

St. Mary's Conservation Project

St. Mary's Church, Athenry, Co. Galway

RPD 326/EGWOOO396



Conservation Architect's Report on Works undertaken Dec 2014 - March 2015

Prepared by

Gerry McManus

June 2015

*Gerry McManus B Arch, M Arch Sc (Building Conservation), MRIA.
Rockmount, Claregalway, Co. Galway.
Ph 091 798874, Mob 087 2837012, Email gerrymcmanusconservation@gmail.com*

St Mary's Athenry.**Conservation architect's report on consolidation works commenced Dec 2014**

Contents	<i>page</i>
Introduction	3
General description of works	3
Consolidation of Entrance Archway	5
Consolidation of west end of South wall of Nave and consolidation of the east reveal of the eastern window in this wall.	9
Consolidation of Blind Arch on South Wall where it intersects South Transept.	12
Consolidation of North Gable wall of North Transept (external and internal).	14
Consolidation of overhanging pier on inner face of North Nave Wall adjacent to 19th Century Church, including partial rebuilding as necessary.	21
Consolidation and stabilisation of west wall of north transept.	23
Consolidation and stabilisation of northern side of west wall of the nave and adjacent projecting masonry.	27
Conclusion	29

INTRODUCTION

Conservation works at St Mary's were commissioned by Galway County Council, the Employer; Mathieu & Mitchell Ltd was appointed Contractor; the consultants were John Britton, Structural Engineer; Dominic Delaney, Archaeologist; Brendan Slevin, Project Manager; Gerry McManus, Conservation Architect.

The works received grant aid, administered by Galway Rural Development.

Tender documents for consolidation works at St. Mary's were issued in October 2014. Mathieu and Mitchell were appointed contractors. Due to limited funding a list of the most urgent works was drawn up from the schedule of works as sent to tender, and it was agreed that these would be undertaken as Phase 1.

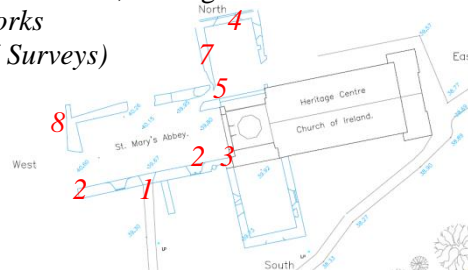
The agreed works consisted of the following:

1. Consolidation of Entrance Archway (Tender documents: DRW 02, Pricing document sections 1.1.1.1 to 1.1.3.2)
2. Consolidation of west end of South wall of Nave and some re-pointing of wall face. *When works were on site the re-pointing work was substituted with consolidation of the east reveal of the eastern window in this wall.* (Tender documents DRW 02 and 04, Pricing document sections 1.2.1.2.1 and 1.7.1 to 1.7.3.1)
3. Consolidation of Blind Arch on South Wall where it intersects South Transept. (Tender documents: DRW 02, Pricing document 1.4.1 to 1.4.2)
4. Consolidation of North Gable wall of North Transept (external and internal) DRW 07 Pricing document sections 2.1.1 to 2.1.3.9.2
5. Consolidation of overhanging pier on inner face of North Nave Wall adjacent to 19th Century Church, including partial rebuilding as necessary. (Tender documents: DRW 03, Pricing document section 5.1.5)
6. General cutting back of vegetation.

Cutting back and partial removal of vegetation from the west wall of the north transept revealed the extent of instability in this wall and it was considered that stabilization and consolidation works should be undertaken urgently in this area also. Likewise, removal of vegetation from the northern side of the west wall of the nave and the adjacent projecting masonry revealed considerable instability. Limited funds were made available early in 2015 to do emergency consolidation in these areas. These works were substantially completed in March 2015.

7. Consolidation and stabilisation of west wall of north transept. (Tender documents: DRW 05, Pricing document 3.2.1.1 to 3.2.1.2 and 3.2.2.1 to 3.3.3)
8. Consolidation and stabilisation of northern side of west wall of the nave and adjacent projecting masonry. (Tender documents: DRW 04, Pricing document 1.7.4 to 1.7.6)

*Key plan showing location of works
(extract from survey plan by PK Surveys)*



GENERAL DESCRIPTION OF WORKS

Works were generally carried out as described in Engineer's drawings and Conservation Architect's specifications and schedule of work. As the time of year was not favourable for the use of lime, particularly not fat or feebly hydraulic lime, it was necessary to use moderately hydraulic NHL3.5 in the mortar and grout mixes.

