GLASPISTOL CASTLE

CLOGHERHEAD, CO LOUTH

Conservation Method Statement | JUNE 2025

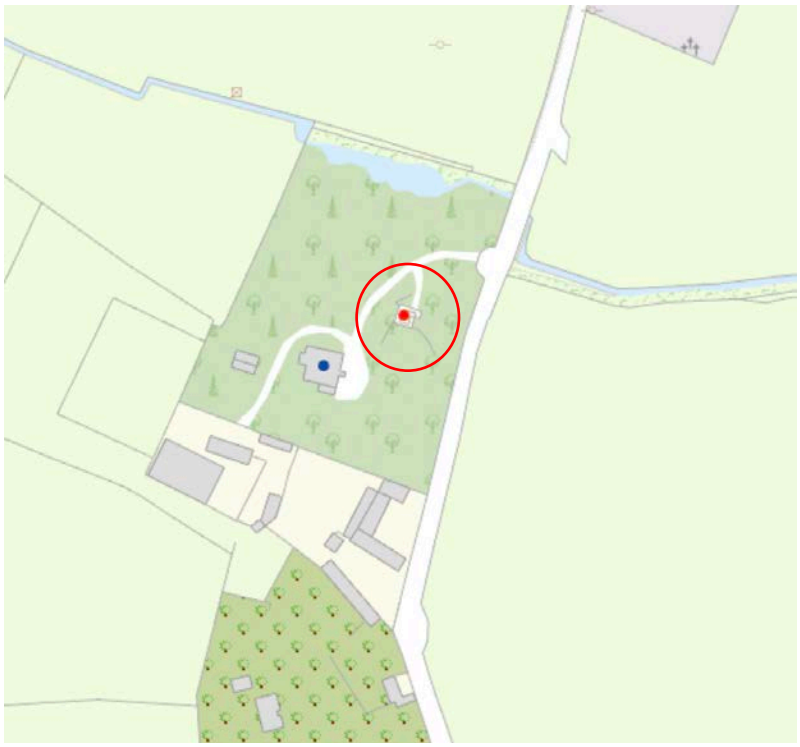
7L ARCHITECTS

1. PREAMBLE

The following conservation methodology is prepared in advance of the third phase of conservation repairs to Glaspistol Castle, a tower house located outside Clogherhead, Co Louth. Note that the second phase of works scheduled out in 2023 were deferred until 2024.

Location	Glaspistol, Co Loouth
Grid Coordinates	715760, 783261
Local Authority	Louth County Council
Statutory Protection	SMR ref: LH022-019----
Special Interest	Architectural, Archaeological, Historical
Inspection Dates	November 2024
Prepared by	7L Architects, CORA Structural Engineers
Issue Date	January 2025

Statutory protection is afforded by the Sites & Monuments Records. Monuments included in the statutory Record of Monuments and Places (RMP) prepared by each local authority, or the Sites & Monuments Record (SMR) prepared by the Archaeological Survey of Ireland, are referred to as recorded monuments and are protected under the provisions of the National Monuments Acts 1930-2004.



2. DESCRIPTION

Glaspistol Castle, one of the 'ten-pound towers' of the fifteenth century built to fortify the Pale, has a rich sense of place and continuity with its owner's family over the generations. As recently as the nineteenth century, it formed part of a larger complex of farm buildings set around a yard. Evidence of an attached two-storey building can be seen with a prominent roof scar high up on the north wall. Well-preserved including the remains of a wall walk (now inaccessible), with fine stone carvings and architectural detail, contribute to a place of regional cultural significance.

As described by the Archaeological Survey of Ireland:

Three storeys high and built of limestone blocks and greywacke roughly coursed, with a slight batter all the way round its base. It

has a tower at the NE angle which projects eastwards, rises above the level of the tops of the walls of the main building and contains the stairwell. On the outer face of the N wall there is clear evidence of the pitch of a roof of another building which was formerly attached to that side of the tower house. The original doorway, which is E of centre in the N wall, has only two jambs surviving and these are at the W side. The NW angle has a tower which rises above the level of the tops of the walls and would have matched the NE tower in height were it not broken. It has a narrow ope at second-floor level constructed of punch- dressed limestone with a single lintel and sill stones. There is a plain rectangular ope almost directly over the doorway at first-floor level and a slit in the N face of the N angle at the same level.

The E wall has a window at first-floor level with a hood moulding and decorated panels. There is a two-light window above it at the second-floor level, constructed of hammer dressed limestone, and a single-light ogee-headed window with hood moulding immediately above it at third-floor level. There is an armorial plaque on the outer face of the E wall just below the two-light window. The S wall has a large rectangular opening at ground level, now blocked, similar to one at first-floor level which has limestone jambs with a late type of punch dressing. This wall also has a blocked two-light window at second-floor level. The W wall is covered with ivy and other than a slit ope at first-floor level no features can be discerned from the outside.

The entrance to the stairwell is to the E side of the main doorway and has a two-centred arch of finely punch-dressed limestone. A murder hole, square in plan, is situated overhead between the entrance to the stairwell and the main doorway. There is a barrel vault with wicker centring over the ground floor. It has a double-splayed ope at the E and W gable ends, and one in the W wall with a large embrasure. There are two cubby-holes in the S wall and one in the N side of the embrasure of the ope in the W wall. There is a rectangular guardroom to the W of the entrance with a large cubby hole in its W wall and a single-splayed ope in the N side.

