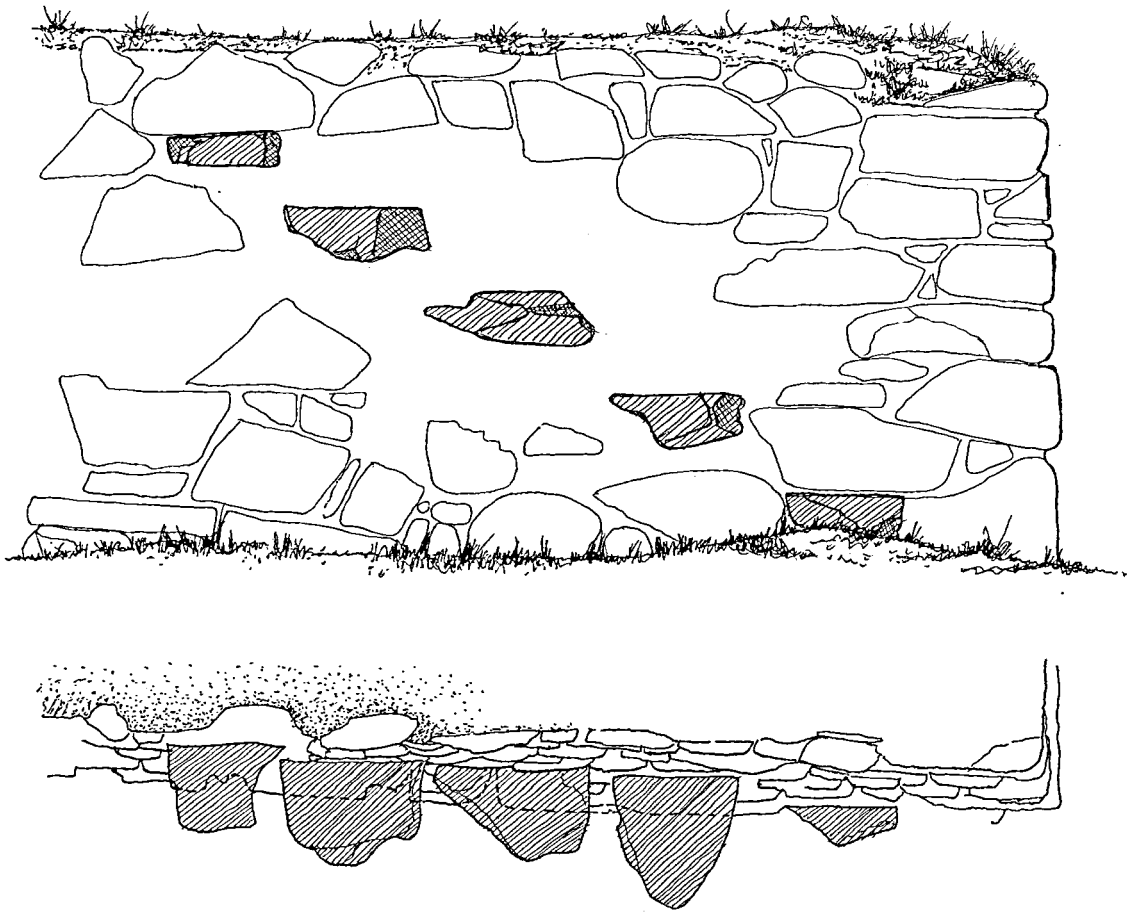
Large flat stones varying from two to four inches (50 to 100mm) in thickness are required for the lintels. The number of such stones is easy to calculate from the number of openings and the thickness of the walls.

Similarly a number of stones are required for the cantilever steps from ground to wallhead at the byre end of the house. These are approximately a foot wide (300mm) and from six inches to a foot (150mm to 300mm) deep. The longest stones are used at the bottom and the shortest at the top.

The thin stones used for the soldier course round the base of the thatch are about eighteen inches (450mm) high and as wide as possible, rectangular or roughly triangular stones providing the best results.

The hanging stones weighting the ropes holding the thatch are more difficult to obtain as they should be as regular in size and weight as is possible with a natural material. Stones roughly brick sized are ideal. Some of those collected for 42 Arnol have a slight curve along the length. These are used with the curve facing upwards to make a natural saddle for the loop of the rope. Oval stones where the rope would have to pass round the widest point are least desirable as the stone is likely to slip out of the loop.

Sketch survey of cantilever steps



3.02 Tempered Earth

The core of the wall is formed with tempered earth. This is a mix of natural soil, blue clay, peat dust and peat ash mixed to obtain a loam. The loam is compacted between the two drystone skins as they are erected. This creates a strong structural wall that helps support the drystone skins which are essentially wearing coats. The top of this wall is protected by a layer of blue clay topped with living turf to protect the clay from drying out.

3.03 Blue Clay

Blue clay is a natural material found at the bottom of peat bogs. It is an altered granite comprising kaolinite, clay minerals containing decomposed felspar and to a lesser extent mica, residual quartz crystals and mica flakes. This creates the impervious surface on which the bog forms. Natural oils from the bog penetrate the clay and when dug out it looks and behaves like a stiff concrete mix.

The quartz crystals and mica flakes form an aggregate that makes blue clay behave like the tempered earth system known as Pisé-de-terre, forming a multitude of hair cracks as the material dries out rather than a few large structural cracks. This is probably assisted by the presence of natural oils from the peat bog. The significance of oil in the mix has yet to be fully understood but in countries such as Ghana vegetable material is pounded to form an oil which is mixed with clay being used as plaster or render. The same practice has been recorded on the east coast of Scotland using linseed oil.

Blue clay is dug, worked with a spade to make it malleable and trowelled into position. It is used for various purposes such as waterproofing the exposed wallheads, pointing the cobbled or paved floor, making complete earth floors, making the clay hearth, and as the plaster for the room and kitchen walls.

3.04 Turf

Two types of turf are used in the construction of the house: Green turf or sod and heather turf. In obtaining both types it is important to ensure that there is a well developed root system capable of holding the material together during handling and of withstanding the effects of the wind when the material is used on the wallhead.

Ideally the grass should be cropped before the green turf is cut as it makes it much easier for the operative laying the material to ensure that it is laid to an even weathered surface.

Similarly, heather turf should be cut once the plants have had a chance to recover after burning. At that time there is a good root system from the previous growth and the heather fronds are not too long and therefore less of a fire hazard when they dangle through the spars of the roof into the interior.

3.05 Straw

The straw used for thatching is oat straw. This is the traditional material in Arnol but there are problems associated with its use today that did not occur in the past. Traditionally the oats were grown on the croft using natural fertilisers such as dung or seaweed. The variety was a long stemmed type with tough fibrous stems. The crop was grown in sandy soil and was pulled by hand. Pulling oats in a sandy soil is comparatively easy as the sandy soil is easy to knock off the roots and the crop dries out easily.

Today, there is little cereal grown in Lewis. Oat straw is being purchased in Morayshire and Invernessshire and is shipped over. This makes the straw very expensive but that is the least of the problems. The straw is normally combine harvested and shipped in large cylindrical bales. This causes some damage to the straw but the biggest problem comes from the high quantities of nitrate fertiliser being used by the farmers. This produces a weak straw lacking fibrous material and toughness in the stem and chemically charged with free nitrogen for quick decomposition in damp warm conditions. The lack of fibre also makes the straw susceptible to wind damage though vibration of the surface stalks. The combine harvester also harvests grain that has been flattened by the wind but is often incapable of threshing this immature grain from the stalk leaving the oat seeds in the roof ready for germination. These combined disadvantages have caused a number of minor failures in the last five years.

The damage resulting from poor material can be contained to a certain extend by careful examination of the straw at the time of purchase and by discarding unthreshed straw during thatching. What is more difficult to control is the behaviour of unthinking visitors who climb on the wallheads and occasionally on to the thatch.

Climbing on the thatch without the use of a small ladder to distribute the weight causes the straw to break under the pressure exerted by the feet. The straw is particularly susceptible to this type of damage in dry weather when the stalks are brittle or when totally saturated with water. This type of thoughtlessness was easy to control when everyone in the settlement had a thatched roof and therefore understood the consequences but it is particularly difficult to control when the custodian is selling tickets inside the building or when the monument is closed.

Returning to the hand pulled straw. It is obvious that

there is less mechanical damage. Traditionally the grain is threshed by only partly inserting the sheaf into the threshing machine leaving the root end of the stems undamaged by the threshing drum. Natural fertilisers are used reducing the free nitrogen in the straw. Only the bottom eighteen inches (450mm) of the straw is used for thatching, the middle straw used for bedding and the finer top straw cut-up as chaff and used as cattle fodder. This eliminates the risk of grain germinating on the roof and produces a really tough straw that stands up well to the vibration set up by the wind.

An attempt has been made to have oats grown on Lewis and to harvest them in the traditional way but the grain was planted in peaty soil at Lews Technical College rather than in sandy machair soil. When pulled, the soil stayed on the roots making drying difficult and leaving too much soil for the material to be used for thatching without removal of the root. This defeated the original purpose and illustrates one of the many problems encountered in trying to re-recreate traditional materials.

Even with this set back the answer still lies in having the material grown on Lewis but in sandy soil typical of the machair. This dramatically reduces the cost of carriage, but, even without this advantage the Western Isles is one of the few regions of Britain not polluted by nitrate fertiliser. In other regions of Scotland even areas of set-aside can take up to twenty-five years to return to normal nitrate levels assuming that the ground in question is not subjected to wind blown fertiliser or to nitrate wash through the field drainage system.

3.06 Other Thatching Materials

Other thatching materials can be used for blackhouse roofs but since there is no direct evidence relating to Arnol it has been decided to omit these from this publication.

Information on these materials and their application is given in Historic Scotland: Technical Advice Note No 4: Thatches and Thatching Techniques: A Guide to Conserving Scottish Thatching Traditions.