The contractor sourced his sand from Cannon Quarry, Loughrea and used a mix of sharp plastering sand and concrete sand with a large chip. This proved to give a successful mix which set well and

gave a satisfactory appearance. While the proportion of large chip was probably a little greater than in the early mortars, the mortar gave the desired grainy appearance and matching grey colour tones. The repair and consolidation work can be identified on close inspection while toning in well from a distance.

Sand used was limestone sand with particle size from 0-6mm, larger aggregate had particle size from 0-14mm. Neither were from crushed aggregate but from pebble aggregates which matched fairly well with the original mortar.

Due to the time of year the contractor made provision for protection of the lime work using straw, hessian covers, and used plastic and electric tracer wires hooked up to a metered electricity board independent of the Heritage Centre. The tracer wires were placed over and around the completed work below the straw protection. These wires heat when the temperature falls below a certain point (in this case the setting was 0 deg C)

It is notable that the archaeologist considers that there are probably 4 or more different phases of building at this site as well as a certain amount of modern 20th century repair. His report will discuss this and pinpoint different styles of building corresponding to the different phases. The historic mortar mixes also show subtle variations associated with the different phases. However the colour of the mortar is fairly consistent due to the general use of local grey limestone sand.

It was decided to use the one repair mix throughout for the consolidation of rubble stonework because of its desirable properties described above, particularly the good setting properties conferred by the coarse aggregate, useful at the time of year. Of course, a much finer mix was used for repair of cut and carved stonework, and for grouting. The lime used was Otterbin from the Traditional Lime Company which has a creamy rather than a very bright white colour.

Mortar mix for building rubble stonework generally and rough racking:
2 parts NHL 3.5 : 3 parts 0-14mm aggregate : 2 parts 0-6mm sand

Mortar mix for re-pointing:
2 parts NHL 3.5 : 3 parts 0-6mm sand : 2 parts 0-14mm aggregate.

Mortar mix for limecrete capping where required:
2 parts NHL 5 : 5 parts 0-14mm aggregate.

Mortar mix for repair of cut stonework:
2 parts NHL 3.5 : 5 parts silica sand 1mm down.

Mortar mix for grouting:
2 parts NHL 3.5 : 5 parts silica sand 1mm down. 7kg of casein used per 15 bags of lime, approx.

The grouting technique adopted by the contractor as the most appropriate in the particular circumstances is described as follows. Wall was cleaned down and loose mortar and clay removed from joints. Water tests were carried out to establish if and where there were voids in the core of the wall and where the water was escaping on the wall face. Escape holes and joints were plugged temporarily with a clay daub and the wall grouted in shallow lifts as per usual practice. Re-pointing was undertaken where necessary following setting of the grout and washing away of the clay daub plugging.

Where it was necessary to rebuild stonework the stone used was sourced from collapsed stone at the base of the particular piece of wall being rebuilt, or where sufficient was not available in situ, stone was sourced in the stone dump against the boundary wall in the north corner of the graveyard. The archaeologist supervised all reuse of stone. No cutting or dressing of stone was done.

1. Consolidation around Entrance Archway and section of wall head above it.

Work in this area consisted of removal of any vegetation; re-pointing and pinning of stonework on internal and external faces; repair of the vault behind the cut stone arch on the external face; removal of 20th century cement based repair on western reveal of archway and extensive grouting behind this western reveal. Only a small amount of grouting proved necessary above the arch - about 300 litres. Vegetation was removed from the wall head and it was consolidated using the rough racking technique.

