

Report on Current Condition, proposed repair  
and advice on conservation based alterations for re-use to

## The Walled Garden Walls and corner Bastions at Auburn House, Streamstown, Malahide, Co Dublin

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*Title page photographs - courtesy of Sheehan Barry Architects  
Northwest Bastion and outer northwest corner of walled garden.*

# 1 Introduction

## 1.1 Outline of brief and proposed works

CORA Consulting Engineers were asked by Hatley Homes to provide a structural appraisal and recommendations for the repair of the walled garden walls and corner follies at Auburn House Walled Garden along with an assessment and guidance on the reduction of impact of new interventions required as part of the proposed new housing development application at Streamstown, Malahide.

This report is thus limited to the Structural Engineering appraisal and recommendations for repairs to the walls and two follies. Whilst other structures such as the existent pet cemetery and the proposed new community centre are referred to there is no design responsibility for such.

For all other matters such as Architectural Conservation comment please refer to reports by others.

## 1.2 Description of Structure

The walled garden was in existence as part of the extended gardens of Auburn house, possibly an orchard from the late eighteenth century. It is thought that corner Bastions were added in the mid nineteenth century. Ref Sheehan and Barry Architectural Assessment / Conservation Report.

The garden is approximately 120 long north to south and 40m wide west to east. There is a moat to the north boundary, a ditch to the west, further walled gardens to the east and a housing estate to the south.

The walled garden is part of the curtilage of Auburn House and is referenced as structure 0448 in the Fingal County Council Record of Protected Structures, established under the Planning and Development Act 2000. For legislation regarding the care and repair of such refer to reports by others.

## 1.3 Method of Appraisal

The walled garden was visited 9<sup>th</sup> February 2021 by Lisa Edden of CORA Consulting Engineers.

The inspection involved a walk around the walled garden, particularly along the inside face of the west wall and a visit to the two corner Bastions or Gothic revival Belvedere Follies. The west side of the west wall was not accessible at the time.

Extensive ivy and other plant growth covered the majority of the walls and it should therefore be noted that a certain level of additional findings are to be expected once the ivy has been cut back and controlled. Safe methods and appropriate times for carrying out such are contained in this report.

No invasive works were carried out, samples taken or tested.

## 2 Observations

### 2.1 Plan layout

The walled garden is just over 120m long north to south and tapers in width from approx. 30m wide at the southern end to 44m wide at the northern end. It was originally L shaped in plan extending to the northeast but this area is not part of the current curtilage and is to be bounded by a new railing and hedging. Thus the proposed walled garden will be a tapered rectangle with interconnecting path from existing northern gate to proposed new western gate.

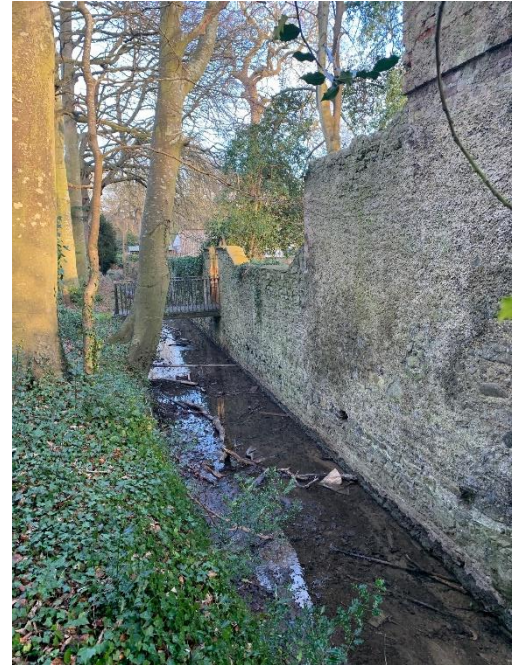


## 2.2 Existing walls

### 2.2.1 North Wall

The walled garden is currently accessed by a bridge over the moat which runs along the outer face of the north wall under a line of mature trees.

*Entrance form north over moat  
Photographs courtesy of Sheehan Barry Architects*



The north wall is interrupted by scooped ends framing the metal gate at the end of the bridge. The gate piers are formed of both random rubble and brick.



Within the garden because of the change in levels between the moat and the garden the height of the wall is more modest.