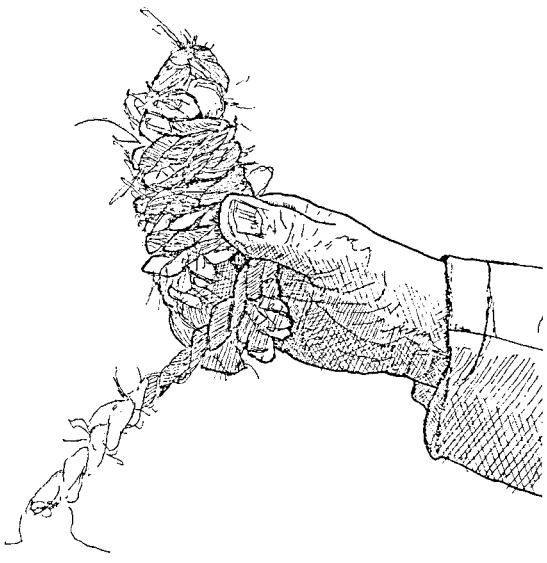
3.07 Rope

The rope used to hold down the thatch is single strand coir. Coir rope is made from coconut fibre and was so inexpensive in the early years of this century, it completely superseded the traditional heather rope. It is much more expensive now and has to be specially ordered. Occasionally three core coir is separated and each of the cores used separately.

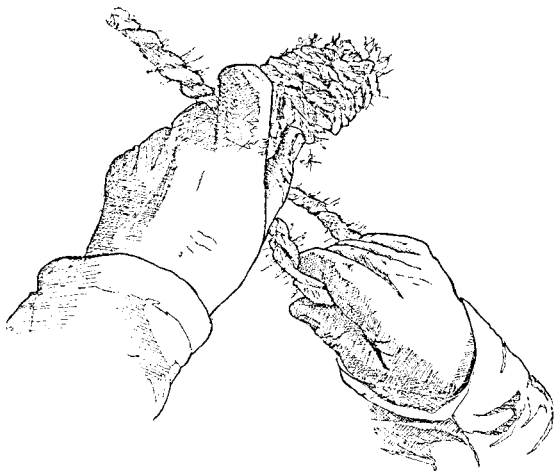
The thatcher requires the coir in a ball for ease of handling. To make this ball the rope is wound round the extended fingers of left hand about half a dozen times. The direction of winding is then changed to form a cylinder round the original loops. The direction changes again winding over each end moving the cylinder to right and left as each end is reached. This continues until the ball of coir takes the shape of a rugby ball. The oval ball allows more rope to be handled at one time as a spherical ball is much more difficult to hold under one arm. The ball is tied off when it begins to become too bulky to tuck under the arm. This size of ball is easy to throw up to the thatcher controlling the roping of the roof. As each ball is paid out it stays under the thatcher's arm. When a new ball is required, the coir of the new ball is attached to the end of the used rope using a reef knot.

Original loops

Formation of cylinder



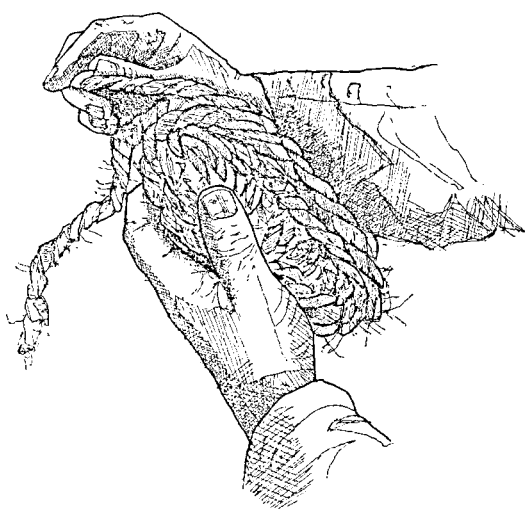
Keeping the strain on the cylinder

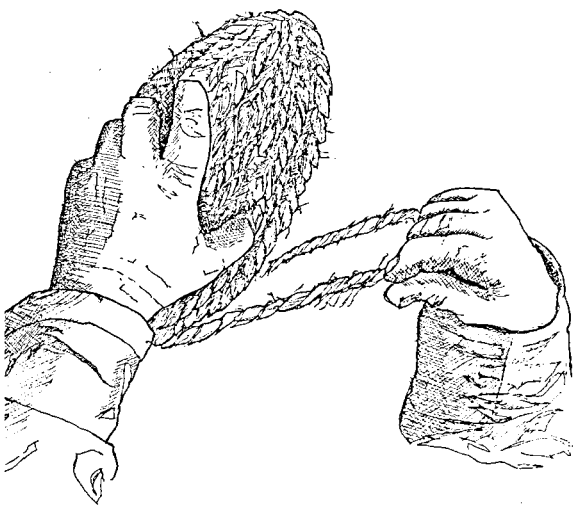


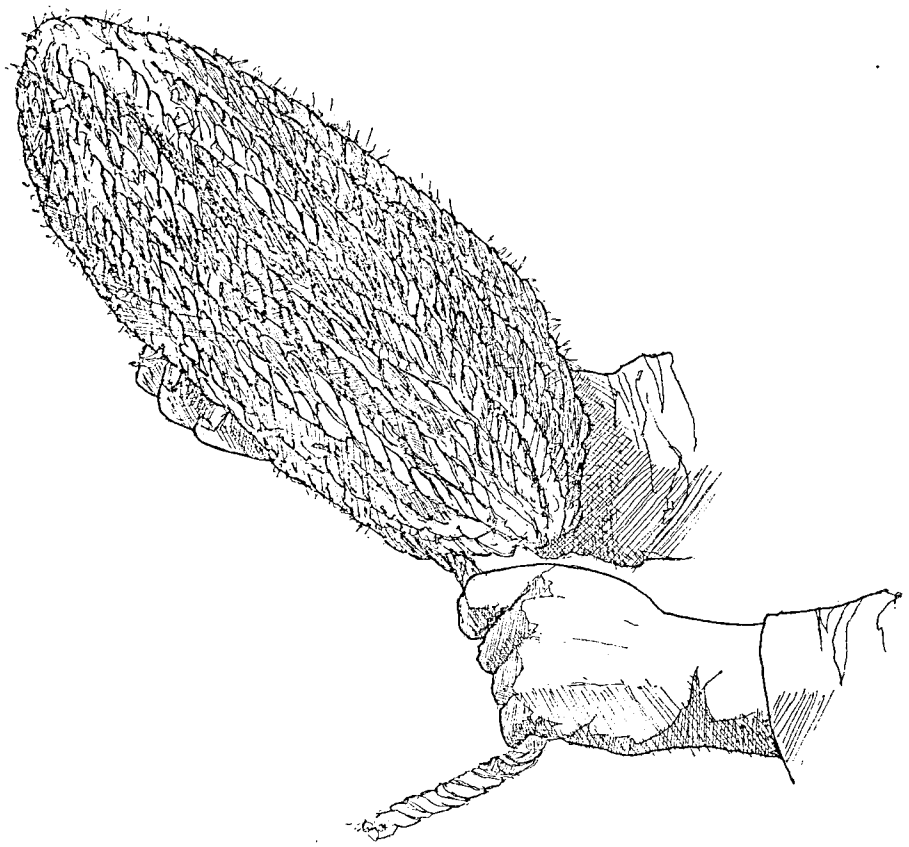
Rugby ball form taking shape

Taking the rope round the ends of the cylinder

Continuing the process







The completed ball ready for use

The introduction of coir changed the appearance of the roofs as it is much lighter in dimension and appearance than the older straw and heather ropes.

The change in appearance is extremely obvious when old photographs are studied. Care must be taken if old photographs are being used in this way as each community has its own method of roping the hips.

Basically, there are two principal ways to rope a roof in Lewis. The first is described above where the cross ropes run at an angle to each other, to each thatching stone. The second type is characterised by parallel cross ropes sometimes linked to a spine rope but always linked to a ground rope above the thatching stones.

There is no gradual geographical change from one type to the other and both types are found the length and breadth of the Hebrides but are exclusive in each community where the particular technique is used.

3.08 Timber

Timber supplies in Lewis tended to rely on bog oak and driftwood as there was no standing timber on the western side of the island in the nineteenth century. Bog oak is any form of timber preserved in a peat bog. It comprises the remains of former forests and the wood is extremely hard. Bog oak is not a sustainable resource as once it is removed from the peat bog there is nothing to replace it.

The bulk of the timber used in Lewis in the nineteenth century was driftwood. Driftwood comprises: timber from wrecks; timber washed overboard from ships such as spars, sweeps, oars, farlins and deck cargo particularly lumber; and logs from the Caribbean and the Americas brought across the Atlantic in the Gulf Stream. The fact that much of this timber comes from semi-tropical waters is confirmed by the presence of large holes made by marine borers that are only found in the tropics.

A pit saw in the roof of the barn confirms that timber was reduced to suitably sized scantlings on site.

Timber lengths are very seldom shortened, again confirming their value in a virtually treeless landscape. As a result ridge trees, purlins and other timbers overlap at the trusses rather than being cut to length. Collars are also set in the roof trusses at an angle in such a way as to give headroom where required but avoiding the need to cut the timber.

3.09 Whalebone

There is no whalebone in the roof of 42 Arnol but a little to the north at Shader a former blackhouse has at least two whale's shoulder blades used as principal members in an A-framed roof truss. This must have been much more common in the past when there was a large population of whales in the area and when whales were washed ashore or deliberately hunted.

There is a whale-jawbone arch at Bragor to the south of Arnol confirming the availability of large whale bones in the past.

4
INTERIOR FINISHES

4.1 Floors

Internally, the floor is finished with rough paving carefully pointed with blue clay to smooth our the irregularities. The hearth is formed in the paving by raising the surface of a circle about an inch above the rest of the floor. This is used as a base on which to create a blue clay raised hearth about three to four inches thick with battered sides and a slightly dished top surface. The hearth is made with a dryish mix of blue clay capable of being trowelled like a stiff concrete mix. As soon as the hearth is completed the fire is rekindled to dry out both hearth and floor. The byre end of the house is not paved but finished as a clay floor. The traditional way to construct a floor of this type is to evenly spread the clay in the area to be floored then fill the whole space with sheep for about twelve hours. The sheep's feet compacted the clay as it dried out making a well consolidated, hard wearing surface.