Internal face



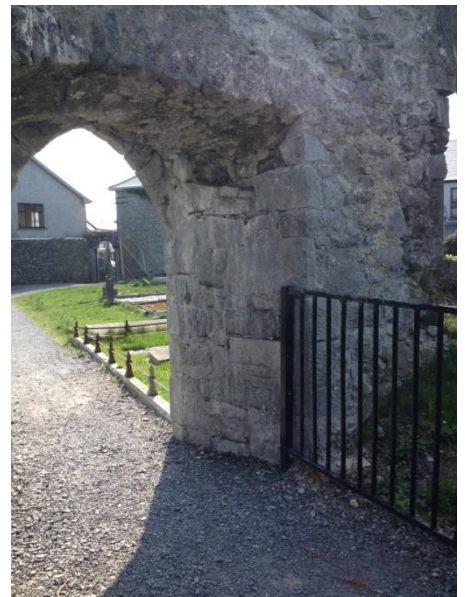
Before works



After works



After works





Before works.

Late 20th century cement based repair



After works

Cement based repair was removed and early soffit and reveal of arch exposed. (Present form of arch is later - see archaeologist's discussion.) Extensive grouting was carried out behind the existing later reveal.



Before works. Gap where stones and mortar fallen away.



After works

Gap where plank centred vaulting had fallen away was repaired by plugging with suitably sized rough stones and mortar. Repair was held back from face of original work.

External face



Before works



Before works



After works

Works on the external face around the archway consisted mostly of re-pointing.

Wall head above archway

During works, vegetation removed.

Looking down on stone apex



During works



Vegetation growth on the wall head was vigorous and had loosened and dislodged smaller stones in the exposed core of the wall and was penetrating the joints between facing stones. Large amounts of clay/humus and multiple roots of plants and small trees were removed prior to re-bedding of stones and consolidation of the wall head.

Below, after works

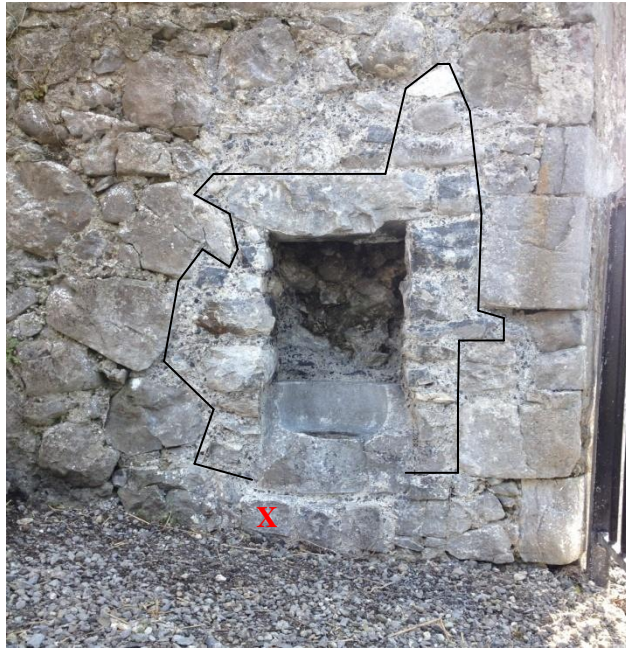
Wall head consolidated by rough racking, considerable amount of re-bedding of loose stone on the wall head was necessary. No stone introduced from elsewhere.



Niche with font



Before works



After works, line outlines area where stones were introduced.



After works, mortar still very fresh.

It was concluded that this was not the original location for this font (see archaeologist's discussion) but that it should be left as found and the 'niche' stabilised. Method of repair was agreed with National Monuments DAHG. Stones for repair, including long stone used as lintel, were sourced in the rubble pile at the base of the west wall of nave. Stone was not dressed. Sides were built up to support lintel. Stone X is part of the broken edge of font.

1. Consolidation of west end of South wall of Nave

Works in this area consisted of the careful removal of vegetation; removal under archaeological supervision of the extensive pile of stonework from the collapsed west wall of the nave, which may also have included some stone dumped from elsewhere; building up under unsupported stonework at the upper part of the wall and buttressing the end of the wall by rebuilding a nib of stonework - part of the west gable of the nave. Work was done using rubble stone found in-situ and coarse lime/sand mortar.



Before works, view from south-west.



Before works, from west.

