

Conservation Guidelines

Stone-walling

Foreword

This series of booklets has been produced by the Department of the Environment to increase awareness of the value of our architectural heritage and to provide information on the basic principles and methods of conservation and restoration.

The titles in the series are listed on the back of each booklet.

These texts are not intended to be comprehensive technical or legal guides. The main aim is to assist architects, builders, owners and others, in understanding the guiding principles of conservation and restoration. They will facilitate the identification of the most common problems encountered in heritage buildings, and indicate the best solutions. It should be appreciated that specialised aspects of conservation and restoration will require professional expertise and more detailed information.

The Department acknowledges, with appreciation, the efforts of the authors of the individual booklets, the Irish Georgian Society who coordinated their production, the Conservation Advisory Panel established under the Operational Programme for Local Urban and Rural Development and all others involved.

Summary of Conservation Principles

- Research prior to planning work
- Minimum intervention - repair rather than replace
- Respect the setting.

Summary of Conservation Procedure

- Research and analyse history of building
- Survey building and identify original material
- Plan work according to conservation principles
- Use experts where necessary
- Record all work
- Install maintenance procedures.

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Introduction

This booklet briefly covers the conservation and repair of stone walls, particularly traditional dry and mortared stone boundary walls.

In recent years, communities across the country have discovered a value in what has remained largely unnoticed for a long time, namely, the stone walls at the entrances to towns and villages, and those around nearby estates and fields. Tidy Towns competitions, tourism and Community Employment Programmes have all assisted and encouraged this welcome development.

The standard of this work is variable and, unfortunately, many examples can be seen where the wrong materials, styles and techniques have been used, with the intent of doing good, but resulting in permanent eyesores and destruction of existing good traditional work.

Dry stone and lime mortared walls can survive for thousands of years. But when we come to repair these walls, the modern concept of 'strong is better' is applied. Concrete fill, and hard sand and cement pointing is introduced which does nothing except accelerate decay. Modern ease of transport and the disappearance of local rubble quarries have also resulted in stones from long distances away being used which

have no relationship to the local geology or stone walls of the area. Time should be spent looking closely at the traditional stone walls of each locality. They will reveal many secrets about their history and function, as well as the skill employed in their construction.

Brief History

Ireland has at least a 5,000 year history of building with stone. Some of the earliest examples, such as the passage grave at Newgrange in County Meath, show fine examples of dressing and laying of rubble dry stone.

The first walls as boundaries to enclose land were built in this period, the remains of which can be seen at the Ceide Fields in County Mayo.

Walls were later built to protect monasteries, castles, cities and towns and to enclose gardens, fields and estates. The latter two examples are to be seen nearly everywhere across the country and most originate in the 18th and 19th centuries. The walls around estates are often quite high and built in lime mortar. Other lower walls are built either dry or with mortar. The 19th century saw the end of the Rundale System of open farming and the building of boundary walls as enclosures to fields on a large scale. Many of these 18th and 19th century walls are now in need of conservation and repair.

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Legal Requirements

Before commencing work check ownership of walls. Walls may be in private ownership or come under the aegis of the National Monuments and Historic Properties Service (NMHPS), Local Authorities, church authorities etc. Town walls, city walls and those associated with or near national monuments, including the walls and structures of some graveyards, come under the National Monuments Acts which makes it an offence to carry out unauthorised work of any nature on them. The National Monuments Act of 1994 states that anyone wishing to carry out work on a site or national monument listed in the Sites and Monuments Record (SMR) must notify the NMHPS in advance or risk prosecution and severe penalties on conviction. No digging is allowed near an archaeologically sensitive site except by a qualified archaeologist under licence from the NMHPS. Should any objects be found, such as cut, dressed and carved stone elements, there is a legal requirement to contact the Director of the National Monuments and Historic Properties Service (NMHPS) and the Director of the National Museum, Kildare Street, Dublin 2, within four days.

Types

Dry stone walls

(a) Single dry stone walls

This type of wall occurs, typically, between

fields and also along roadsides and bohareens. These walls are only one stone in thickness and are usually triangular in cross section, with the largest stones at the bottom, graduating to smaller stones on top. Any available indigenous field stone was, and is, used. They may at times be rounded in shape from past glacial action, or long and flat and laid on their ends, as seen in some areas. There is no foundation; they are built directly on the ground after the removal of the top soil and the height rarely exceeds 1.5 metres. This type of wall is common in some areas and is quite stable if well built. The wind speed across the land is reduced as the wind is broken up or fragmented when passing through the apertures between stones, unlike a solid wall which can increase wind speed and turbulence on the leeward side. The unstable appearance of single dry stone walls, with light showing through, seems to deter animals from attempting to scale them.