*View of north wall from within the Walled garden. Photograph courtesy of Sheehan Barry Architects*

### 2.2.2 East Wall



The 70m of east wall is more substantial than the other walls. It is brick lined akin to a typical Walled Garden wall for growing of fruit crops etc.

The gateway through to the eastern areas is worth noting for its brickwork as a possible theme for new works.



### 2.2.3 South Wall

The south wall appears to be of random rubble with a dash to the vertical face and a rusticated random rubble top.



## 2.2.4 West Wall

The approx. 120m long wall to the west side is quite low in height at approx. 1.2 to 1.5m height and possibly was originally a field boundary as opposed to a walled garden structure.

There is a shallow drainage ditch to the west side of the wall, indicated on the survey drawings.

The wall is covered in Ivy and hard to discern, let alone establish its condition.



It was noted in two locations that there were more recent blockwork repairs. There may be more interventions

Significant lean to the wall both inwards and outwards was also noted.



## 2.3 Ivy and other vegetation

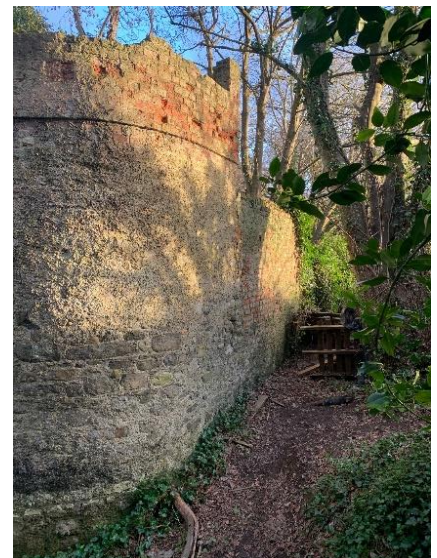
Ivy proliferates the west; south and east walls.

Some other plants were also observed.

To properly assess the walls vegetation control needs to take place in the form of a hard haircut of all plant growth on the walls. There are more ecologically friendly times to carry this out such as between 1<sup>st</sup> Sept and 28<sup>th</sup> February. Refer to vegetation control specification in the Appendix.

## 2.4 Existing Corner Bastion structures

To the northwest corner there is a brick arched masonry 2 storey bastion nestled into the curve of the walled garden northwest corner, accompanied by a blind arch to the west wall.



*Northwest Bastion and outer northwest corner of walled garden.  
Photos courtesy of Sheehan Barry Architects*



To the southwest corner the Bastion design is repeated albeit housed into a squared corner where south and west walls join.



*Southwest corner Bastion and detail of brick arches*



Both bastions have brick masonry vaults supporting the stairs and first floor platforms, solid granite steps laid onto the vault, and brick parapet walls.

The brickwork has suffered degradation from plant growth and general neglect, the parapet walls are missing in places.

The granite steps are uneven and in places slipped and tilted backwards towards the structure.

It is thought that the original form of the westerly Bastions was more viewing platform rather than fully enclosed structures unlike the larger repaired Turret to the SE corner of the adjoining walled garden.



## 2.5 Other features in the Garden

There is a Pet Cemetery approximately in the centre of the garden slightly to the east side.

There are also specimen trees.

There may be other features / plants of note that are discovered when ivy is removed.



## **3 Recommendations & Conclusions**

### **3.1 Repair and new works required to walls**

The repairs and new interventions required, ordered in likely sequence of works are:

- Careful control and removal of vegetation
- Creation of new vehicular entrance and new pedestrian entrance through west wall including temporary protection of exposed ends of wall during construction works.
- Repairs to all four walls including localised rebuilding of west wall.
- Repairs to all wall tops to provide better weathering to ensure longevity.
- Repairs to follies – particularly arch vaults, steps and parapets.
- Permanent creation of new ends to west wall either side of new entrances.