Before works, view from north

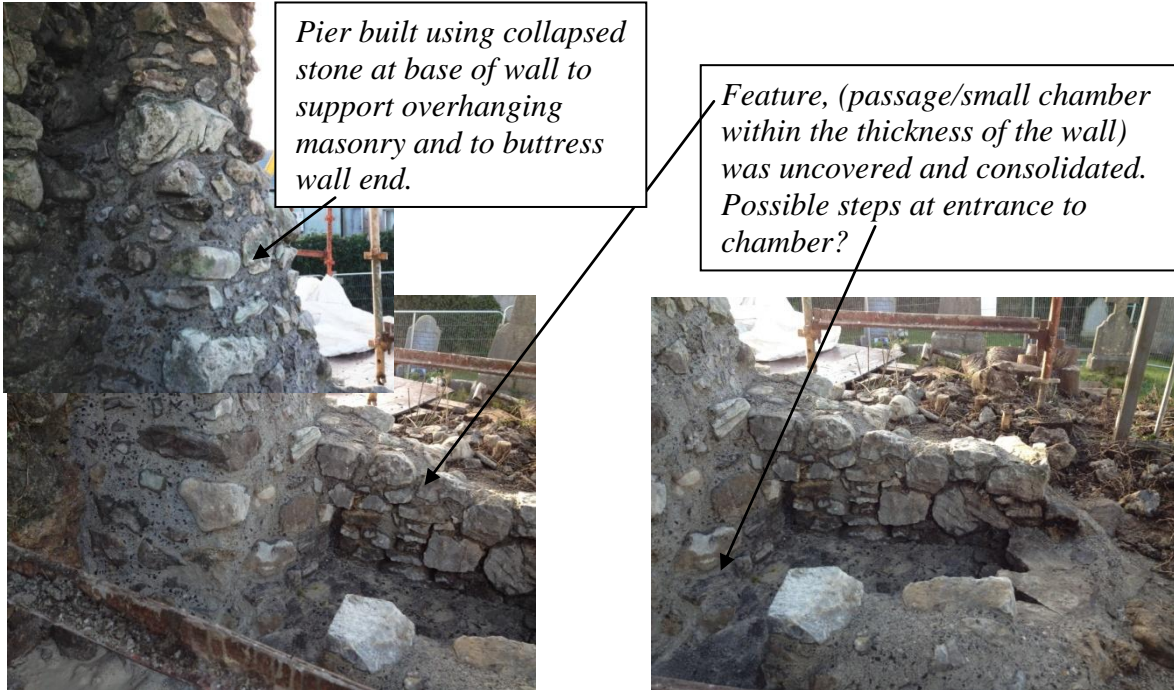


During works, view from north



During works, view of base of west wall of nave looking down from above.

During works a hidden feature was uncovered in the depth of the wall as the pile of collapsed and dumped stone was removed. See Archaeologist's discussion - probably a late feature. Marked in photo above by red dashed line.



Completed consolidation work viewed from north



Completed work viewed from west.

The face of buttressing and supporting stonework introduced into the structure was held back as far as possible from the original faces of the walls. The style of stonework attempted to match core work while of necessity also functioning structurally.

2.1 Consolidation of the internal east reveal of the window to the east of the entrance in the south wall of the nave.

Work in this area included removal of modern cement based repair. Remnant of cut stone mullion used in this repair was removed and stored in south transept with other displaced cut stone remnants. New repair was made using lime/sand mortar and consisted of re-pointing and pinning work. A few larger rubble stones sourced under archaeological supervision were introduced where necessary to support unstable stonework. These were sourced from fallen stone immediately below this window or in the stone dump in the north corner of the graveyard against the boundary wall.