4.02 Drains

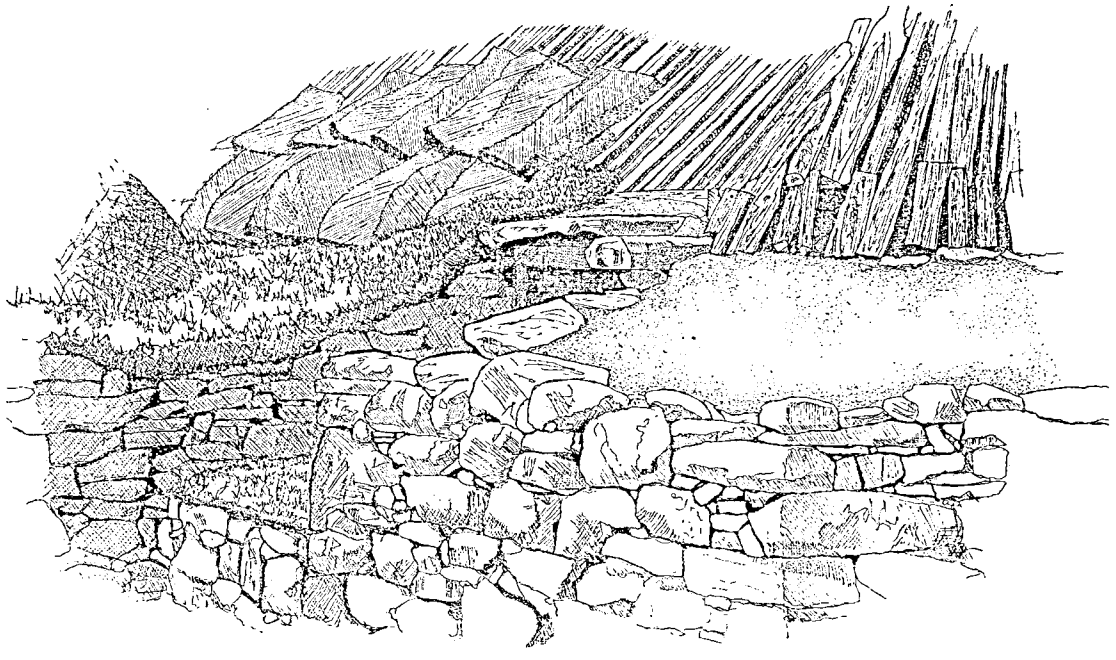
Obviously if there is any form of drainage problem with the site then the drains should be constructed before the floors are finished. At 42 Arnol there is a drain running the length of the house with the two cross drains, one between the fire and the bed in the kitchen, the other in the cross passage. There is also a slype behind the cattle in the byre. The line of this has been shortened and curved as a safety measure as a large number of visitors were falling into it in the gloom of the byre. This is particularly uncomfortable when water backs up the drain from partially flooded ground to the south of the byre. Hopefully with improved lighting the correct line and detail will be reinstated in the near future.

4.03 Window

The house was altered after a sea-mine exploded on the shore to the north during the Second World War. Part of the barn wall fell and the barn was shortened in the rebuilding. The remains of the original wall can still be seen. About the same time it was decided to put a wall window into the room. The window frame, salvaged from a trawler that ran aground at Arnol, is made of teak. Part of the wall of the room was taken down and the core of the wall excavated to allow the inner and outer skins of masonry to be connected at the jambs. The window is located at the inner skin of masonry and the roof is carried over the opening on a lintel the same width as the inner skin of masonry. The wallhead steps down to sill level at the window and the sill is constructed using blue clay and turf in the same way as the wallhead.

4.04 Clay Plaster

The dry stone walls are plastered with blue clay to give a reasonably smooth finish to the walls. The surface is lime washed. Cloth, or more frequently wallpaper is pinned to light timbers at the wallhead, round the top of the beds and to the intermediate purlin to form a coombe and high level frieze. Above that the timbers are left to blacken in the smoke. All



Window to room during the replacement of roof and wall turves

internal partitions stop at this level leaving the blackened out void above to read as a black ceiling. The coombed area of roof protected the principal items of furniture from tar drips and dislodged pieces of turf or thatch.

4.05 Wallpaper & Paint

When the house was taken over in 1965 the room and kitchen were wallpapered or lime washed from floor level to the level of the lower intermediate purlin. This is being restored since any former wall finish is outwith the folk memory of the inhabitants of Arnol, but, considering the late date of the original construction, a similar arrangement is likely to have existed from that time to when the house was purchased by the Secretary of State.

The original wallpaper was tacked to the purlins giving a characteristic hanging appearance. This is not acceptable in a building open to the public. To achieve the necessary fire protection jute fabric is dipped in plaster of Paris and pinned in place. The wallpaper is then applied to the hardened plaster of Paris.

4.06 Lamps

The kitchen interior is lit at night or in dull weather by two wall mounted Tilly lamps - one at the door to the room and the other at the door to the passage. Tilly lamps constitute a fire hazard and care must be taken not to place them in close proximity to the thatch. The room is lit as required by candles or mobile lanterns. Storm lanterns are also used to light the byre and barn. For safety reasons the Tilly lamps and lanterns have been converted to electricity and an additional light has been installed in the room.

4.07 Temporary Bed Spaces

It should be remembered that a blackhouse is constructed to serve the requirements of the croft and not the needs of the crofters family. Hence the house size, byre and barn area is determined by acreage and land quality rather than by the size of the family. If there is insufficient room for the family and their possessions in the room and kitchen, or if guests arrive, the byre or barn accommodates the surplus.

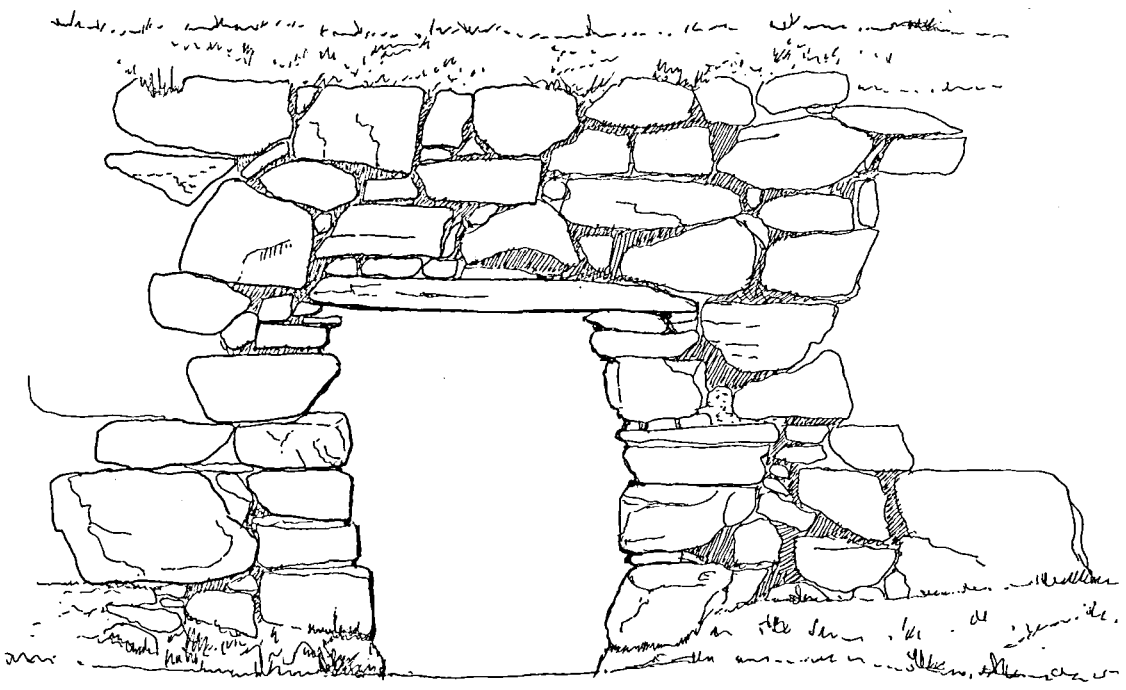
4.08 Byre

The byre is furnished with a calf pen, trellises to separate the cattle, nesting boxes for hens, hen roost with access to the wallhead hen hole and an open drain behind the heels of the cattle draining out through a hole into the midden.

4.09 Barn

The barn holds the threshed straw, meal cist, threshing floor, winnowing hole, and provides storage for agricultural implements, tools, spare rope, buckets etc. A hand quern is also located in this area.