### **3.2 Repairs to Corner Bastions**

The repairs and new interventions required to the two Gothic revival Belvedere follies, ordered in likely sequence of works are:

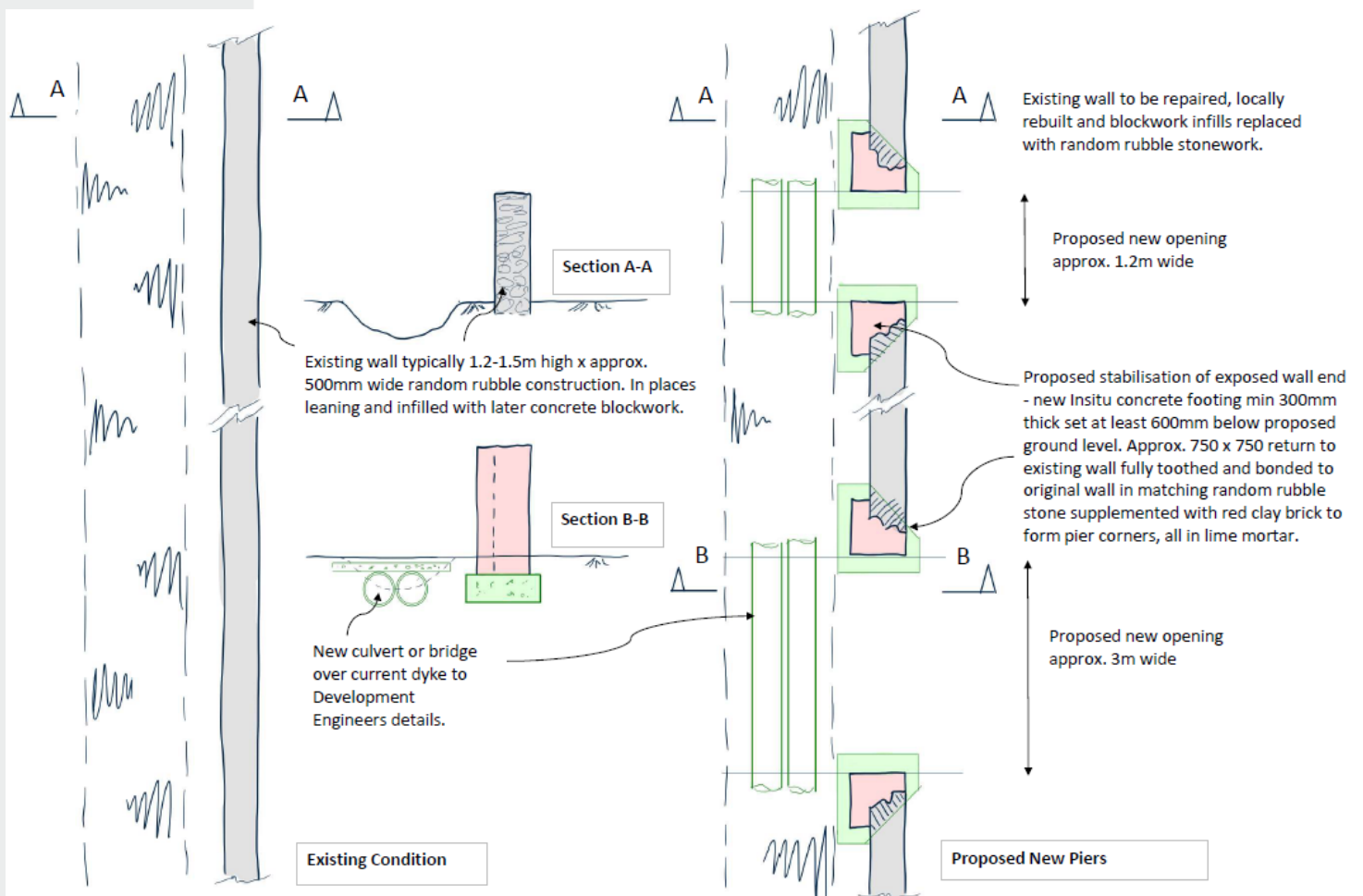
- Careful control and removal of vegetation
- Back propping as deemed necessary to arches for safety and to allow repair of arches
- Temporary removal of granite steps if deemed necessary to facilitate repair of arches under
- Repair of brick arch vaults using bricks to match set in new lime mortar as specification.
- Reseating of granite steps, including re-bedding / pointing to ensure falls down the steps and limit water penetration into brick vaults.
- Re-establishment of parapet detail to Architects drawings using materials to match existing, set in lime mortars.
- Security fencing / guarding to prevent unauthorised access to platforms.

### 3.3 New entrances to West Wall

The new entrances to the west wall should be subservient within the walled garden and thus restraining piers constructed to the westerly face.

There is consistently use of a clay red brick throughout the garden for reveals to gate piers and folly insertion and this brickwork should be matched in type and size for the new interventions. A light dash cover or shelter coat may help the interventions blend within the walled garden. To the new estate side a more prominent intervention may be appropriate.