At the first-floor level there is a fireplace in the N wall. Its lower jambs are still in place and are of chamfered punch-dressed limestone. A chimney stack, presumably a later addition, rises above the level of the tops of the walls and is supported by masonry fill between it and the NW angle-tower. A doorway in the centre of the W wall at first-floor level gives access to a mural passage, which to the S leads to a single-splayed ope and to the N to the garderobe recess which is U-shaped in plan. The second floor was carried on corbels set in the N and S walls, beams in the E wall and on the thickness of the W wall. There is no easy access at present to the second floor but it can be clearly seen from the

stairwell that the mural passage at this level in the W wall only existed at the N side where the garderobe is contained.

The roof over the second-floor level was carried by large beams. The third-floor level had a low head clearance, being only c. 1.5m high, and was not accessible from the stairwell. This level may have been used for storage and access was probably gained by wooden steps from the second floor. This arrangement is also found at Dunmahon (LH012-018----). The towers at the NW and NE angles rise above the tops of the walls by c. 2m. The doorway to the first floor level from the stairwell has a two-centred arch of punch-dressed limestone with bar holes behind the jambs. This is not repeated in the doorway at the second-floor level. The wall walk could be reached via the stairwell but is no longer accessible. (Wright 1758, bk II, pl. XIII; D'Alton 1844, 405)

The above description is derived from both the published 'Archaeological Inventory of County Louth' (Dublin: Stationery Office, 1986) and the 'Archaeological Survey of County Louth' (Dublin: Stationery Office, 1991). In certain instances the entries have been revised and updated in the light of recent research.

Date of upload: 17 July 2007

3. EXISTING CONDITION

The tower house is approximately thirteen meters high, with walls 8m x 9m in plan with the addition of an offshoot (2 x 4.5m) containing the spiral staircase, that once gave access out onto a wall walk along the north side. Wall thicknesses vary from 1.1 up to 1.9m along the west side.

The walls are constructed with coursed limestone rubble with larger dressed quoins. Its walls are thick and of robust construction and its simple square plan form lends itself to stability, however the tower has suffered from water ingress through the centuries.

Of most concern for the conservation of the tower house is its advanced state of decay. This gradual process will continue unless the structure is stabilized and weathered, while sections of its walls being at risk of collapse. Works to the walls internally and externally, along with repairs to the basement vault, were carried out between 2022-2024 with the support of a Community Monuments Fund grant under Stream 1.

The original historic soft lime and sand mortar used for bedding and for pointing the stone blocks has long washed away leaving open joints to both interior and exterior wall surfaces. Some internal plaster has survived on the first-floor level, and elsewhere

large voids between stones and in the core of the wall have emerged which risk localised instability. During previous phases of repair works the NE corner at the base of the wall was re-pointed with Portland cement and sand mortar. Several openings and voids have been infilled with loose stonework, a precaution against accidents.

Historic mortars, that had the function of binding the wall blocks together while allowing the passage of moisture through the structure, were designed as sacrificial layer that needed regular renewal. Repair mortars need to be compatible with the rest of the historic fabric and to be designed on a like-for-like basis. The introduction on the historic fabric of modern hard cement mortars has a detrimental effect as the mortar, harder than the building blocks, forces the blocks to act as sacrificial element exposing them to a continuous freeze and thaw cycle with crystallization of salts. This process accelerates the decay of the stonework, speeding up its erosion and compromising the cohesion between the blocks. With significant water allowed to enter the masonry, the original bedding mortars have also been washed away from the core of the wall leaving large voids and stones sections loose and now at risk of falling. Debris of various size, including mortar and stones are sometimes found at the base of the tower.

All vegetative growth shall be removed and the joints raked out to allow the full re-pointing of the wall surfaces to the north wall and adjoining sections of the west and east walls. This will be carried out with a gauged quicklime and sand mortar. Stone pinnings will be inserted in larger pockets and joints to reduce the joint size and allow a proper curing process. It will be necessary to carry out some localized consolidation of walling using stone salvaged from the site, laid to match existing, and retrieved under the supervision of the design team archaeologist, Donald Murphy of Archaeological Consultancy Services Unit Ltd.

Due to ivy coverage, we were unable to inspect the condition of the wall tops in detail. We assume that there will be consolidation of the upper courses of the wall heads in places. This will be carried out using lime and sand mortar, and the exposed wall tops rough racked and pointed up where sound to preserve historic detail.

A structural assessment has been carried out by CORA Consulting Engineers, and they have identified large cracks in the walls along with smaller cracks to structural elements such as lintels which require repair. They have also provided details and specifications for mortars for a range of different applications.

5. PREVIOUS WORKS – (2022 - 2024)

Two phases of work have been carried out to date by separate conservation contractors. In 2022, works commenced with the north wall, internally and externally with some repairs to the basement vault. In 2024, works continued to the northeast corner, the highest part of the tower surviving. The subfloor build up to the first floor has been installed, along with the stainless steel chute, ready for completion in 2025.