Survey sketch of winnowing hole



5
BUILT FORM

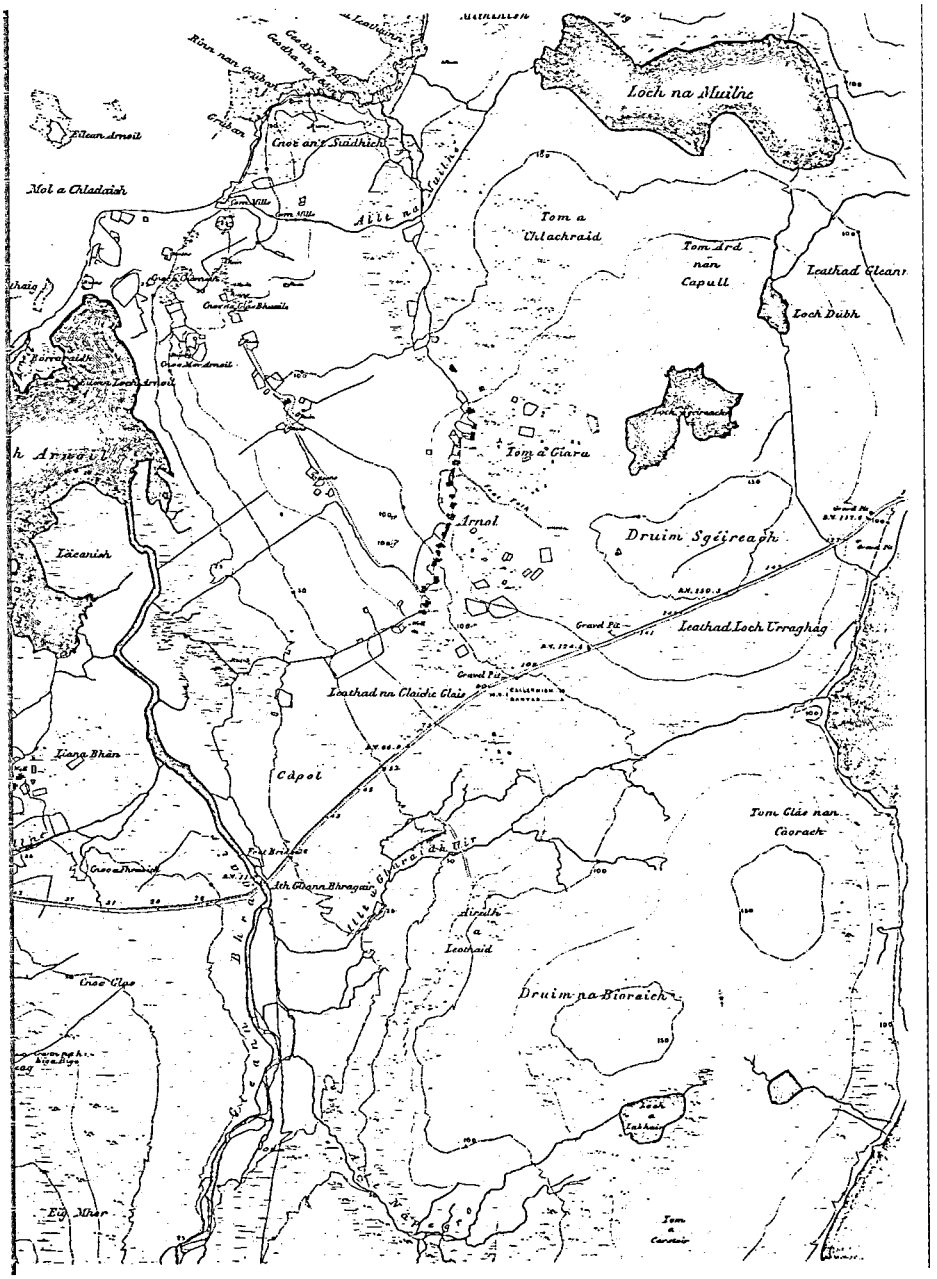
5.01 Location

The blackhouse at 42 Arnol is located at the north end of Arnol township. The township is roughly triangular in shape with access roads off them from the south-west and south-east meeting a cul-de-sac that runs north/south. The blackhouse is on the east side of the cul-de-sac opposite the ruins of an older blackhouse at 39 Arnol recently purchased by Historic Scotland. Both are within sight of the Atlantic Ocean.

The field system related to the Arnol township is to the west of the access road and the boundary wall to the original field system runs parallel to the cul-de-sac, on its west side in line with the east end of the blackhouse at 39 Arnol. The boundary wall, built partly drystone and partly with turf is a major feature in the landscape and should be retained at all costs.

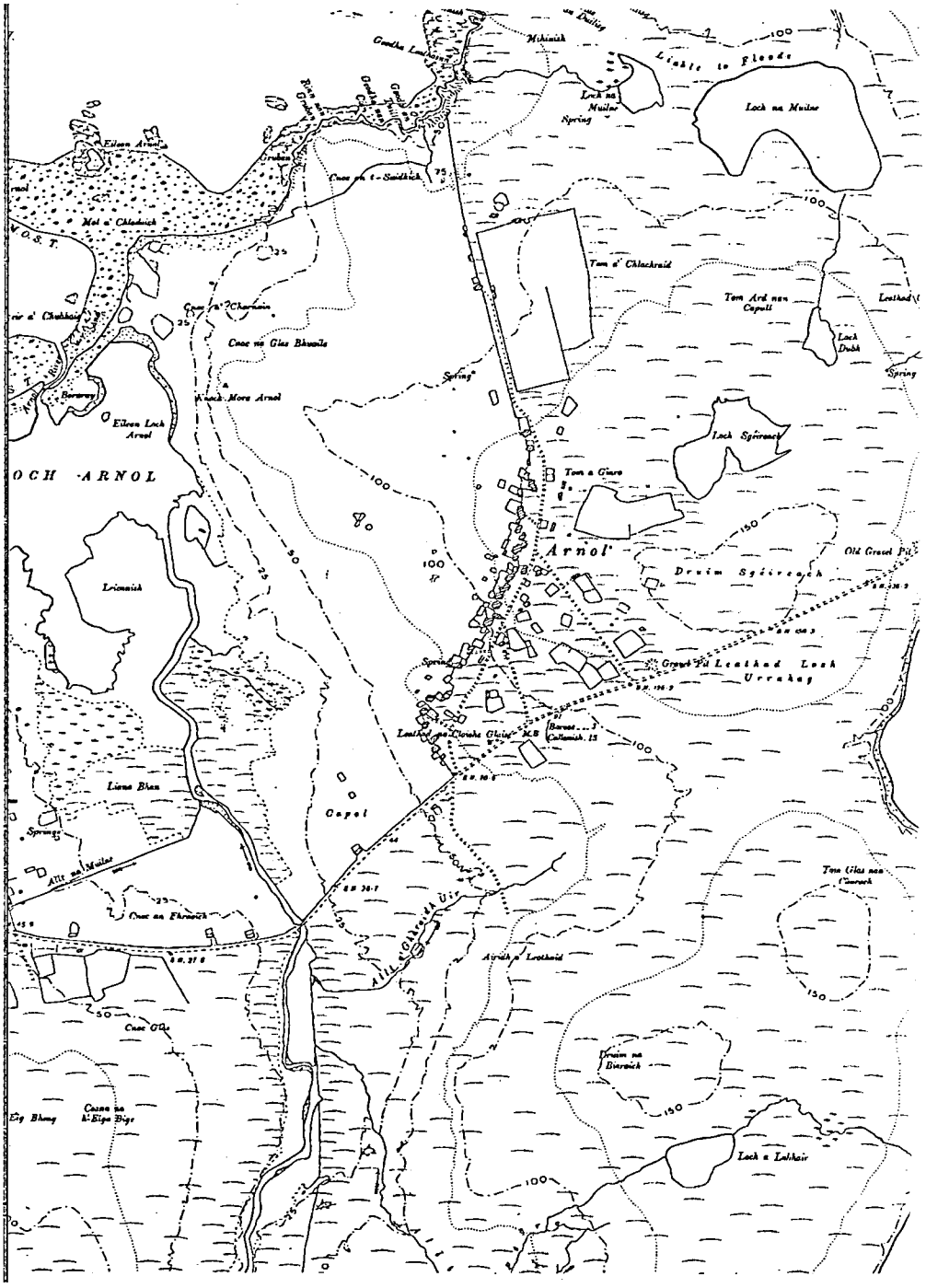
The croft at 42 Arnol together with the crofts to either end of the cul-de-sac extend the traditional Arnol field system into the former common grazing on the east side of the road. This common grazing extends north and eastwards to the township of Bru.

As mentioned earlier the Atlantic coast to the north-west is close enough that a sea mine washed ashore in the 1940s caused part of the barn to collapse when it exploded on the beach.



Plan of Arnol in 1853

Plan of Arnol in 1898

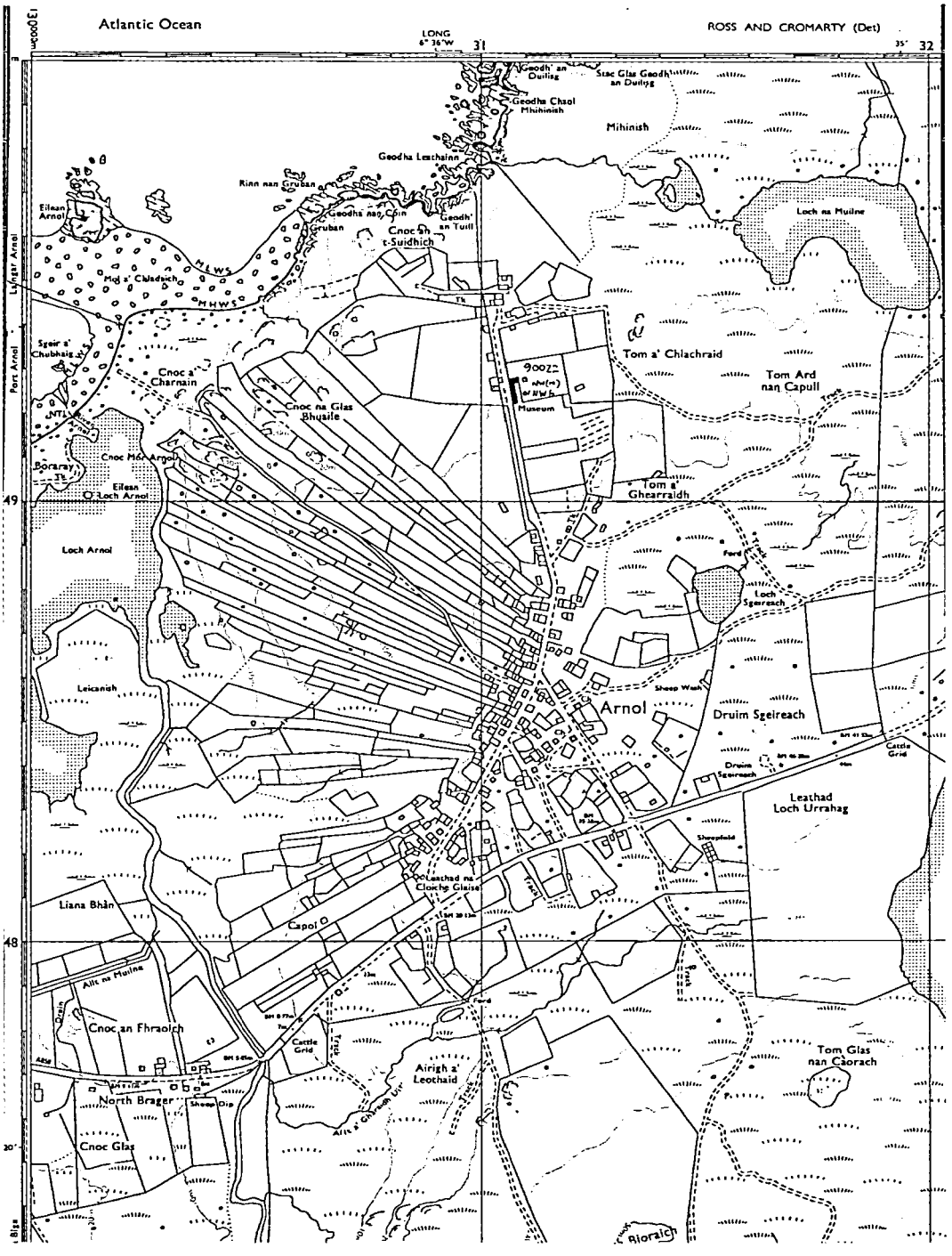


5.02 Site

The site of 42 Arnol is positioned on a natural rise. The changes of level are subtle but fundamental to the functioning of the house. The stackyard, containing the unthreshed grain, occupies the highest ground with the house and barn. The byre floor inclines naturally to the south, away from the house and towards the midden at the lowest point of the site. This assists in keeping the house and grain storage areas free from pollution. Underground drainage across the house at the kitchen and passage increases the protection.