Gate hanging can present a problem on all dry stone walls and, for this reason, single monolithic narrow standing stones were sometimes employed for this purpose. These are quite beautiful but sadly are now being replaced with their concrete equivalents. In some parts 'gaps' are employed. These are sections of wall which can be quickly thrown down and then re-built as the need arises.

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Single dry stone wall



Double dry stone wall

(b) Double dry stone walls

These are built with two faces tied together with through stones. Stone foundations when provided are rarely laid deep and no consideration is allowed for frost heave as unlike a mortared wall, such movement has little or no effect on a double dry stone wall. The centre is carefully hearted with smaller stones and the coping is laid locking the top together and preventing dislodgement of individual stones. The style of coping varies from place to place and is worth preserving rather than introducing foreign styles from outside the local area. These are the most stable of dry stone walls and if built well, require little maintenance. They provide a natural hiding place for many wild animals. Like many dry stone walls, instead of having a vertical plumb face they often incorporate a batter.



Laying through stone in double dry stone wall

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(c) Combination of double and single dry stone walls

These consist of a double stone wall at the base built of small stones to nearly half the height of the wall with a single stone wall on top. They are built directly on the ground without foundations. These walls are common in certain parts of the west of Ireland. They display certain advantages as discussed previously and also use up large amounts of small stones which otherwise could not be used in a single stone wall. The solid base may afford protection from the wind and cold during the lambing season.

(d) Other dry stone walls

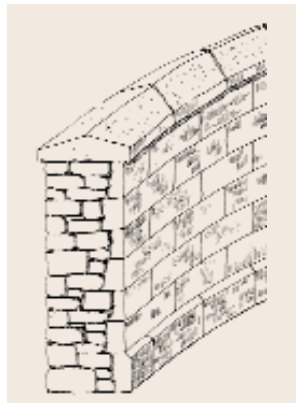
Various other types of dry stone walls exist. Some incorporate the use of stone and earth with a whitethorn hedge, others are stone flags laid on edge. Another type stems from continuing land clearance, resulting in field stone being used to build additional walls parallel and against the original. The finished style of the wall will be determined by local geology, the shape, size and ease of working, the stone available, combined with the utility of the particular wall.

Mortared Walls

Traditional mortared walls are double stone in thickness, built in lime mortar without cement. Lime mortars create soft structures which have the advantage of being able to flex and move during settlement or for any

other reason without undue problems, such as cracking.

These walls are usually laid on a stone foundation with through stones, a corefill of stone and mortar and a coping. They are laid coursed or uncoursed with cut or uncut rubble. The quality of these walls varies from well cut stone laid with tight joints to any available rubble stone laid roughly to a line. The latter type of wall in some areas was wet dashed with lime mortar on completion and this should be done when repair work is being carried out. This is a tradition in itself worth preserving. A notable feature in just about all of these walls is the coarseness of the aggregate and the whiteness of the putty lime used. The texture and colour that these impart to the mortar can be quite beautiful.



Rubble stone backing (sometimes brick) laid in lime mortar

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At entrances to estates exquisite ashlar stone is often seen with mortar joints of as little as 3 mm and less. Piers and capping may display classical or gothic design in their elements. These walls may give the appearance of having large or even massive stones but this can be an illusion and the stones are often relatively thin.



Entrance pier in need of repair, showing relative thinness of stones

If held together with iron cramps these may expand on rusting and cause the stone to burst and crack. On the other hand the piers of these entrances are often built of

very large blocks of stone to support heavy wrought iron gates. The conservation and repair of these entrance walls and piers should be left to experts.

Common Problems and Solutions

(a) **Coping missing, causing wash out of lime core by rain and also dislodgement of face stones.**

Replace face stones and replace missing coping in similar style to existing.

(b) **Loss of face stones and mortar at the base of walls caused by splashing from passing vehicles.**

Replace missing stones and point selectively with lime mortar to a flush finish, and with aggregate matching the original.

(c) **Excessive leaning and distortion of walls from the undermining of foundations during road works or removal of soil adjacent to wall for any purpose. This can also happen when double walls are built with insufficient through stones, and when walls, not designed for the purpose, are acting as retaining walls.**

In some cases part of the wall may need to be dismantled and rebuilt using the same stone, and in the same manner as the original. Other solutions exist but are outside the scope of this booklet.

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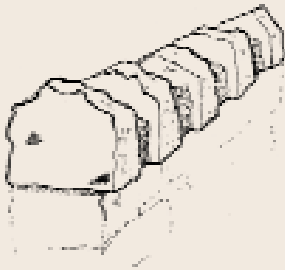


'Cow and Calf' coping

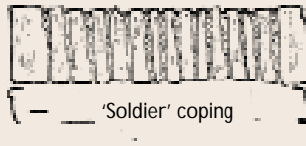
Copings may be laid flush with the face of the wall, project to be indented. The latter two protect the face of the wall and cast an attractive shadow.

In shape copings may be thin, rounded, small, large, rough or cut.