5. CONSERVATION METHODOLOGY 2025

In 2025, it is proposed to follow with a phase of works to the west side of the tower house, which has a very large void at high level through the line of the battlements, a collapsed intramural chamber and a badly degraded dovecote. Given its condition and slenderness, we need to undertake an amount of reconstruction in order to stabilise this wall. An intramural chamber has long since collapsed at second floor level, leaving the wall above dangerously unsupported - contributing to the stone loss. From the facing stone, we can see the extent of the missing chamber, and propose to reconstruct it to bring more stability to the entire wall. While we have no evidence for the precise location of a door, we will take care to determine if there is any evidence of its former location with the project archaeologist. This will avoid creating an inaccessible chamber which will gather debris. We will then consolidate the dovecote that survives where it is placed against the wall.

To the exterior, the large void cuts through the base of the battlements. Here the stonework sits in front of the main face set on flat stones, with weepholes of the long missing wall walk. Elsehere we have allowed for a 25-50mm set back the way we do for facework infill, but in this location, we propose to reconstruct the parapet close to its original design, matching the profile of the stone. The repair will remain distinguishable between old and new, without the loss of architectural detail.

A limecrete floor slab is to be installed on the existing sub-base installed in 2024, being drained by the SS outlet already installed. There are several cracked window heads to repair. Deep repointing will be required in areas due to the extent of mortar loss, with at least two passes needed, and extensive numbers of pinnings. In previous phases, suitable building stone was salvaged from the piles of stone in the neighbouring field, but stocks of these are running low.

The aim of the proposed works is:

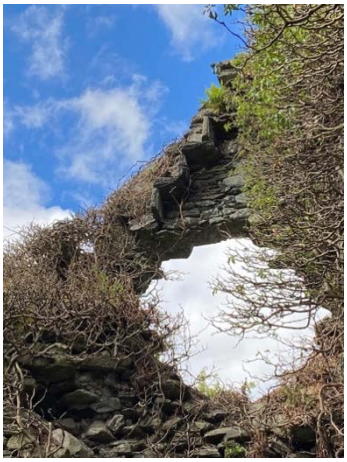
- To protect and maintain the existing built and archaeological heritage of Glaspistol Castle, while minimising the impact of the conservation repairs.

- To continue to carry out specialist repairs to the existing tower to assist in its preservation as well as the security of the site.

The proposed works will be:

- Notified to the National Monuments Service under Section 12 (3) of the National Monuments Act.
- Will be overseen by a conservation structural engineer along with a RIAI Grade 1 Conservation Architect and monitored by a licensed archaeologist.
- Will be carried out using lime mortars and specialist masonry repair techniques by contractors who have extensive experience in the repair of historic masonry structures, especially where they are in poor condition or unstable.
- No ground disturbance, vegetation control or raking out will be undertaken without archaeological supervision.

The proposed works will be carried out with the following methodology:



- Installation of limecrete screed capping to floor vault to seal and form layer to throw off rainwater. To be laid to fall to the stainless steel outlet installed in 2024, which has been placed on a bed of hardcore separated from the floor vault by a geotextile layer.
- Protection to landscape features in the vicinity of the tower and adjacent areas not included in the current phase to be put in place.
- Only relevant areas of the tower will be scaffolded. A method statement for the scaffolding shall be submitted by the appointed contractor for approval prior commencement.
- All existing vegetative growth will be removed and the treated walls will be washed.
- All existing pointing is to be raked out and repointed using gauged quicklime lime and sand mortar mix, batched to closely match appearance of surviving mortar to be retained. Small stone pinnings are to be used to tighten up joints and the wall face generally. Repointing samples to be submitted for approval.
- Lime grouting may be used to fill large voids within the wall after repointing is completed.
- Following propping, existing opes and voids are to be consolidated and repaired in accordance with CORA methodology and specification sheets. This includes the installation of Irish Blue Limestone lintels with smooth sanded finish, with 5mm joints to follow existing courses, to approved sample.
- Infill rubble stone to be set back 25-50mm from existing wall surfaces where refacing larger voids to external and internal walls.
- Under archaeological supervision, clean off debris and consolidate stone dovecote assembly by carefully taking down

loose stone to a solid base and then reassembling using lime and sand mortar.

- Care will be taken to identify the original extent of openings that have widened through stonework loss, having assessed the features close up as a team to include the project archaeologist.
- Miscellaneous smaller voids evident to the walls to be infilled with suitable salvaged facing stone rubble bedded in lime mortar.
- Parapets, stone roofs and wall tops to be inspected and assessed prior to putting work in hand, and then after remaining ivy has been removed.
- Disturbed wall heads to be consolidated and capped using flat salvaged limestone to follow existing profiles or rough racked using flat stones bedded in lime mortar. NHL3.5 is to be used to the wall tops due to increased exposure.