5.03 Walls

The thick walls and exposed wallheads are a survival from the former turf walled era of blackhouse construction. The late survival of this particular building form can be attributed to two important functions. The fore edge of the exposed wallhead acts as a wind spoiler/deflector preventing the wind from getting under the base of the thatch and stripping the roof. The second, and possibly more significant reason for retaining the exposed wallhead is that it provided a platform for thatching and maintenance in an area where it can be difficult to



Plan of Arnol in 1990

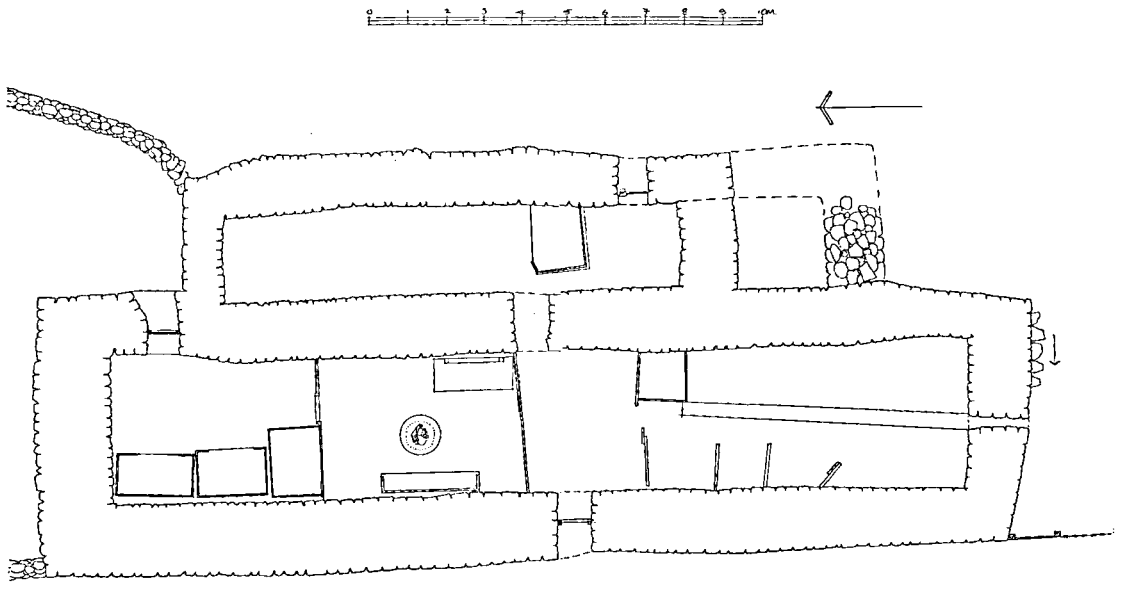
obtain long timbers for the construction of ladders or staging and the style of thatching is dependant on the availability of a ledge on which the thatcher can stand.

5.04 Roof

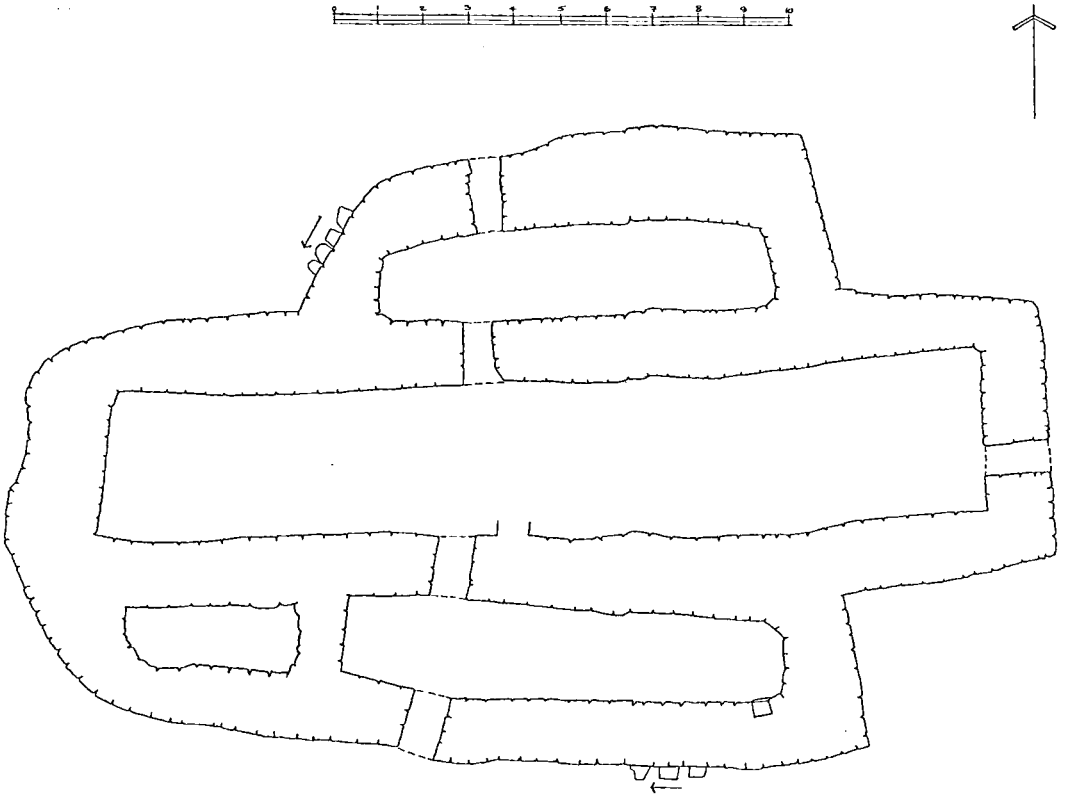
Although the roof trusses are angular the external form is rounded and streamlined, improving the wind flow over the structure. The aerodynamic form is carried round the ends of the roof completely eliminating sharp corners and angled ridges. This streamlining combined with the soft surface of the thatch totally eliminates wind and rain noise in the interior of the house. The thickness of the thatch adds considerably to the installation value of the roofs.

The rounded form of the completed thatch derives from the method of application and the curve of the body of the thatcher.

Plan of 42 Arnol



Plan of 39 Arnol

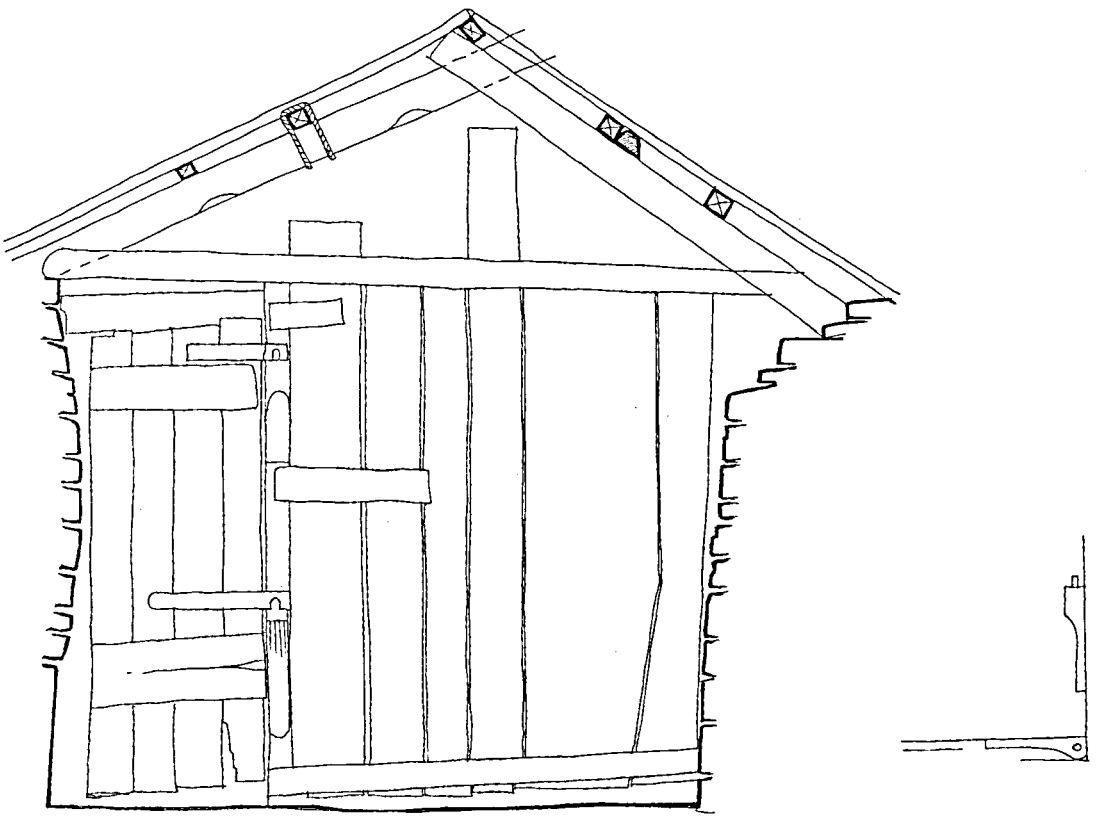


5.05 Internal Air Flow

The roof shape and positions of doorways and openings are of fundamental importance in a chimneyless byre-dwelling.