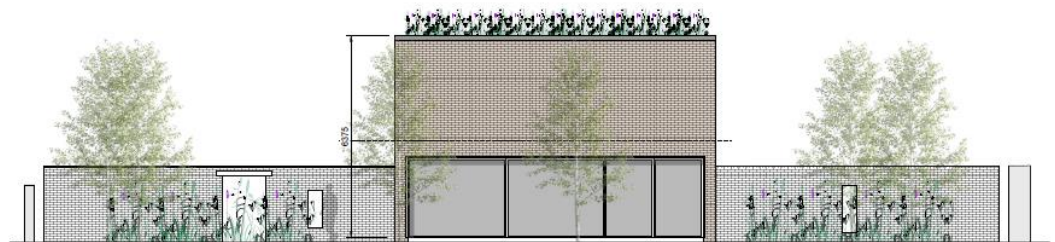
Note the drainage ditch to the west side of the wall will need to be culverted or bridged  
This is the remit of the Civil Engineers for the development



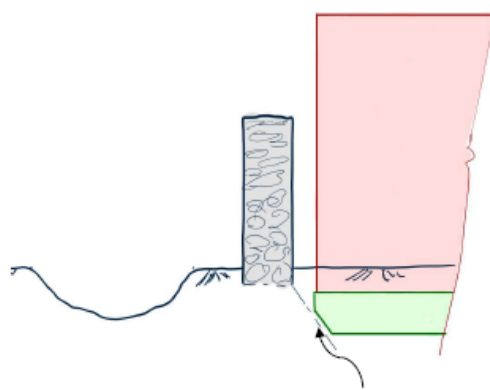
### 3.4 New community hall intersection with Walled Garden Walls

The new community screen wall finishes close to the east and west walls but has been designed such that it does not connect to the existing garden walls.

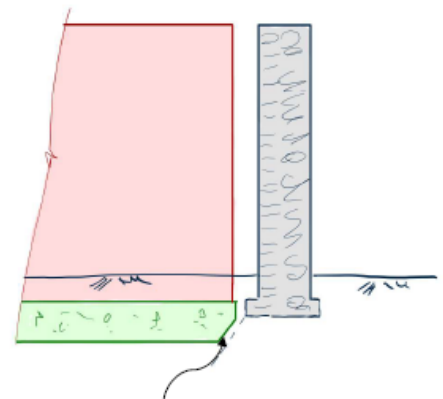
The detail of the foundation will need to be finalised after localised trial pit excavation and should be designed such that it does not interfere with the garden wall foundations nor encroach within a 45 degree splay of the base of those foundations.



Proposed detail at West Wall



Proposed detail at East Wall



New foundations to details by C&S Engineer for development.  
To be detailed such that no connection or interaction with Walled Garden wall foundations or within 45 degree spread of those foundations.

Proposed detail where new screen wall to Community Centre abutts existign

### 3.5 Materials to be used in the repairs

All works to be preceded by exemplars refer to Mortar Specification in Appendix.

It is assumed that the extent of any patching or re-building will only necessitate the use of the stone on site that has previously fallen from the wall or being removed as part of the new entrance works through the west wall.

Extent of repairs should be limited to the extent of this stone rather than importing new stone which may confuse the historic record. The only supplement should be new (or salvage) red clay brick and natural slate and a selection of small wedge-shaped limestone pieces for pinning the masonry arches to the follies; repairs in the west wall and creating the new returns to the west entrance gateways.

At the new entrance gates through the west wall it is proposed that the outer corners are formed using a new (or salvage) red clay brick.

A typical lime mortar specification is appended for initial reference.

The mortar to be used for repairs to the weathering faces such as wall tops should be formulated to be weatherproof.

The mortar to be used for repairs to vertical faces should be less hard and more permeable than the masonry units it binds.

Careful selection of these lime-based mortars will need to be made. An indication of mixes is appended in the Lime Mortar Specification. The final selection will be based on exemplars produced on site by the chosen contractor and approved by the appointed conservation design team.

Prepared by;



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Lisa Edden BEng CEng MStructE MIEI

for CORA Consulting Engineers.

