

APPENDIX A: HLM Project Proposal

THE HLM PROJECT - HOT LIME MORTARS & RENDERS

TECHNOLOGY TRANSFER & APPLIED RESEARCH between Scotland & Ireland

With the support and collaboration of:-

The Office of Public Works
Clogrennane Lime Ltd – CRH plc

February 2014

1. Introduction:

In conjunction with CRH/Clogrennane, the Office of Public Works is to undertake applied research for the gathering of technical information on hot-lime mortars and related for their preparation and applications. The HLM Project is a response to the endeavour of the Building Limes Forum Ireland to commission a technology transfer and applied research project on hot lime mortars and renders between Scotland and Ireland.

Essentially the project will entail transfer technology from Scotland, customised to Irish conditions by applied research with comparative testing of materials. All research and testing will take place at the OPW facility in Athenry. The HLM Project is to be accomplished under the auspices of the BLFI where its Technical & Standards Committee will play a consultative role, albeit the HLM Project will be independent of the Committee and enjoy autonomy. The output will be the production of suitable technical literature for the production of specifications with methodologies on the preparation and application of hot-lime mortars and renders customised in an Irish context. Good practice with Health & Safety statements will be provided. There is provision for publicising general information and promotional literature on the use and application of hot-lime mortars and renders specifically designed for specifiers and craft operatives.

Emphasis is likely to be on the empirical practice of the craftsman mason and plasterer. The outputs will be practical and pragmatic rather than academic.

It is anticipated that much of the work would be undertaken by the OPW National Monuments Depots at Raheen, Athenry, Co Galway, in collaboration with the Project Team.

2. Hot Lime Mortar Project:

The HLM Project appears to be gathering a pan European dimension in as much as Dr Alan Forster of Heriot-Watt University, Edinburgh (who is one of the leading authorities on hot lime mortars) and the Academy of Sciences of the Czech Republic are considering undertaking research into hot lime mortars. It is understood that the project is being supported by the Royal Society of Edinburgh. It is also understood that the Building Limes Forum in the UK intend joining forces with Historic Scotland and will hold a fairly definitive seminar on hot-lime mortars later this year. It is intended that the HLM Project will be joining forces with both of these. It is possible that the BLFI in cooperation with the Heritage Council may also become involved in holding a seminar/workshop on hot-lime mortars and renders later in the year.

3. Activities & Outputs:

- i. Evaluation of the suitability of hot-lime mortars and renders for use in the consolidation and repair of Ireland's traditional buildings, monuments and ruins.
- ii. Characterise the performance of a range of hot-lime mortar and render mixes using commercially available Irish quicklime and Irish sourced aggregates.
- iii. Production of suitable technical literature and good practice guidance on the preparation, use and aftercare of hot-lime mortars.
- iv. Production of a guide handbook on design, mix and use of hot lime mortars and renders specifications with methodologies including Health & Safety.
- v. To conduct practical field trials which can be subsequently monitored to assess long term performance of materials.
- vi. In association with others to provide a workshop for both building professionals (specifiers) and craftspeople (practitioners) to enhance knowledge and understanding of hot lime mortars and renders.

4. Why 'hot limes' ?

In the recently published *Building Limes in Conservation* (Ian Brocklebank, The Building Limes Forum, Donhead 2012) the introductory paragraph of an article by Alan Forster *Hot-Lime Mortars a Current Perspective*, he states; hot-lime mortars are again being used and are perceived to have advantages over cold manufactured mortars. Little is understood, however, regarding the physical and chemical performance of hot-lime mortars. This is despite their successful use since Roman times and earlier.

So, there is currently is a relatively high level of uncertainty with regards to *which* mortars should be used in *which* applications, and this is leading to reticence amongst certain practitioners in the selection of mortar types for particular applications, with the potential risk that inappropriate materials are being used.

Hot limes are often avoided on the basis that they are perceived to be complex and require skill in their use and aftercare, along with consideration of health and safety issues. Notwithstanding the foregoing, a growing number of specialist contractors in Scotland, and lately in Ireland, are now in the position of having developed in-house skills, confidence and construction techniques in order to effectively work with these materials.

What is becoming reasonably clear is that hot lime mortars can be superior in performance and particularly in workability, increased production, cleaner work, fuller joints and ability to work with wet sands and stone, to that of conventional imported Natural Hydraulic Limes (NHL) mortars. In the majority of situations they are a more authentic replication of the original mortar. They are also cost effective and lastly, indications are that there is already a potential market for their commercial usage.