5. SPECIFICATIONS

Table of contents:

Protection of historic fabric

Site access should be controlled and the perimeter secured for the duration of the works.
Care must be taken to ensure that adjacent areas are protected from accidental damage, fenced off or boxed out in plywood as necessary.
Removals of unstable masonry are to be carefully sequenced, after assessment of the risk of consequential damage, rather than pulled out using mechanical means.
Temporary propping or strapping of walls, openings may be required in advance of repairs commencing.
Historic fabric should be suitably protected during the works.
Care shall be taken not to damage the ground and grassed, planted areas during works.
Contractor to limit access to areas undergoing works and protect the ground from contamination by builder's refuse or from tyre damage.
Any damage to the ground shall be repaired and the site cleared and made good, to the satisfaction of the CA at the expense of the contractor prior to handover.
The method statement for the specific design and construction of the protection must be agreed with the CA.
Hoarding (framework/sheeting) shall be constructed using non-ferrous screw fixings to facilitate ease of alteration/inspection. Nails shall not be used.
The form, construction and materials used must be sufficiently robust to protect historic features from falling items/debris from above.
Under no circumstances shall the protection measures fix into the historic fabric.
The contactor shall facilitate the opening and closing of hoarding/protection as directed by the CA for the purposes of inspection.
Protection measures are to be inspected by the site supervisor on a daily basis and maintained/repaired as necessary.
A Certificate for Temporary Works specifically for the site hoarding to be submitted by the PSCS to the PSDP.

Removal of Ivy & Treatment of Woody Stem Growth

Clearance of plant growth around the structure should include both ground cover, shrubs and embedded ivy that would impede the repair works.

All vegetation cutting / removal should occur within the period 1st September to 28th February (dates inclusive) to comply with the Wildlife Act 1976 (Amendment) 2000.

All the plant growth growing from the sides or top of the walls should be clipped back hard. The vegetation may be mechanically trimmed initially but then carefully cut close to the wall by hand. Tendrils shall be removed by hand and using a soft bristled brush. Particular care must be taken not to damage carved areas or friable stone during removal of ivy.

All vegetation waste should be chipped on site and a place for disposal preferably in the nearby vicinity agreed with the NPWS. Note waste must be disposed of correctly and in accordance with the Waste Management Acts 1996 to 2008, under which parties disposing of the waste must be licensed.

Extreme care must be taken when removing plant growth at high levels to reduce the risk of injury from falling masonry. The operatives removing the plant growth should work in pairs and make an assessment as to what sort of access may be required.

Leave all growth in place and spray apply several coats of a root killer. This should be left for as long as possible – approximately two weeks- before any removal of growth. This will serve to kill all embedded root systems deep in the fabric of the masonry. It may be necessary to repeat the injection of biocide on a regular basis until the plant life has died.

After removal of plant growth, by hand, the entire structure should be sprayed with a biocide (Algae Rem, see section above) in conjunction with a turbo and nozzle steam wash. This will kill and remove all small surface growth and also remove all soil from the joints.

Pre-drill all areas of open joints where there are heavy roots present.

Repairing/ renovating/ conserving masonry

Generally/ preparation

Scope of work

Schedule:

- Re-pointing of stonework.
- Consolidation, repair and reconstruction of stonework.

Works must only be carried out by specialists with extensive experience in repairing and re-pointing historic fabric. Submit evidence of competence.

Records of masonry to be repaired: Before starting work, use measurements and photographs as appropriate to record existing masonry.

Identification of masonry units to be removed and replaced or repaired and repointed to be agreed with conservation architect. Mark clearly, but not indelibly, on face of masonry units or parts of units to be cut out and replaced. Transcribe markings to drawings/ photographs.

Site inspection

Purpose: To confirm type and extent of repair/ renovation/ conservation work .

Parties involved: Conservation Architect, stone mason

Instructions issued during inspection: Confirm in writing, with drawings and schedules as required, before commencing work

Raking out of pointing

Rake out all existing pointing using a fine-toothed mason's saw and hooked knife blade.

Removal of fittings/ fixtures

Remove: all existing metalwork

Removal of plant growths from masonry

Plants, root systems and associated soil/ debris: Carefully remove from joints, voids and facework.

Removal of roots: Where growths cannot be removed completely without disturbing masonry seek instructions.

Record of work

General: Record work carried out to masonry clearly and accurately using written descriptions, sketches, drawings and photographs, as necessary.

Specific records: Mason to take good quality before, during and after photographs and forward to conservation architect for records.

Documentation: Submit on completion of the work.

Workmanship generally

Power tools

Usage for removal of mortar: Pointing mortar:
Permitted only stitch drilling in centre of large very hard cementitious joint for removal of old pointing. Use of disc cutters is not permitted.

Protection of masonry units and masonry

Masonry units: Prevent overstressing during transit, storage, handling and fixing. Store on level bearers clear of the ground, separated with resilient spacers. Protect from adverse weather and keep dry. Prevent soiling, chipping and contamination. Lift units at designed lifting points, where provided.

Masonry: Prevent damage, particularly to arrises, projecting features and delicate, friable surfaces. Prevent mortar/ grout splashes and other staining and marking on facework. Protect using suitable non-staining slats, boards, tarpaulins, etc. Remove protection on completion of the work.

Structural stability

General: Maintain stability of masonry. Report defects, including signs of movement that are exposed or become apparent during the removal of masonry units.

Disturbance to retained masonry

Retained masonry in the vicinity of repair works: Disturb as little as possible.