## **4 Appendix**

### **4.1 Specification for Vegetation Removal**

#### **4.1.1 General**

##### **Before starting**

Vegetation treatment / cutting / removal should ideally occur within the period 1<sup>st</sup> September to 28<sup>th</sup> February (dates inclusive) to comply with the Wildlife Act 1976 (Amendment) 2000. [www.npws.ie/legislation](http://www.npws.ie/legislation)

Although the removal of structure endangering plant growth outside of this period is not illegal, consultation with the National Parks and Wildlife Service is advised where substantial removal of vegetation is envisaged.

It is possible that bats are roosting in dense plant growth and cutting of the plant foliage should only occur after inspection by a qualified bat ecologist, who will recommend appropriate mitigation measures. All bat species are protected under the Wildlife Act and it is prohibited to interfere with their roosts.

Only very specific use of herbicides or biocides as mentioned below is to be deployed at any stage as the general policy is to reduce the plant growth immediately at the wall but not to the surrounding areas.

##### **Access for works**

Extreme care must be taken when removing plant growth from walls and at high levels to reduce the risk of injury from falls and from falling masonry.

The operatives removing the plant growth should work in pairs.

All work above 1.8 metres must be carried out from a safe access platform such as a mobile tower, scaffold or MEWP such as a small articulating boom lift hoist.

Machinery must be operated by personnel qualified to do such.

##### **NB: IF IN DOUBT STOP WORK**

##### **Disposal of waste**

All vegetation waste should be chipped on site and a place for disposal preferably in the nearby vicinity agreed with the client. Note waste must be disposed of correctly and in accordance with the Waste Management Acts 1996 to 2011 under which parties disposing of the waste must be licensed.

[http://www.citizensinformation.ie/en/environment/waste\\_management\\_and\\_recycling/waste\\_management.html](http://www.citizensinformation.ie/en/environment/waste_management_and_recycling/waste_management.html)

#### 4.1.2 Site Investigation Stage

##### Specification for containment of plant growth

###### Where NO masonry works are envisaged

For maintenance / control of growth and / or survey and assessment purposes where no immediate repair works are planned. This will allow more effective survey and also reduce windage on walls.

###### **Cutting of plant growth on/in walls and at base of walls**

All the plant growth growing from the sides or top of the walls and within 2m of any wall should be clipped back to reduce the canopy without interfering with the root system of the plants. This will reduce the demand of the root system and also reduce the risk of wind damage to the structure. Reduction of the vegetation also allows for better inspection of the wall for surveying and assessment of the structures.

The vegetation may be mechanically trimmed initially but then carefully cut close to the building by hand. Hedge trimmers and croppers are likely to be the appropriate tools for this job. It is extremely important not to pull any plants or roots away from the masonry walls as this will dislodge stones and mortar.

Removal of roots and vines attached to the walls should only happen alongside masonry repair works to the building at a later date. Under no circumstances should ivy that is growing up the walls be cut at the base as this only encourages development of the aerial roots and potential for much greater damage to the building in future years

There is to be no general herbicide treatment at this stage excepting that as below to woody stems

###### **Woody stems growing out of sides; tops and bases of walls and within 1m of wall bases**

Where woody stemmed plants / trees are found growing out of walls or within 1m of base of walls cut back root close to face of wall / ground and paint suitable root killer on cut stem within one hour of cutting.

All roots / stems over 30mm diameter to be treated with EcoPlug by Monsanto or similar approved, treatment to be carried out in accordance with manufacturers instructions.

Typically:- Treat within 2 days for optimum performance.

Using the prescribed drill bit make the appropriate number of holes in the living part of the stump just inside the bark. Each hole should be 25-30mm deep, 13mm wide.

Place an EcoPlug Max in each hole with the narrow end first. The top of the plug will protrude by about 10mm.

Tap each EcoPlug Max until the head is flush with the stump. This will force out the sides of the plug and release the glyphosate



#### 4.1.3 Construction Phase

##### Specification for containment of vegetation growth where Masonry works are being carried out

###### **Prior and during repair works to masonry**

Leave all growth in place and carefully weed wipe or very topically spray only those plants growing from foundations or walls with Glyphosate such as Roundup Pro Bioactive or similar approved. Apply according to manufacturer's instructions. <https://www.monsanto-ag.co.uk/documents/>. Extreme care must be taken to avoid any spraying in such close proximity to a water course

The herbicide should be applied as long as possible, at least 2 weeks, before any removal of growth. This will serve to kill embedded root systems deep in the fabric of the masonry.