During work. Stones introduced to support stones in danger of collapse

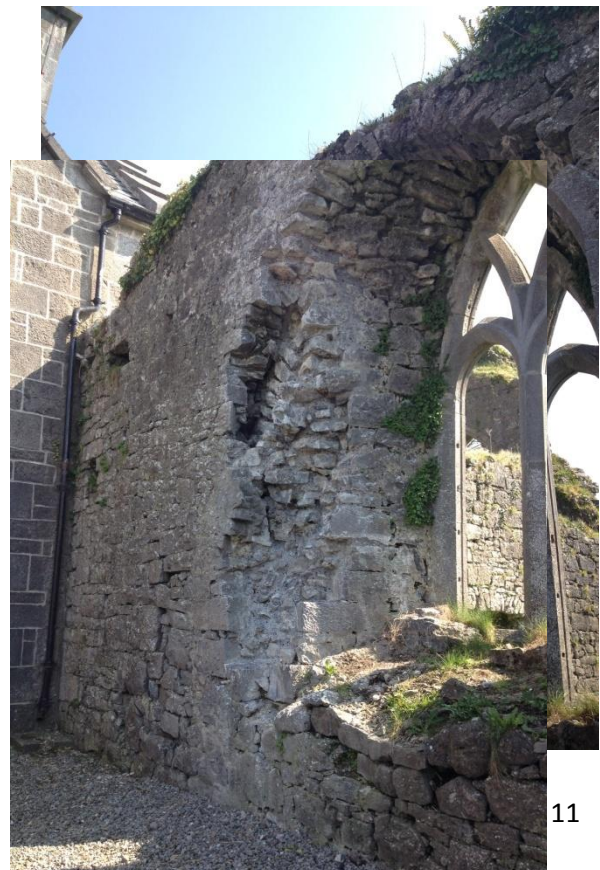
*Before work
Cement based fairly recent repair (late 20th century)*

After works



Consolidation taking place around partly visible remnant of 13th century arch (see Archaeologist report)

During works



2. Consolidation of Blind Arch on South Wall (where it intersects South Transept)

Work in this area consisted of careful removal of extensive vegetation and cleaning off of humus and decayed mortar, followed by finishing 'rough raked'. This involved re-bedding of stone where necessary and the introduction of an occasional stone to support vulnerable overhanging stones where masonry had fallen away. Extensive pinning and pointing was undertaken and all surfaces shaped to throw off water.



After works.

Circles indicate where 2 stones were inserted

Before works



Before works



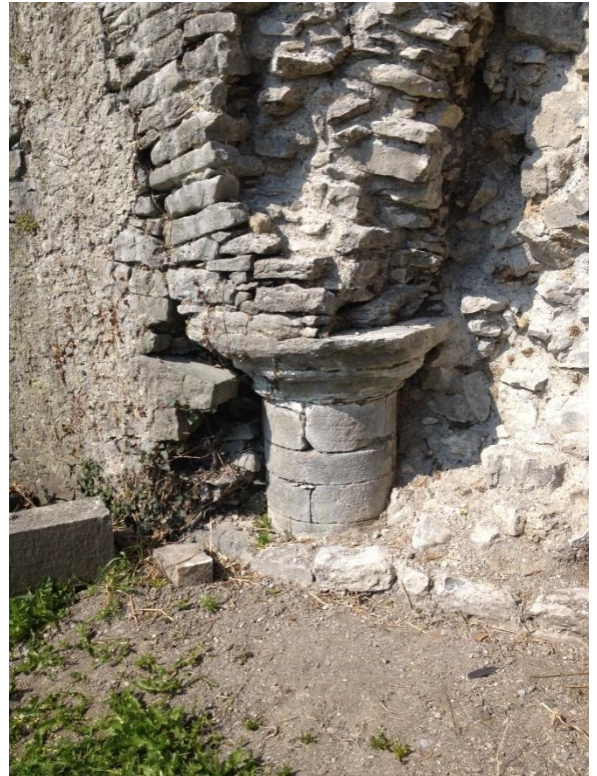
After works

Stones retrieved from fallen stone at foot of wall were inserted to support stones above.



During works - vegetation cleared but consolidation not yet done.

After works



4. Consolidation of North Gable wall of North Transept (external and internal)

Work in this area was extensive. Much of the window tracery had collapsed and the remaining window tracery on the north face had moved considerably, and likewise the cut stone surround on the south face. Extensive root penetration and vigorous vegetation growth on the gable and west wall of the transept, coupled with the robbing out of quoin stones from the north-west corner of the gable are likely to have been the principal causes of destabilisation. Ideally the window tracery should have been restored but funds did not allow. The fallen tracery stones were retrieved and put for safe keeping in the south transept to which there is locked access.