Existing retained masonry: Do not cut or adjust to accommodate new or reused units.

Retained loose masonry units and those vulnerable to movement during repair works: Prop or wedge so as to be firmly and correctly positioned.

Workmanship

Skill and experience of site operatives: Competent for types of work on which they are employed.

Documentary evidence: Submit on request.

Adverse weather

General: Do not use wet or frozen sand or lime and do not lay masonry units on frozen surfaces. Store all binders in frost-free conditions. Do not use frozen mortar for bedding, pointing.

Air temperature: Do not bed masonry units or repoint:

In hydraulic lime: Lime and sand mortars not to be applied when ambient air temperature is at or below 5°C and falling or the week weather forecast is below 5°C. If sudden drop in temperature occurs use propane gas heaters.

Temperature of the work: Maintain above freezing until mortar has fully set. At 20°C and 90% humidity NHL may achieve frost resistance after 90 days. At 10°C it will reach it in 135 days. Ideally work should be carried out between April and October.
If this is not achievable, always provide full protection of the work during application and curing. Protect scaffold all the way to the top lift.

Rain, snow and dew: Protect masonry by covering during precipitation, and at all times when work is not proceeding.

Hot conditions and drying winds: Prevent work from drying out rapidly. Protect from wind with multiple layers of hessian or old woollen blankets draped against or close to the work. Spray to keep damp, not wet. Damp coverings on weekend, make provision. Provide scaffold sheeting, if plastic hung at least 100mm from face of wall. Protect also top lift of scaffold with sheeting or tarpaulins to avoid driving rain for at least first few weeks to avoid leaching. In good weather 15 days is long enough for protection. 20 days or longer if cold, longer if wet and windy.

New mortar damaged by frost: Rake out and replace.

Protection of lime work: All works require adequate protection until fully cured. Protect from rapid drying out from wind and direct sun and allow for air to circulate. New lime works will need to be dampened regularly (by lightly spraying). Plasterer/mason to forward proposed plan for protection suited to time of year and wall location and factor in aftercare when assessing works. (It is expected dampened multilayers of hessian will be used.)

Control samples

General: Complete an area of each of the following types of work, and arrange for inspection before proceeding with the remainder

S1: one square meter of pointing on limestone

S2: Sample of salvaged stone reconstruction

S2: Sample of reconstruction of dovecote

Materials/ production/ accessories

Material samples

Representative samples of designated materials: Submit before commencement

Retention of samples: Unless instructed otherwise, retain samples on site for reference. Protect from damage and contamination.

New Stone

Standard: BSEN 771-6 for new stone.
Also comply with BS 5628-3:2001 sections 4 and 5.
It is essential that replacement stone – either from the original quarry or, where the original is no longer available, an alternative source – is compatible with the existing. Compatibility includes durability, porosity, colour and texture. Lead in times can be critical; allowance must be made for sourcing sufficient quantities and for seasoning.

Supplier: Submit proposal and provide sample before order is placed. Sample to be sufficiently large to show natural variations and specified finishes before ordering. The contractor shall be responsible for site measurement and provision of templates.

Quality: Free from vents, cracks, fissures, discolouration, or other defects that may adversely affect strength, durability or appearance. Thoroughly seasoned, dressed and worked in accordance with shop drawings prepared by the supplier.

Finish: to match existing, hammered and dressed

Replacement stone units

Sizes and profiles: To match existing masonry. Maintain existing joint widths.

Sinkings for fixings, joggles and lifting devices: Accurately aligned and positioned in relation to existing masonry.

Marking: Mark each block/ dressing clearly and indelibly on a concealed face to indicate the natural bed and position in the finished work.

Orientation of natural bed

In plain walling: Horizontal.

In projecting stones and copings: Vertical and perpendicular to wall face.

In arches: Perpendicular to line of thrust.

Dismantling

Dismantling masonry

Masonry units to be removed: To be confirmed with Conservation architect. Remove carefully.

Treatment: Rake out all pointing. Lever unit from position by whatever method necessary to prevent damage to any surrounding work and approved by conservation architect. Timber block may be used to prop adjoining masonry to be retained in situ. Clean off old mortar, organic growths and dirt, and leave units in a suitable condition for storage in location to be agreed with employer.

Identification: Mark each unit clearly and indelibly on a concealed face, indicating its original position in the construction. Transcribe makings to drawings/ photographs.

Replacements and insertions

Preparation for replacement masonry

Defective material: Carefully remove to the extent agreed. Do not disturb, damage or mark adjacent retained masonry to be retained in situ.

Existing metal fixings, frame members, etc: Report when exposed.

Redundant metal fixings: Remove.

Recesses: Remove projections and loose material; leave joint surfaces in a suitable condition to receive replacement units. Protect from adverse weather if units are not to be placed immediately.

Replacement of stone

Stone: to match existing

Bedding depths: to match existing

Mortar: As section Mortars.

Standard: BS EN 459-1:2010 and BS EN 998-2

Mix: gauged mix quicklime: NHL 3.5 : sand (in parts 1:1:5)

Lime manufacturer:

. Kibbled indigenous quicklime as manufactured by Clogrennane, Co. Carlow

. NHL 3.5 exact brand subject to sample approval

Aggregate source/ type: well graded gritty Wexford beach silica sand 0.07mm-4mm and Wexford pebbles slightly rounded 3mm-7mm (in ratio 3.5 and 1.5)

Joints: to match existing

Stone inserts

Stone: to match existing

Finish: to match existing.