There are several reasons for constructing the house without a chimney. The dead smoke in the roof space over the fire tends to extinguish rising sparks whereas sparks lodged at the edge of a smokehole or carried up a chimney onto the thatch can be fanned into flame and can therefore destroy the roof. The smoke also coats the timbers, of the roof, with tar which helps in their preservation. The smoke also prevents fungal growth in the thatch, turf and timbers. It discourages insects such as midges, mosquitoes, wood borers, flies and other larvae producing insects that contaminate food or destroy fabrics. Meat and fish hung in the roof timbers are dried and smoked as a means of preservation and soot-laden thatch makes an excellent top dressing for the potato crop.

The major disadvantage of smoke in a byre-dwelling is the susceptibility of cattle to chest complaints particularly bovine tuberculosis.



Sketch survey of internal partition

The answer is to control air movement within the byre-dwelling in such a way as to retain the smoke in the house whilst keeping the byre clear, particularly when the cattle are in residence. This is achieved by the gradual flattening of the roof pitch as it gets further from the house. This assists the heat rising from the cattle and dung to create a convection current that acts as an air curtain preventing the smoke in the dwelling from reaching the byre. This convection current also carries a weak solution of ammonia in the steam from the cattle urine. A weak solution of ammonia inhaled regularly is a known cure for tuberculosis and explains the low incidence of this disease in Lewis at a time when it was prevalent throughout Britain. The only other group of persons identified at that time as being comparatively free from tuberculosis being dairymaids, obviously for the same reason.

The positioning of the doors, in line across the house/byre passageway contributes to the smoke control process.

The flattening of the roof pitch over the byre end of the Lewis blackhouse is unique amongst surviving European byre-dwellings as all other low roofed, small volume types have chimneys. Some North American Indian lodges utilise a similar roof form to similar ends. Studies of other chimneyless byre dwellings, from the large "hallen-house" of the Low Countries to Alpine chalets, illustrate that the sectional form is always adapted to ensure similar convection currents deflect the smoke away from the livestock.

5.06 Ventilation

The smoke escapes through the thatch, quickly in warm dry weather but increasingly slowly in prolonged periods of rain. Air enters the building at the front and back doors. This is augmented by air from the hen hole and the drain opening at the low end of the byre.

It is important to maintain a degree of ventilation at night when the doors are closed. Early doors were wattle panels, wedged in place at the jambs. Later plank doors are ill fitting allowing sufficient air penetration to maintain ventilation to the cattle, humans and fire but the hen hole and drain opening provide permanent ventilation.

5.07 Organisation

The organisation of parallel ranges utilising mutual walls to support minimal span roofs allows direct interconnection internally. This allows the entire range of buildings on a croft to be connected internally whilst retaining the advantages of minimal spans and reducing the amount of external wall.

6
Maintenance

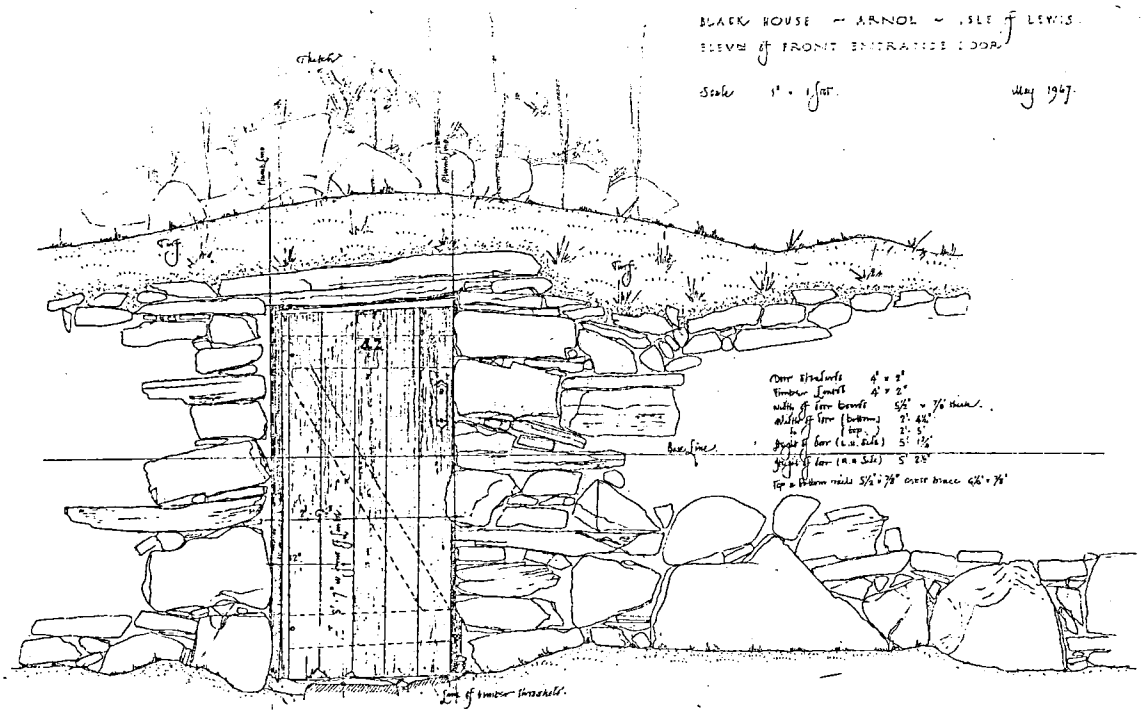
It is essential that the house is maintained in a manner that recognises its unique properties and that the maintenance should, as far as possible, be based on traditional materials and methods.

The changing nature of "natural" materials has been stressed in Section 3.05, but, whatever the problems, everything possible should be done to retain this monument as a "living" example of this remarkable building type.

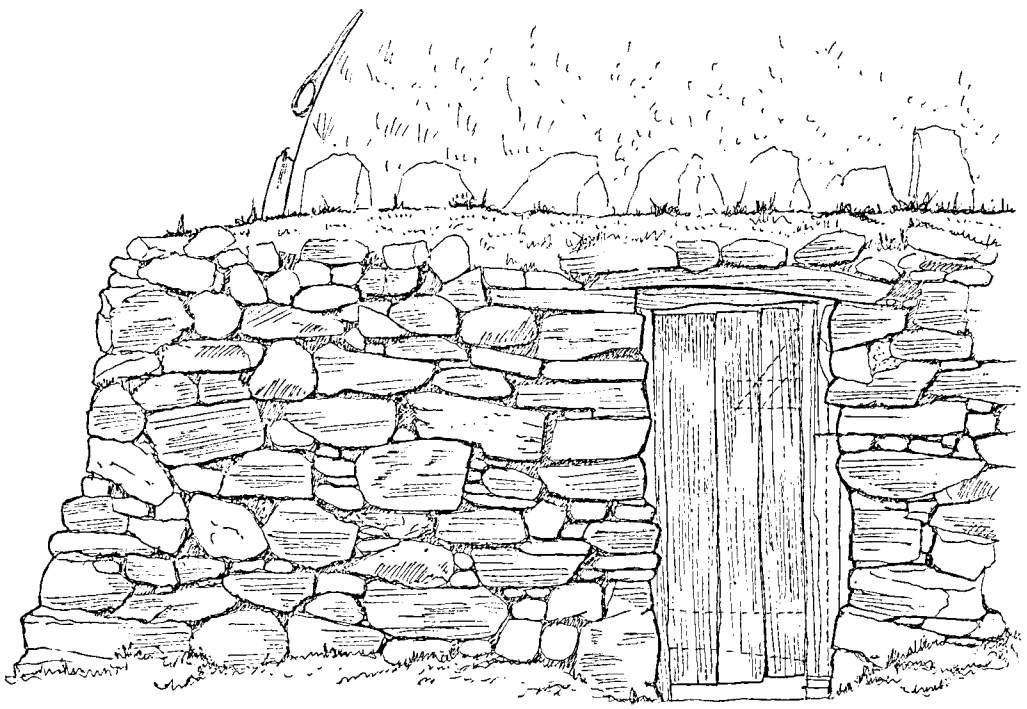
6.01 Thatch Rope

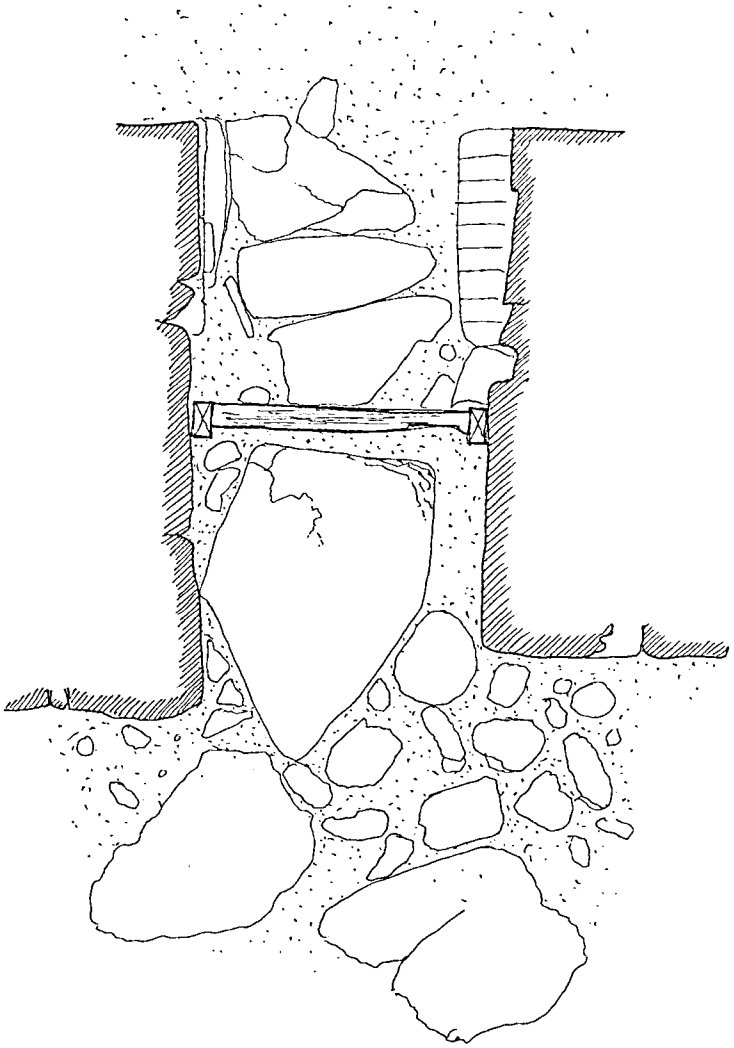
After each major storm, the thatch rope should be checked for breakages or slack anchor stones and made good.