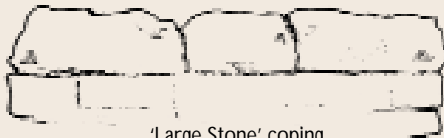
Represented here are some common types but follow the local traditional practice of your own local area.



'Cow and Calf' coping
indented on face



'Soldier' coping



'Large Stone' coping



'1/2 barrel' coping
(cut stone)

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(d) Trees that are too close to a wall can also be a problem.

Careful consideration should be given before removal or part removal of trees as, in addition to their own intrinsic worth, this may also destroy the natural habitat of protected species of wild animals and plants.

Bridge walls over tree roots, if possible, rather than cutting through roots or cutting down trees.

(e) Bushes and even small trees growing out of wall tops where coping stones are missing or elsewhere on the face of the wall. A lime rich core can provide optimum conditions for some plants.

Remove plants carefully while still small and before they get a foothold. The pulling out of mature plants, such as ivy, may result in the collapse of the wall; great care must be taken.

(f) Removal and non-replacement of a single gate pier to allow access for machinery to pass leaving the matching pier still standing. Also the knocking down of parts of walls for the same purpose without making repairs.

Piers should be repaired or replaced, and gaps or holes filled to match the original. Repairs to piers can be carried out fairly easily by a skilled craftsman, and the repairs should be done immediately the damage occurs to prevent further damage or deterioration.

(g) Inappropriate concrete repairs to gaps and holes can cause problems, as can concrete used for corefilling in double dry and mortared stone walls. This is commonly done with the intention of imparting strength and durability to a stone wall even though examples built traditionally without concrete can be seen nearby, which have lasted for 150 years or more.

A long life is best guaranteed in stone walls if they have the ability to handle change by being flexible rather than rigid. Concrete blocks, shuttered concrete and facebedded stones used in repairs, should be removed and replaced with matching stone laid in the traditional manner.

(h) Facebedding of sedimentary stones, like limestone and sandstone, which leads to the lamination of the layers.

These stones should be laid on their natural beds as was generally done in the past.

(i) Pointing using rich sand and cement mixes which are waterproof and prevent drying out of the wall, and using inappropriate styles of pointing, such as weather struck. These are major problems associated with stone and brick structures throughout the country.

All pointing should be carried out in lime rich mortars, generally to a flush finish, for flexibility and to allow the structure to breathe and dry out.

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See booklet No. 4 *Mortars, pointing and renders*



Pleasing stone wall



Example of crude pointing

(j) Damage caused by gritblasting and other aggressive cleaning methods.

This is a matter of prevention. Grit blasting of stone walls should never be carried out. Beautiful cut stone entrance walls have been destroyed using aggressive cleaning methods with a loss of detail, including the rounding of arrises and the enlargement of the overall surface area resulting in rapid despoiling and decay of stone surfaces.

Gentle water cleaning may be permissible under expert guidance, but cleaning for aesthetic reasons is best forgotten. It is better to accept that old stone walls are not as clean as the day they were built. If cleaning is thought to be necessary, expert advice should be sought from a stone conservator.

Procedure for conservation and repair

- (a)** If the wall is part of, or related to any part of a national monument, graveyard etc., the NMHPS must be contacted. Check ownership carefully and seek permission, if necessary, before commencement of any works.
- (b)** Seek professional advice regarding a plan of action based on minimum intervention using sympathetic and appropriate materials and techniques. Professional help may also be required to supervise the correct carrying out of the work.

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- (c) Engage an experienced contractor to follow the agreed specification and price.
- (d) If a FAS Community Employment type programme is to be used, ensure that the supervisor and workforce receive adequate training.
- (e) It is good practice to record existing walls before and after conservation and repair to resolve any possible future dispute, and also as a local historical record.

Dos and Don'ts

- Do*
- use lime based mortars, for all repair work
 - use local traditional materials and methods for repair
 - look closely at local examples of traditional stonewalling.
- Don't*
- repair stone walls with concrete, or concrete blocks
 - use sand and cement for pointing
 - use weatherstruck or similar styles of modern pointing
 - face-bed sedimentary stones such as limestone and sandstone.

IT IS BEST TO SEEK EXPERIENCED PROFESSIONAL ADVICE.

Sources of Information

The Irish Centre for Architectural Conservation and Training
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Select Bibliography

- Danagher, Kevin. *Ireland's Traditional Houses*. Dublin, 1991.
- Evans, E. Estyn. *Irish Folkways*. Dundalk, 1989.
- Evans, E. Estyn. *Irish Heritage*. Dundalk, 1977.
- McAfee, Patrick. *Stonewalling - a guide to the building and repair of traditional stone walls in Ireland* (to be published Dublin, 1997).
- Office of Public Works. *The Care and Conservation of Graveyards*. Dublin, 1995.