Mortar: As section Mortars.

Standard: BS EN 459-1:2010 and BS EN 998-2

Mix: gauged mix quicklime: NHL 3.5 : sand (in parts 1:1:5)

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Laying replacement masonry units

Exposed faces of new material: Keep to agreed face lines.

Faces, angles and features: Align accurately. Set out carefully to ensure satisfactory junctions with existing masonry and maintain existing joint widths.

Joint surfaces: Dampen to control suction as necessary.

Laying units: On a full bed of mortar, all joints filled.

Exposed faces: Keep clear of mortar and grout.

Installing stone inserts

Pockets to receive inserts

Cut out accurately. Undercut sides of pocket where necessary to provide space for bonding material. Install new stone in exact position previously occupied by original stone. Flush out voids with clean water to remove deleterious material. Dampen stone, spread a mortar bed on the stone and tamp into place using the mortar bedding as a lubricant for manoeuvrability. Pack the mortar around the stone when set in position using a suitable size pointing iron. Push mortar firmly.

Adjust depth so that insert stands proud of existing stone for finishing in situ.

Clean out thoroughly.

Inserts: Cut to the smallest rectangular shape necessary to replace the defective area and provide a firm seating. Install accurately and securely.

Exposed faces: Keep clear of bonding material.

Existing joint widths: Maintain. Do not bridge joints.

Corroded metal fixings

Removal: If found cut out carefully, causing the least possible disturbance to surrounding masonry. Remove associated rust debris.

Structural stability

Contractor shall be responsible entirely for the structural stability during repairs and shall arrange that sufficient temporary supports are used as works proceed to keep the structure stable until repair is complete.

Pointing/ repointing

Preparation for repointing

Tools: Rake out defective mortar with chisel and hammer by hand or for very narrow joints a hand-held saw blade. For very hard cementitious mortar use a tungsten carbide-tipped chisel or claw chisel or stitch-drill along centre line of joint to break up mortar. Disc cutters will not be permitted.

Existing mortar: Working from top of wall downwards, remove mortar carefully, without damaging adjacent masonry or widening joints, to a minimum depth of roughly twice joint width for regular size joint. For large rubble masonry joints rake out to a depth of minimum 30mm.

Loose or friable mortar: Seek instructions when mortar beyond specified recess depth is loose or friable and/ or if cavities are found.

Note should be taken if pinnings/gallets are removed in the cutting out process and these should be retained for re-use.

Do not damage arrises of stone nor disrupt masonry face. Where the arrises of the walling material are worn the pointing is to be kept back square within the joint so that the pointing thickness is not increased. The ability to deliver this must be demonstrated by the contractor at commencement of work with completion of an exemplar.

Raked joints: Remove dust and debris with air puffers compressed air and stiff bristle brush. Wash down with hosepipe fitted with spray attachment. This must always proceed from the top, working down the building, ensuring all traces of debris are cleaned down. Where there are deep joints or voids, care must be taken not to flood the core of the wall. Leave square cut joint.

Control suction by wetting substrate with pump-action sprayer or hosepipe fitted with spray. Couple of days of spraying if weather is hot. Protect scaffold to avoid drying effect of sun and wind. Masonry should be damp not wet.

Pointing

Mortar: As section Mortars

Standard: BS EN 998-2 and BS EN 459-1:2010

Mix : gauged mix quicklime: NHL 3.5 : sand (in parts 1:1:5)

Lime manufacturer:

. Kibbled indigenous quicklime as manufactured by Clogrennane, Co. Carlow

. NHL 3.5 exact brand subject to sample approval

Aggregate source/ type: well graded gritty Wexford beach silica sand 0.07mm-4mm and Wexford pebbles slightly rounded 3mm-7mm (in ratio 3.5 and 1.5)

Joint filling: The mortar should be relatively stiff while still pliable. Joint and surrounding masonry to be damp (not wet) when mortar is applied. The new mortar should be stiff and not sloppy, as this will result in shrinkage and leave a smudged and dirty finish. Methodical introduction and compaction of mortar is required. Tools have to be used of suitable dimensions. Complete packing must be achieved and no smearing lime on the surface of the surrounding masonry.
Joints must be filled from the back to ensure compaction. Any smear on surface to be sponged off with clean water immediately.
Build up pointing in layers of 25mm depth with a minimum of four days between coats, from upper part of wall down to avoid damaging finished work when dampening down subsequent areas of work.
Fill joints slightly proud of intended finished joint profile to allow for shrinkage and compaction of mortar as it firms up. For joints larger than 18mm do not use large blobs of mortar; build up with stone pinnings/gallets. If voids are large bed in the pinning stone in the normal way , if smaller then fill the void and the drive in a stone wedging it in tightly to tighten up loose masonry.