Sketch survey of principal door

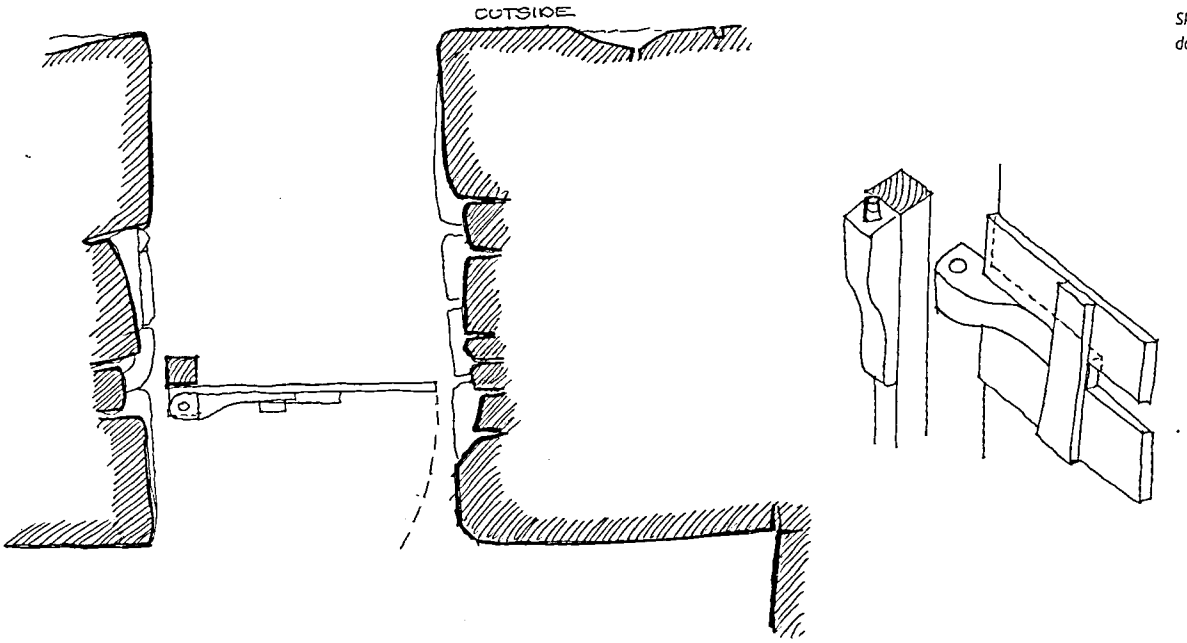


Sketch survey of rear door





Sketch plan of principal door



Sketch plan of rear door

6.02 Thatch Net

As the anchor stones settle the thatch tends to bulge out over the soldier course of thatch stones. These should be tilted back, the net pulled tight to eliminate the bulge in the thatch and the thatchstones replaced. This must be carried out as often as is necessary.

6.03 Thatch: Repairs

Should a section of the thatch fail for any reason that section must be stripped out to the underturf and be re-thatched as described in Section 2.04. As the re-thatching commences and finishes the new section must be fully integrated with the old thatch. This is done by ensuring that the old thatch is lifted sufficiently, in layers, to allow layers of the new thatch to be bonded in. Failure to do this will result in a joint that will fail in the same way as thatch damaged by climbing on it.

Failure of sections of thatch are normally the result of physical damage, wind damage or germination of improperly threshed grain. The physical damage caused by climbing on dry brittle thatch is difficult to see until the roof surface starts to drop and water penetrates internally. Wind damage tends to be obvious but less likely with the strong nylon net presently being used. Germination of grain should be dealt with by pulling the fresh shoots, complete with root systems, out of the thatch before it develops fully. Spraying with weed killer will cause pockets of rot at the root system and could also damage the thatching material.

6.04 Thatch: Top Dressing

Each year the ropes and net must be removed from the thatch and the whole roof top dressed with two inches (50mm) of fresh straw. This becomes the wearing coat that withstands the vibration set up by the wind for the next twelve months.

The roof must be re-netted and re-roped immediately on completion of the top dressing as it is just as vulnerable to the wind and squalls as a newly thatched roof.

6.05 Re-thatching

Complete re-thatching should take place every ten years or when the thatch fails. It is not necessary to re-place the heather turves that form the undercloak unless these are damaged or the proportion of thatch used to trap soot, is to be changed.

6.06 Walls

Regularly check walls for bulging of the stonework and dismantle carefully those sections that appear to be dangerous. Set stones to one side as they are dismantled keeping them in reverse order to their place on the wall. Reinstate section using archive photographs (taken in 1990) to assist in the accurate reinstatement of the stonework making good the core and blue clay waterproof layer as necessary.

6.07 Floors

Annual repointing of the floor paving is necessary using blue clay. The clay floor in the byre may require relaying at sometime. Ideally blue clay should be laid to the appropriate depth (not known at present since it has not been taken up and relaid recently) and the space filled with sheep for about twelve hours. This should provide the compaction required to ensure a long lasting floor.

6.08 Internal

Regularly maintain all electrical wiring and equipment to standards set by Mechanical and Electrical Engineering Section.

Regularly examine and repair timber furniture.

Regularly wash and re-hang bed curtains in rooms and kitchen.

Regularly renew straw used in barn to disguise works store and straw used for mattresses.

Regularly check all fire fighting equipment in accordance with Safety Officers requirements.

Regularly renew wallpaper in kitchen and room using patterns appropriate to the handover date in 1965.

6.09 Fire

The custodian's contract contains a stipulation that the fire should be kept in six days per week. This is essential to keep the thatch in good condition. If for any reason the fire must be put out for a period of time the house, barn and byre must be fully ventilated during that period.

6.10 Peat Stack

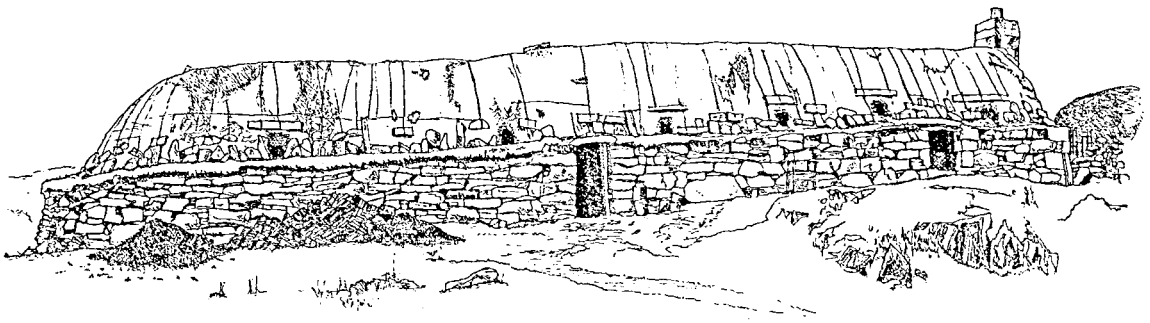
When the peats are brought in from the bog each summer they must be built into a traditional peat stack with inclined bonding to the outer face and curved, overlapping peat block roof.

7
CONCLUSION

The design of the blackhouse and the range of unorthodox principles incorporated in the building extend beyond the typical preconception of many archaeological reconstructions.

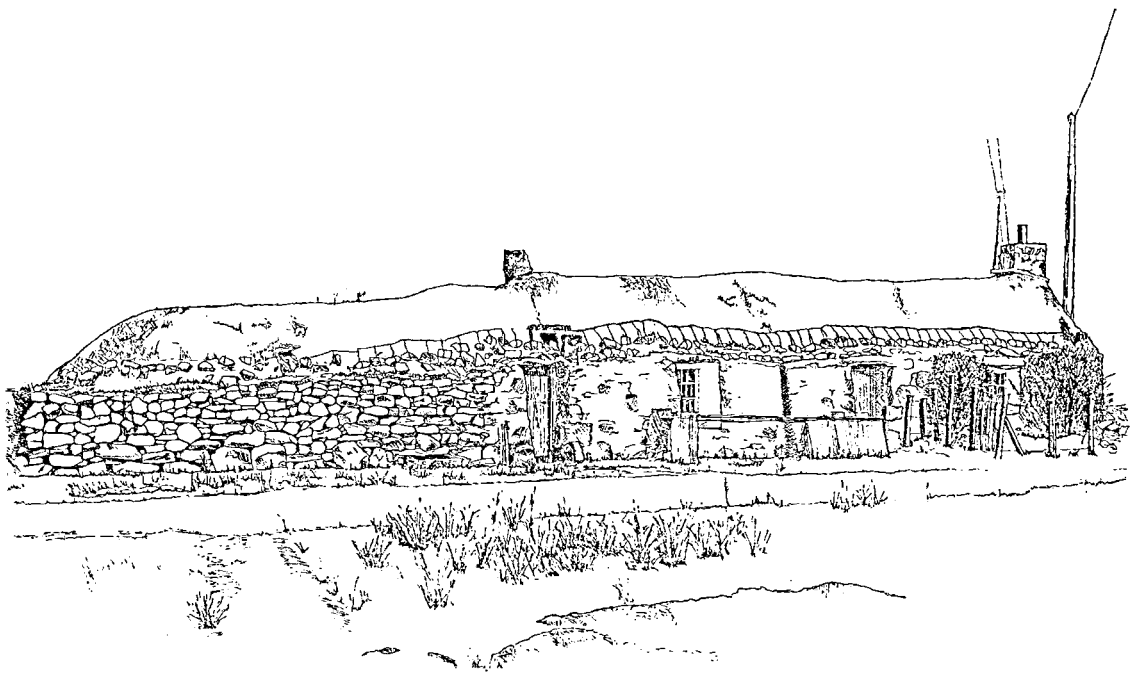
This building, with its low, narrow bodied, well insulated, aerodynamic form and in-built fungicidal, medical and food-preserving properties - erected and maintained by community co-operation using bio-degradable materials and worked without the need for specialist tools - is an ideal model for the "green" home of the future. Obviously in this context, some of the less desirable aspects must be reconsidered but the use of the dung heap to produce methane for heating rather than direct heat gives one example of how this might be achieved.