NHLs will, however, be invariably selected over hot lime mortars where a more predictable and faster set is required and in situations of severe exposure such as the pointing of paving or work at lower levels on bridges etc.

It will be noted that lime mortars were used in all solid masonry wall construction which represents a considerable proportion of our existing housing stock and public buildings.

There is a need for not only a greater understanding of the characteristics and performance of hot lime mortars and renders for use in the conservation and repair of historic masonry structures, but also for good practice advice in their practical application.

5. Why transfer technology from Scotland to Ireland?

- i. Historically in Scotland and most likely in Ireland as well, construction mortars and often harling (render) mortars were commonly based on hot-lime mortars (with both non-hydraulic and feebly hydraulic limes being employed).
- ii. Hot-lime mortars/mixes, and their method of preparation were still part of standard specifications until the early 1960's. BSI Code of Practice 121 (1951) had a description of how to mix a mortar from quicklime. For the last 15-20 years in Scotland hot-lime mortars have been '*reintroduced*' by a number of specialist masonry contractors, and used with high levels of confidence.
- iii. Scotland and Ireland have similarly exposed weather conditions; high levels of wind driven rain and seasonally very low temperatures in high humidity with the rain/frost cycle being common to both.
- iv. The building materials and construction techniques used in both countries have much in common, with a high probability of skill and technology exchange between the two over millennia due to the itinerant nature of traditional building craftspeople.

6. HLM Project Team:

The Team will be lead by Ivor McElveen with Craig Frew providing the principle technical input and reports, with Yvonne Doyle providing secretarial and administrative services.

Scottish Members of the Team:

Craig Frew, Craig Frew Building Conservation Ltd.
William Revie, Construction Materials Consultants Ltd.
Andrew Bradley, Andrew Bradley Stonemason

William Revie:

Bill Revie is a specialist in construction materials with many years experience in materials testing and investigation, gained mostly with a major independent Test House, employed on a wide variety of projects both in the UK and overseas, over the period 1977 to 1997.

Bill joined forces with Dr F H Huddard in July, 1997 to form the Construction Materials Consultancy (CMC Ltd.) to provide specialist investigation, analytical and forensic services, to a wide client base, working in the fields of building Pathology, failure investigation and the sourcing/matching of historic building materials. Prior to this he held the post of Resident Consultant with Stanger Science & Environment (previously Stanger Consultants) over the period July 1988, to July 1997, during which time he made numerous visits to projects in the Near, Middle and Far East, mostly associated with resolving materials related issues.

Bill initially developed an interest in traditional building materials during his period in the Far East, and this has developed over the years to the point where most of the work in which CMC are involved is within the field of traditional masonry and historic buildings.

Bill is a member of the BLF and SPAB, and divides his spare time between researching materials, speaking at various seminars and conferences, and hosting Students, SPAB Scholars and Fellows, and

others interested in the fields of Building Pathology and Materials Sciences and the Forensic approach to materials/building failures, in his laboratory in Stirling.

Craig Frew:

Craig Frew, MSc IHBC, is qualified in Town and Regional Planning (BSc Hons Degree) and European Urban Conservation (MSc Degree) and is a Full Member of the Institute of Historic Building Conservation (IHBC). He is a committee member of the IHBC Scotland branch and a committee member of the Building Limes Forum UK.

Craig has also gained a Scottish Qualifications Authority (SQA) Vocational Assessors Certificate (2003) having been involved in training and assessment of the SVQ National Units in Conservation Masonry (delivered by the Scottish Lime Centre Trust) and more recently the National Progression Award (NPA) in the Conservation of Masonry.

He has a particular interest in external lime coatings to traditional buildings and hot-lime mortars and has specified hot-lime mortars on a significant number of building conservation and repair projects over the last 12 years including high profile projects such as; Craigievar Castle re-harling, Drum Tower repointing (both Aberdeenshire), Old Haa Scalloway (Shetland) re-harling, Ardvreck Castle & Calda House (N/W Sutherland) both ruin consolidation, and many more.

In August 2012, Craig established an independent building conservation consultancy practice 'Craig Frew Building Conservation Ltd.'