Joint profile/ finish: to match existing.
A joint is ready when it is still damp but in a semi-hard, leathery consistency and has become stiffer. When ready, beat back/tap the mortar with a churn brush to expose the aggregate and assist with the compaction of the mortar into the joint and reduce

shrinkage. Excessive tooling to be avoided. Press back any crack when mortar is still plastic (i.e. you can mark it with a thumbnail but a thumb pressed into surface leaves barely any impression).

Curing: Water is essential when new pointing mortar is curing. Relative humidity to be kept at 90%during curing, particularly for the first twenty days.
Protective covering with multiple layers of damp hessian sheeting and light mist spray for 7 days to keep mortar damp (not wet). Hessian to be arranged to hang clear of the face of the wall in such a way that I t does not form a tunnel through which the wind could increase the evaporation of water. Hessian must not have intermittent contact with the pointing as this may cause a patchy appearance. Further daily spray is beneficial for the first 30 days. Optimum curing temperature is roughly 15°C. Protect also from rapid drying conditions.

Control shrinkage: Protect against weather to control rate of drying of mortar. Shrinkage cracks to be closed up by pressing with pointing iron or spatula. Work needs to be checked regularly so that cracks can be closed up as soon as noticed.

Pointing with tools/ irons

General: Press mortar well into joints using pointing tools/ irons that fit into the joints, so that they are fully filled. Pointing trowels should be avoided, as this will not allow pressure to be applied across the whole of the joint.

Face of masonry: Keep clear of mortar. Use suitable temporary adhesive tape on each side of joints where necessary. Finish joints neatly.

Brushed finish to joints

Timing: After initial mortar set has taken place and mortar has stiffened, remove laitance and excess fines by tapping with a church brush, to give a scrap finish to expose aggregates leaving a very well textured surface. It is ideal for carbonation and curing, and for maximum evaporation of moisture from the joints once fully cured. It will also ensure a good bond with surrounding masonry and will eliminate initial shrinkage. Tamp firmly the mortar with stiff bristled churn brush to compact mortar. Do not rub joints with the brush. Mortar has to be of the right consistency in the drying process. If mortar is too soft the brush will leave pin-holes.
Do not use wet sponges as it can leave smears on adjacent masonry

Mortars

Lime:sand mortars

Conservation approach

The use of any cement mortar on the work will not be permitted.
Mason chosen by main contractor must be experienced and demonstrate competency in working with lime mortars and historic fabric and demonstrate high quality evidence of his skills.
The advantage of using lime over Portland type cements is the high evaporation profile that allows water within the wall to be lost through the joints rather than masonry surfaces.
Lime and sand mortars can be used for filling voids, re-pointing, decorative/protective coatings, capping wall heads, grouting and load bearing in bedding masonry.
When used as a decorative/protective coat or when re-pointing it should become the sacrificial part of the wall structure and therefore be weaker than the host fabric. Nature, condition, state, exposure and position of the building are all important parameters in designing a lime and sand mortar. Also aesthetic reasons play a role in the decision.
Properties considered while specifying the type of lime and mortar mix are :
.compressive strength, flexural strength, plasticity, bond strength, effective porosity, permeability, capillarity, absorption, frost resistance, salt crystallisation resistance, reversibility.
Determining factors in the design of the mortars is the condition of the fabric, the fabric materials and the degree of exposure.

Natural Hydraulic Lime for gauged hotlime and sand mix and for NHL and sand mix

Scope of work: Natural Hydraulic lime to be used for the mortar mix for bedding and pointing

Specification: Comply with requirements of
.BS EN 459-1:2010 Building lime: definitions, specifications and conformity criteria
.BS 890: 1972 Specification for Building Limes

Lime to be used on the work:
Natural hydraulic lime NHL 3.5 and NHL5 (floor only) , brand to be subject to sample approval with Otterbein and Roundtower Grey

Note: See also Section Conserving Masonry

Quicklime for gauged hotlime and sand mix

Scope of work: Quicklime to be used for the mortar mix for bedding, pointing

Specification: Comply with requirements of
.BS EN 459-1:2010 Building lime: definitions, specifications and conformity criteria
.BS 890: 1972 Specification for Building Limes

Lime to be used on the work:
Kibbled indigenous quicklime as manufactured by Clogrennane, Co. Carlow

Note: See also Section Conserving Masonry

Sand for lime:sand masonry mortars

Scope of work: sand to be used for the mortar mix for bedding, pointing

Type: Comply with requirements of
.BS EN 13139:2002 Aggregates for mortar
.BS 1199 and 1200: 1976(1996) Sands for Mortar for Plain and reinforced Brickwork, Block-walling and Masonry
. BS 882:1992 Specification for aggregates from natural sources
Shall be clean, coarse, well-graded sharp sand.

Quality, sampling and testing: To BS EN 13139.

Aggregate source/ type: well graded gritty Wexford beach silica sand 0.07mm-4mm and Wexford pebbles slightly rounded 3mm-7mm (in ration of 3.5:1.5 except for floor mix in ration of 2.5:0.5)

Source of Sand Supply: Washed silica Wexford beach coarse sand with sharp angular grains. No sand with clay or silt deposit will be accepted.
Sufficient sand for the entire job should be delivered to site in a single delivery to avoid the risk of inconsistency.
Do not use more than 15% of very fine particles (150microns).