###### **Removal of vegetation**

After a minimum of two weeks all the plant growth growing from the foundations; sides and tops of walls should be clipped back hard. The vegetation may be mechanically trimmed initially but then carefully cut close to the building by hand.

Hedge trimmers and croppers are likely to be the appropriate tools for this job.

It is extremely important not to pull any plants away from the masonry walls as this will dislodge stones and mortar.

Any large or deep-seated roots are to be left in place during trimming operation so that they can be further treated – see below.

Under no circumstances should ivy that is growing up the walls be cut at the base as this only encourages development of any aerial roots and potential for much greater damage to the building in future years. Once the aerial roots have been removed during masonry works the stem will then be removed by the masons as they re-point down the wall.

Apply according to manufacturer's instructions Roundup Pro Bioactive or similar approved, to the cut faces of large stumps within 48 hours of felling. A soluble die will help in identifying which stumps have been treated.

###### **Proceed with masonry repairs**

Dig out as much of root as is practicable as masonry works proceed, without dismantling large sections of currently stable masonry. If in doubt consult Engineer.

Where roots remain drill all roots over 30mm diameter root with 13mm diameter drill and insert EcoPlug by Monsanto. Treatment to be carried out in accordance with manufacturers instructions.

Typically:- Treat within 2 days of cutting for optimum performance.

Using the prescribed drill bit make the appropriate number of holes in the living part of the stump just inside the bark.

Each hole should be 25-30mm deep, 13mm wide.

Place an EcoPlug Max in each hole with the narrow end first. The top of the plug will protrude by about 10mm.

Tap each EcoPlug Max until the head is flush with the stump. This will force out the sides of the plug and release the glyphosate.



#### **Useful References:-**

“Ruins – The conservation and repair of masonry ruins” ISBN 978 1 4064 2445 4

Department of Culture Heritage and the Gaeltacht Architectural Advice series /

“ Bats, Birds, Buildings and You! The heritage Council

“Bats in Buildings” Guidance notes for planners, engineers, architects and developers

<https://www.batconservationireland.org/>

<http://invasivespeciesireland.com/>

“The Herbicide Handbook: Guidance on the use of herbicides on nature conservation sites”

Published by English Nature 2003 in association with FACT. ISBN 1 85716 746 5

## 4.2 Specification for Masonry Repairs using Lime Mortar

### 4.2.1 General

*Note final mix designs to be a result of consultation with Lime suppliers; Conservation Engineer; Architect and appointed Contractor and will be based on exemplars and a more thorough understanding of the previous construction obtained during masonry works preparation.*

Lime mortar works can be affected by excessive wind, rain, sun or low temperatures.

If these conditions prevail the working areas must be kept moist by spraying and protection using polythene or hessian sheets sprayed with water at regular intervals. Spray hoses can be used for large areas or for damping down hessian sheets but should be used with caution to avoid jet action of water washing out mortar or over saturating a wall. Thus a bottle spray, sprayer back pack or similar is an essential part of the equipment.

No works to be carried out if below 5 degree Celsius temperatures forecast within 48 hours unless temperature control methods such as tented enclosures deployed.

Full discussions regarding mortar mixes and methodologies to be undertaken with Engineer prior to commencing works. Exemplars will be required for each pointing / rebuilding type and are to be agreed with the design team before undertaking any work.

### 4.2.2 Stone Identification process - numbering and recording

Any part of a wall that is to be dismantled or stones that need to be removed must follow strict protocol.

All stones that form part of a specifically detailed element such as an arch, window reveal or pier to be numbered using removable chalk / paint; photographed and layout mapped using clear mona flex or similar before dismantling.

After dismantling apply same number in indelible ink / paint to hidden face and store stones in reverse order on scaffold or pallets etc ready for reassembly.

*Note sections containing random rubble with no quoin details do not require numbering.*



### 4.2.3 Mortar Binder

The use of Portland Cement shall not be permitted for this work. All mortars for repairs to the historic masonry including rebuilding of new sections of traditionally constructed walls will be lime and sand mixes as specified in this section.

Lime for structural repairs should be Naturally Hydraulic Lime NHL or indigenous quicklime.

There may be instances such as work in areas where a quick set is desirable because of the inherent wet conditions and the need to work in times outside of the ideal temperatures for lime because of the programme. Prompt Natural Cement may be sourced for these situations with the approval of the Engineer.