Andrew Bradley:

Andrew Bradley is a qualified stonemason having achieved his City and Guilds and Advanced City and Guilds qualifications. He has been a stonemason since he joined the Department of the Environment (subsequently English Heritage) in 1979. He has undertaken both the Society for the Protection of Ancient Buildings (SPAB) William Morris Craft Fellowship in 1988 and the Quinque Fellowship (in North America) in 2003.

Andrew joined the National Trust for Scotland in 1991, based at Culzean Castle, and was responsible for setting up both the John Mather Fellowship on behalf of the National Trust for Scotland (NTS), and the NTS Apprenticeship scheme and training centre. In addition he developed the local production of lime (manufactured in the estate lime kiln and stored in lime mortar pits), in addition to undertaking high quality masonry repairs across the NTS estate.

Andrew joined Laing Traditional Masonry in 2007 as Head Mason, later promoted to Operations Manager in 2009. Andrew now works as a self-employed stonemason on building conservation and repair projects across Scotland, but focussed on the West coast, working in exposed, windy and wet climates

Andrew has travelled extensively across the globe to share his skills and experience, having worked on many high profile projects including the White House in Washington DC and more recently managed the construction of a substantial new 'traditional' built granite chapel in hot-lime mortar on a private estate in the Cairngorms National Park. Equally he has worked on many more small scale traditional and vernacular buildings, from cottages to boundary walls, now using almost exclusively hot-lime mortars. Andrew holds a Construction Skills SMSTS (Site Managers Safety Training Scheme) Certificate.

Irish Members of the Team:

Ivor McElveen, Chair Technical & Standards Committee of the BLFI

Robert Howard, Head Mason, OPW National Monuments Depots, Athenry Depot

Pat McAfee, Master Mason and Author

Yvonne Doyle, Secretarial & Adm Tech & Stds Committee BLFI

Ivor McElveen:

Chartered Engineer, BAI MA CEng FIEI, with over 40 years experience in the public and private sectors being onetime a senior executive with the IDA-Ireland, and also a former Director of John

Sisk & Sons Ltd. Prior to establishing a Conservation Consultancy practice in Wexford, lived in the Czech Republic engaged as chairman and chief executive of a large private restituted estate comprising extensive agricultural lands; forestry plantations; industrial holdings and other buildings including gardens, and seven castles. Before taking up the foregoing post in 1994, was an advisor to a Czech Government Minister being appointed by the European Commission in 1990. Fellow of the Institution of Engineers of Ireland and recipient of the First John Ashurst Prize awarded by English Heritage from West Dean College, Chichester. Holds a Postgraduate Diploma in Applied Building Repair and Conservation from Trinity College Dublin and was awarded a Gratias Agit Laureate by the Czech Government in 2011 in recognition of services rendered to the Czech nation. Serves on the International Scientific Committee on the Analysis and Restoration of Structures of Architectural Heritage (ISCARSAH) of ICOMOS and is a former Chairman of the Building Limes Forum Ireland.

Robert Howard:

Robert has been working on historical architectural material for over 25 years. After completing a degree course, trained as a stone mason (completing CGLI Advanced Craft). Served time and then completed post-graduate diploma in stone and plaster conservation at Weymouth College (Bournemouth University). Worked for a number of companies employed both in restoration and conservation works. Some of the projects include Lincoln and Litchfield cathedrals, York Minster, Mansion House London, London city wall, Prior Park and Wardour Castle amongst others. A period of self-employment commenced, working largely on medium to small vernacular projects including a period working on the Caterina Conaro palace project in Cyprus. Latterly joined the National Monuments Division of OPW and involved in developing lime methodology within the institution and setting-up the small laboratory in their Athenry depot, where hot-lime mixes have been experimented with, on and off, since 1979.

Patrick McAfee:

Advanced City and Guilds Certificate, Senior Department of Education Certificate & others. Self-employed Ireland and Australia (1964 – 81), FAS instructor (1982 – 1998) including Chairman of Irish Centre for Architectural Conservation and Training. Workshops, consultancy and lectures including the National Roads Authority Masonry Arch Bridge Repair Programme since 2003. Part of the lime revival movement in the 1980's. Extensive experience in stone and lime mortars in Ireland, Australia, USA, Canada etc.

Publications: Irish Stone Walls, O'Brien Press 1997; Stone Buildings, O'Brien Press 1998; Lime Works, Building Limes Forum Ireland 2009. Contributed to other books and publications.