Storage of lime:sand mortar materials

Sands and aggregates: Keep different types/ grades in separate stockpiles on covered, hard, clean, free-draining bases in ventilated areas. Keep dry at all times.

Store on clean bases or in clean containers that allow free drainage. Prevent drying out or wetting and protect from frost.

Bagged kibbled quicklime: Store off the ground in dry conditions. Reject all damaged bags. Once bag is open ,fold down top and weight it. If unopened shelf time is as per manufacture's recommendations. Materials when stored should be located and used as soon as possible following delivery in chronological order.

Site movement of mortar: Ensure that tracks or runs for wheeled containers are smooth and flat.

Making Gauged Quicklime Lime:Sand mortars generally

Mortar mix ratio: 1 (Quicklime):1(NHL3.5): 5(aggregate)

Batching: By volume. Use clean and accurate gauge boxes or buckets.

Mixing: Heap moist sand and hollow the heap. Add kibbled quicklime (any lumo larger than 6in should be broken down) and add the water necessary to effect the slake (typically around two two-and-a-half volumes of water for each volume of quicklime) before mounding the sand over the quicklime. As the quicklime expands, cracks will appear in the sand covering , which will also begin to dry out. These cracks should be closed to retain the necessary heat of the slake. The sand and lime may then be mixed together while still very hot, more water added to bring the mix to a workable mortar consistency agitating the mix with shovels. This is if the mortar is to be use immediately. For later use bring the mix to a somewhat less wetted coarse stuff, to be later knocked up to a full-blown mortar.

For gauged mix with NHL, once slaking is complete add the chosen volume of NHL and add more water if necessary, use promptly.

If using a pan mixer add aggregates and mix well, add kibbled lime. When well distributed add a full gauging bucket of water and then train the hose into the mixer at

low pressure stopping occasionally until a sloppy mortar consistency is achieved. This will begin to stiffen as slaking proceeds and as the mortar cools. If not used hot it may need knocking up with more water before use. Pan mixers are preferred than drum mixer.

The temperature reached during slaking should be a minimum of 100 degrees C or a little higher. If too little water is added which risks burning the lime the addition of more water during slaking then risks chilling the lime which leaved the mortar short. If too much water or sand is added or quicklime is thrown into an excess of water the temperature of the slake may not reach 100 degrees C and the lime may be drowned and may lack binding qualities.

Working temperatures: Not below 5°C nor above 30°C.

Contamination: Prevent intermixing with other materials, including cement.

Water for mix: Should be of drinking water quality.

Health and Safety

Primary hazard is from the alkalinity of the material and it is attached to all forms of lime and natural hydraulic lime and cement mortars. Primary hazard is to the eye and if the chemical burn is not promptly removed it may cause blindness. Modern quicklime is highly reactive so it will 'spit 'upon the addition of water. Wear eye protection and dust mask and all other appropriate PPE when using all lime and cement products. Have sugar solution (Diphoterine) to hand for eye-wash in phials kept in a worker belt for immediate application.

Health and Safety

Wear eye protection and dust mask and all other appropriate PPE when using all lime and cement products. Have sugar solution (Diphoterine) to hand for eye-wash.

Performance specification scaffold

General
Before starting work:
Examine all available information.
Survey the structure, site and surrounding area.
Ensure that all statutory notices have been given and licenses obtained.

Commencement Condition Survey
Before starting work, carry out a visual inspection of the existing fabric and record with photographs any damage to the existing fabric, and note areas that look unstable and may require special care of operatives during erection of the scaffold

Codes of Practice
Design scaffold in accordance with BS EN 12811 2005
Workmanship to be in accordance with BS EN 12811 2005

Design Loading
Design wind loads to be in accordance with BS EN 12811 2005

Extent of Scaffolding
Provide scaffolding as shown on the tender drawings to carry out works to the main roof with four chimney stacks, canted bay roof and entrance porch roof.
Provide safe access and safe places of work in the scaffold for inspection and repair of damaged areas.
Ensure that working platforms are suitably close the walls of the building so as not to allow materials or tools to accidentally fall from one level to the next.
Scaffolding to be suitable to provide necessary protection when using lime mortars.
Access to all exit doors to be maintained throughout works and passage to be protected from falling objects.

Maintenance of Scaffolding
Regularly inspect and maintain scaffolding, making good ties, wedges, connections, corrosion protection, etc. as necessary.

Stability
Temporary wall fixings to be agreed with CA and to be in stainless steel. To be made good on completion when the scaffold is removed.
Provide bracing to the exterior of the scaffold, so as not to inhibit any works.

Safety
Operatives must be appropriately skilled and experienced for the type of work
Site staff responsible for supervision and control of the work are to be experienced in the methods of erection and maintenance of support systems to be used
Examine and note the contents of the pre-contract health and safety file before commencing the work.
Prevent access of unauthorised persons onto scaffold.
Leave safe outside working hours.
The structure itself must not be used for access or to support demolition of construction materials.

Before starting work, submit detailed proposals for all systems to the Contract Administrator, and resolve any amendments proposed.
Accept responsibility for the adequacy and stability of scaffold and thereby the integrity of scaffold for the period from commencement of erection to completion of dismantling of scaffold.