The principals incorporated in the house are the result of hundreds of years experience. They amply illustrate the weakness of many "armchair" archaeological theories and the importance of monitoring all buildings to assess their specific properties.



Sketches of gabled blackhouses in Arnol

circa 1968



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BIBLIOGRAPHY

ÀGÚSTSSON, Hördur: 1969: Det Islandske Törvhus" Byggmastaren II 23-29.

ÀGÚSTSSON, Hördur: n.d.: "Iceland Architecture in Past and Present" Forum 25.2 4-23.

ÀGÚSTSSON, Hördur: 1982: "Den Indre Opbygning af det Islandske Tørvehus" MHYRE, STOKLUND, GJÆRDER eds: Vestnordisk Byggeskikk Gjennom To Tusen År

ÀGÚSTSSON, Hördur: 1982: "Den Islandske Bondegårds Udvikling fra Landnamstiden Indtil det 20, Århundrede" MHYRE et al. (ed.) op. cit. 255-268

ALBRETHSEN, Svend Erik: 1982: "Træk af den Norrøne Gårds Udvikling på Grønland" MHYRE et al. (ed.) op. cit 269-287

BORGEN, Kjell: 1954: "Samenes Bygningskultur" Byggekunst 4 85-92.

BREKKE, Nils Georg: 1982: "Samanbygde Hus i Hordaland: langhustradisjonar i Vestnorsk Byggeskikk" Foreningen Til Norske Fortidsminnesmerkers Bevaring Særtrykkav Årbok 1982 51-114.

FENTON, Alexander: 1978: The Island Blackhouse Historic Scotland, Edinburgh.

GJESSING, Gutorm: 1942: "Baelljegammen en Hypotese om Opphavet" Norsk Geografisk Tidsskrift IX.2 41-57.

HVASS, Steen: 1982: "Huse fra Romersk og Germansk Jernalder i Danmark" MHYRE et al. (ed.) op. cit. 130-145.

INGSTAD, Anne Stine: 1977: The Discovery of a Norse Settlement in America: Excavations at L'Anse aux Meadows, Newfoundland 1961-1968.

KOLSRUD, Knut: 1955: "Sjøfinnane i Rognsund" Studia Septentrionalia VI 81-182 "The Sea Lapps of Rognsund" (Summary) 174-182.

LUCAS, AT: 1956: "Wattle and Straw Mat Doors in Ireland" Studia Ethnographica Upsalienia XI 16-35.

MYHRE, Bjørn: 1982: "Bolighusets Utvikling fra Jernalder Til Middelalder i Sørvest-Norge" MYHRE et al. (ed.) op. cit. 195-217.

NIELSEN, Konrad og NESHEIM, Asbjørn: 1956: Lappisk Ordbok IV 353-383.

STOKLUND, Bjarne: 1982 a: "Tre Models for Studiet af Vestnordisk Byggeskik" MHYRE et al. (ed.) op. cit. 15-30.

STOKLUND, Bjarne: 1982 b: "Røgstue og Glasstue: Boligudviklingen på Færøerne set: Vestnordisk Sammenhæng" MHYRE et al. (ed.) op. cit 218-230.

THOMAS, FLW: 1866-68: "On Primitive Dwellings and Hypogea of the Outer Hebrides" Proceedings of the Society of Antiquaries of Scotland 7 153-196.

VREIM, Halvor: 1937: "The Ancient Settlements in Finnmark, Norway: Cabins and Tents" Folkliv: Journal for Nordic and European Ethnological Folklore 2/3 169-204.

WALKER, Bruce: 1988: "Lofted Open-Hall Farmhouses in Scotland" Vernacular Building 13 45-49.

WALKER, Bruce: 1989: "Traditional Dwellings of the Uists" Highland Vernacular Building 50-70.

WALKER, Bruce: 1989: "Edited Notes on Hebridean Buildings from Ake Campbell's Field Notebooks of July 1948: I. Sheiling Huts, II. Blackhouses, Crucks and Outbuildings Vernacular Building 13 47-61.

WALKER, Bruce: 1996: The Lewis Blackhouse: Green House of the Future? Welcome: News for Friends of the Scottish Monuments (September).

WALKER, Bruce, McGREGOR, Christopher: 1992: The Hebridean Blackhouse: Possible Green House of the Future The Ancient Home and the Modern Internationalised Home: Dwelling in Scandinavia TRONDHEIM.

WALKER, Bruce: 1994: Traditional Buildings after the '45 in FOJUT,: PRINGLE, and WALKER, The Ancient Monuments of the Western Isles Historic Scotland: HMSO, EDINBURGH, 55-71.

WALKER, Bruce, McGREGOR, Christopher and STARK, Gregor: 1996: Thatches and Thatching Techniques: A Guide to Conserving Scottish Thatching Traditions Historic Scotland Technical Advice Note 4, EDINBURGH.

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USEFUL ADDRESSES

Inspector of Ancient Monuments (Western Isles)
HISTORIC SCOTLAND
Longmore House
Salisbury Place
EDINBURGH
EH9 1SH Tel: 0131 668 8600

Regional Director: North Region
HISTORIC SCOTLAND
Fort George
ARDERSIER
IV1 2BR Tel: 01 667 462 777

HISTORIC SCOTLAND: Blackhouse
39-42 Arnol
BRAGAR
Isle of Lewis
PA86 9DB Tel: 01 851 710 395

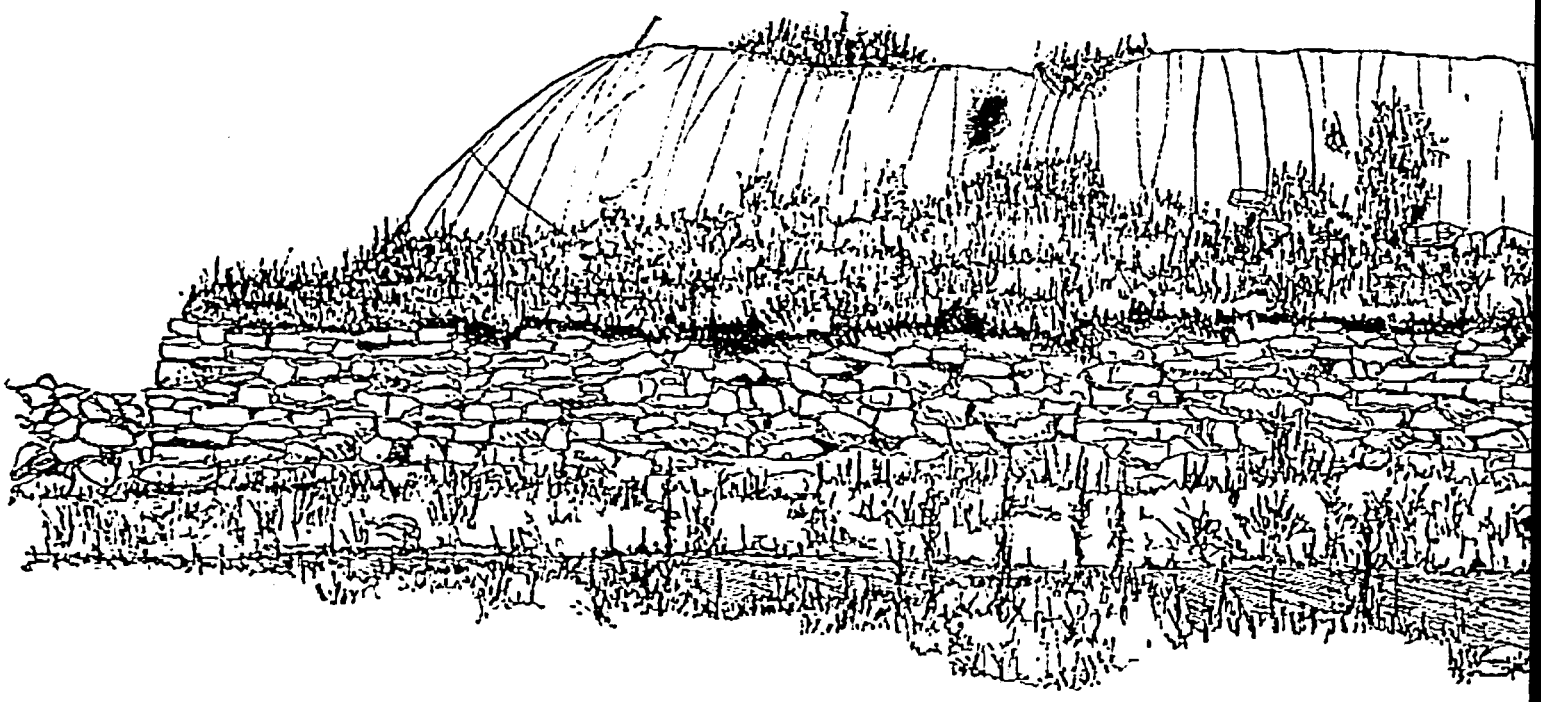
The
Hebridean Blackhouse

A guide to materials, construction and maintenance

Historic Scotland Technical Advice Note 5

Bruce Walker

Christopher McGregor



Historic Scotland staff receive many enquiries regarding the form, structure, construction and maintenance of the Blackhouse at 42 Arnol, Lewis now in the care of the Secretary of State for Scotland.

The available publications on blackhouses, tend to concentrate on the social aspects of life in these buildings but provide little information on their construction. Furthermore, much of the information presently in circulation is inaccurate and based on early assumptions that have never been refuted.

A general study of blackhouse origins, design and construction is long overdue but is now being addressed. This will take some time to produce and as an interim measure it has been decided to make available this information collected for the 1990 refurbishment of the Blackhouse at 42 Arnol.