Organisations: Board member of Building Limes Forum Ireland. Committee member Feile na gCloch, Inis Oirr, Aran Islands, Co Galway. Board member of the Stone Foundation, Santa Fe, New Mexico, USA.

Yvonne Doyle:

Yvonne is an MA graduate and a chartered Planner (RTPI accredited) and is currently studying a part-time postgraduate diploma, Conservation of Buildings, Interiors and Sites (PDD Building Cons) at West Deane College in association with Historic England. She has worked as a Planning and Conservation Adviser both in the UK and Ireland (public and private sectors) since 2009. Yvonne joined Ivor McElveen Associates, Historic Building Consultants & Conservation Engineering practice in 2012 advising on and specifying the conservation of and restoration of heritage structures and monuments. She also participated in a three month Building Conservator Traineeship in Israel based at the UNESCO World Heritage Site Old Acre. She has an interest in traditional & vernacular building materials, decorative fabric, and detailing and in particular in the identification, design and use of traditional lime & mud mortars, plasters and renders. Yvonne is a member of The Technical & Standards Committee with The Building Limes Forum Ireland (BLFI) and a member of The Institute of Historic Building Consultants (IHBC) and The Irish Georgian Society.

7. Clogrennane Lime:

Joe Connolly, Technical Manager, Clogrennane Lime Ltd will be an observer and an advisory member of the team representing the interests of Clogrennane Lime.

8. Programme:

The scheduled dates for meetings are the 10th & 11th April 2014 when all will be in attendance and when the set-up and programme will be agreed.

- i. Preparatory work including desk research.
- ii. Establish communications and reporting procedures.
- iii. Design and agree testing programme of selected mixes.
- iv. Consultations and preparing of samples and exemplar applications (test pieces).
- v. Testing and analysis with results and observations.
- vi. Completion of report and preparation of literature.

9. Contributions:

Financing of the Project through the generosity of CRH/Clogrennane.

All testing at Athenry with the courtesy of the OPW.

Voluntary contribution from BLFI members with no charge, with the exception of administrative and secretarial costs.

10. Requirements:

- i. Subject to amendments, agreement and approval of this memorandum by all parties with signatures hereto.
- ii. Exchange of letters between the OPW and CRH/Clogrennane on contributions with BLFI being a Third Party.
- iii. Opening of Project Bank Account in name of the BLFI HLM Project to be administered by the BLFI.
- iv. Confirm targets and output with reporting procedure.
- v. Inaugural Project Meeting 5th April 2014.
- vi. Submission of Project Completion Report with text for information/promotional literature.

Ivor McElveen
Standards & Technical Committee
Building Limes Forum Ireland.

APPENDIX B: HLM Project Phase I ACTIVITIES

- Drawing up of the HLM Project proposal in consultation with others including Scottish counterparts.
- Promotion and establishment of the HLM Project.
- Appointing and directing consultants.
- Providing executive, management, administrative services and general communications, include negotiations and consultations with stakeholders and other interested parties; dissemination of information and handling queries, attendance at meetings and conferences, cultivating leads etc.
- Fund raising including grant applications and related.
- Report writing and provision of editorial services.
- Organisational
5 Operational Meetings
3 Technical & Standards Committee Meetings
- Portumna: 4 Build Test Walls & Panels at Portumna including tutorial. Organised by the OPW National Monuments Depot, Athenry, Co Tipperary. July 2014
- Drimnagh: HLM Demonstration Workshop organised by BLFI with 60 attendees. Workshop supported and co-hosted by The Heritage Council under the REPS4 Traditional Farm Building Grant Scheme, The Department of Arts, Heritage and the Gaeltacht, CRH and The Office of Public Works (OPW). November 2014 *Please see Appendix C.*
- Preparation and presentation of Progress Report. August 2014
- Organised or participated in seven events including the BLF & Historic Scotland Open Forum on Hot Lime Mortars, Edinburgh, June 2014; Russborough Lime Kiln Restoration project organised by Lisa Edden, July 2014; Presentation at BLF Annual Conference, Bath, September 2014 and other presentations.
- Issuing Final Project Report

APPENDIX C:

Extract from *The Builder's Complete Guide*, by C.F.Pattington, 1825, describing the making of hot-lime mortars etc