Metastar 501 pozzolan will be permitted for situations such as exposed wall tops.

Hot Mixed Lime mortars using indigenous quicklime as manufactured by Clogrennane, Co. Carlow should be considered for rebuilding. For masonry wall re-building it is proving a much quicker, more robust way of rebuilding rubble stone masonry and the expansion during slaking will be inherently useful in tightening up the arch voussoirs. The document "Hot Lime Mortars - HLM Project - TECHNOLOGY TRANSFER & APPLIED RESEARCH" should be consulted (see references).

Naturally Hydraulic Lime; Metastar; Prompt and quick lime for hot mixing are all supplied by the following (not exclusive list)

Stoneware Studios, Youghal [www.stonewarestudios.com](http://www.stonewarestudios.com)

Traditional Lime Co., Carlow [www.traditionallime.com](http://www.traditionallime.com)

All lime mortars should be prepared and mixed as recommended in manufacturer's printed guidelines. Bags of lime hydrate, natural cement, etc. must be stored off the ground in a clean, dry place and not used outside of the dates recommended on the bags. Quicklime should be stored in weatherproof air tight bags/containers.

### 4.2.4 Sand

Sand shall be clean, coarse, well-graded sharp sand.

Particle sizes should range from 3mm to fine dust for any ashlar repointing and 5mm to fine dust for repointing larger joints in stonework.

The sand colour is important in achieving a good visual match to the existing mortar.

#### 4.2.5 Mixing

Lime and sand should be carefully measured by volume, using batching boxes (shovels are not sufficiently accurate to be used). A conventional cement mixer may be used.

Add lime and sand dry and mix thoroughly. Lime hydrate and sand must be mixed dry in a mixer for a minimum of 20 minutes prior to the addition of water, to encourage air entrainment and improved workability.

Add water carefully until mixture starts to run. It should be a little dryer than a cement-sand mix. After water is added allow a full twenty minutes further mixing. The long mixing period helps improve workability.

The mortar should be damp but not too wet. Mortar for re-pointing needs to be dryer than that used for original bedding because it is being placed in small quantities in a vertical situation.

Use mixed mortar within a few hours and do not moisten to extend the working life. Mortar when mixed must be used within the time scale recommended by the manufacturer.

#### 4.2.6 Exemplars of proposed works

Exemplars of all proposed works will be required at start of contract. This should include the following at minimum:

- i) Pointing of original facing stonework
- ii) Insertion of new facing stonework where structural repairs required
- iii) Sample wall top details



#### 4.2.7 Mix Proportions

Mix proportions may need to vary depending on the lime + sand but are to be in the range:

##### **Hydraulic mortar: For structural repairs, and wall tops**

Structural repairs: 1 part NHL 3.5 lime to 2.5 – 3.0 parts graded sharp sand.

Sand should be minimum 5mm down with additional larger aggregate 3-6mm and 6-10mm supplied to site for gauging

Wall tops and slopes As above but gauge the NHL3.5 with Metastar according to manufacturers' instructions.

##### **A typical Hot-mixed mortar: for repointing to vertical faces of wall**

1 part quicklime (Clogrennane kibbled or powder):

3 parts coarse sharp sand 5mm down (If a silica sand as opposed to a calcareous sand is to be used then substitute 0.5 part for limestone dust).

Gauging by (level) bucket. Additional 3-6mm and 6-8mm aggregate may be required to create a good match where the joints are wide

##### **Gauged Hot Mix Mortar - wall face work such as rebuilding sections of facing stones**

1 part Hydraulic lime (NHL5 St Astier or NHL3.5 Roundtower grey):

1 part quicklime (Clogrennane kibbled or powder):

5 parts coarse sand (If a silica sand as opposed to a calcareous sand is to be used then substitute 0.5 part for limestone dust).

Gauging by (level) bucket. Coarser aggregate may be required as above.

##### **Moisture resistant Mortar - works below ground level to wall bases**

1 part Naturally Hydraulic Lime NHL3.5 (upper band width NHL3.5 spec)

1 part Prompt Natural Cement

2 parts 5mm down washed sharp sand + addition of up to 10% 10mm aggregate

*Note. The Prompt Natural Cement in these ratios will give an initial set in approximately one hour of placing*

*without dramatically increasing brittleness or reducing longevity.*

*For details of Prompt refer to supply and also*

[www.vicat.fr/en/Activities/Cement/Prompt-natural-cement](http://www.vicat.fr/en/Activities/Cement/Prompt-natural-cement)

#### 4.2.8 Re-laying Masonry

All loose stones / bricks are to be laid on a full bed of mortar, spread on a carefully cleaned and wetted upper surface of the underlying masonry. Slate or small stone pinnings may be used to level the stone and all horizontal and vertical joints are to be completely filled with mortar well packed in so that the loadings of the structure are distributed evenly.

Think of mortars as soft beds to provide cushions between stones. Lime does not glue things together or create a hard, impervious skin like cement-based mortars and coatings.

Where new stones or bricks are to be inserted, allow for “dry packing” joint over with barely wet mortar.

The new mortar joints of the rebuilt stone and brickwork are to match exactly the existing joint depth and are to be struck flush, brushed off diagonally across joint in both directions and sponged off carefully to match exactly the re-pointing works to the remainder of the masonry. Care must be taken to ensure that mortar or grout splashes do not stain the existing masonry faces. See also note below re: beating back of mortar once stiff.

#### 4.2.9 Preparation for Re-pointing and initial build-out

Prepare areas for re-pointing using small hand-held tools and by removing all the very friable mortar saving any small stones (“gallets” or “pinnings”) that come loose for re-use.

Good preparation is essential for all lime works and a brush is an essential piece of equipment for cleaning out joints, wall surfaces and for brushing pointed joints.

Do not use large blobs of mortar to fill in voids or loose areas; build up with pieces of stone. If the voids are large, bed in the small filler stones in the normal way. If smaller then fill void with mortar and then drive in a stone wedging it in tightly to tighten up loose masonry.

#### 4.2.10 Re-pointing

Carefully rake out joints to depth of twice the joint width. Face of raked out mortar to be cut back square and not sloped or V-shaped. Brush out joints to clear of all debris.

Wet down joints and adjoining masonry to be pointed thoroughly, on dry or windy days spraying may be needed several times and also occasionally during the pointing process and after the work is completed. The wetting is to stop the bed joints from drawing water out of the pointing mortar that would make it dehydrate and fail to set. Lay the pointing mortar on a hawk to a depth equal to the depth of the joint and square off the front edge. Using a pointing iron of similar depth to the joint, cut off thin strips of mortar and offering the hawk up to the joint press well in with the pointing iron.



Make sure the joint is well filled and the front face brushed off lightly once the mortar has become stiffer. Beating back the mortar with a churn brush (as supplied by lime supply companies above) once stiff also assists with compaction of the mortar into the joint and reduction in shrinkage cracks.

#### 4.2.11 Protection & Follow up Work

All finished work must be protected by plastic sheeting or damp hessian sheeting to prevent the joints or coatings from drying out too quickly or conversely becoming saturated

Some slight cracking may occur to the joints and this should be pressed back by hand/churn brush. Brushing up of finished pointing is essential to roughen the finish and clean up drips and splashes from adjoining areas.

All masonry works should be carefully planned such that proper protection can be included or scheduled for the warmer months of the year.

Precautions of suspending operations until the temperature reaches 6<sup>o</sup> C on a rising thermometer or 8<sup>o</sup>C on a falling thermometer shall be strictly observed. Also frost protection and protection from saturation by rain is essential.

The horizontal surfaces of masonry are particularly vulnerable to saturation and thus frost damage in the weeks immediately following rebuilding/ pointing and should therefore be protected from excesses of water. The vertical elevations can be protected by draping with hessian

Consideration should be given to insulating and /or applying heat to wall faces if cold weather is forecast in the two months during or after masonry works are completed.

Care must also be taken to protect applied work from rapid drying conditions i.e. exposure to direct sunlight or drying winds. In these conditions it should be kept evenly damp for up to 30 days, depending on ambient conditions and the rate of set, by lightly spraying periodically with clean water. In areas exposed to direct sunlight, the possibility of a "greenhouse" effect must be avoided, either by shading the polythene or by substituting woven cloth materials.

Polythene, hessian or other approved sheeting that is used during curing should be arranged to hang clear of the face of the wall in such a way that it does not form a tunnel through which the wind could increase the evaporation of water. The polythene or hessian sheeting must not have intermittent contact with the pointing / render as this may cause a patchy appearance.