Elaborate propping of the stonework in this area was necessary before any works could be undertaken. When this was in place it was possible for many of the displaced stones to be carefully eased back into their original positions. Ropes were used to hold them temporarily in their restored positions and then pointing and wedging secured them. A fine sand / NHL 3.5 mix was used for pointing and thin lead pieces were used as shims in some joints where necessary to secure the cut stones. (Lead was considered preferable to the stainless steel shims originally proposed as its softer nature would be more forgiving in the stonework joints.)

Grouting was undertaken as specified, using a fine sand / NHL3.5 mix with casein added. Stainless steel pins and reinforced limecrete under barge were installed as per engineer's design. Position and number of pins agreed on site with engineer and archaeologist. 7 pins were introduced. Barge was then finished in manner of 'rough racking' by reusing small stones dislodged and salvaged during removal of extensive vegetation and humus.

Stainless steel tie wires were put in place as per engineer's specification to ensure no possible future movement of incomplete stone tracery. Plastic sleeves were used to protect stone at vulnerable pressure points but wires were not over-tightened.

At sill level and below, the wall was grouted and consolidated using rough rack method and straightforward pointing up as appropriate.



Before works, above and after works, below.



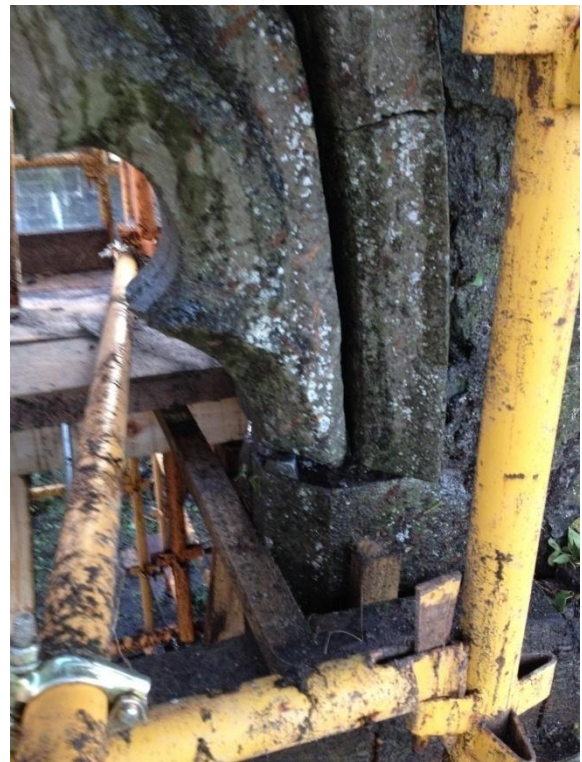
Tracery:



Before works, many stones out of alignment.



*Before works, propping in place.
Gaps between stones easily seen.*



Photos show the extensive propping. Slipped stones, mortar completely washed out.



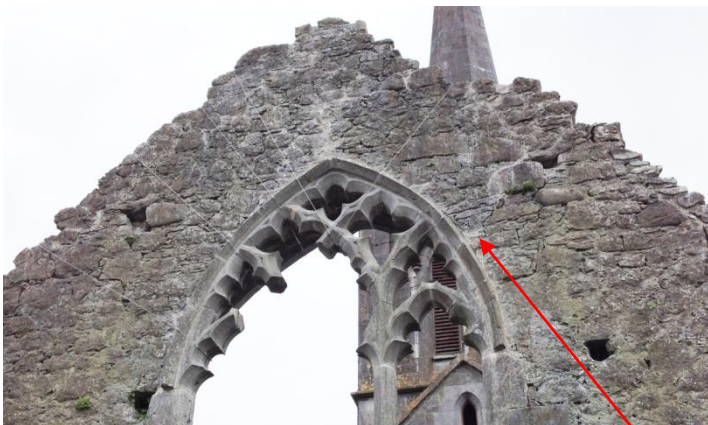
Tubes inserted for the pouring of grout.

Stones eased back into their correct positions with the aid of ropes and joints then mortared up.





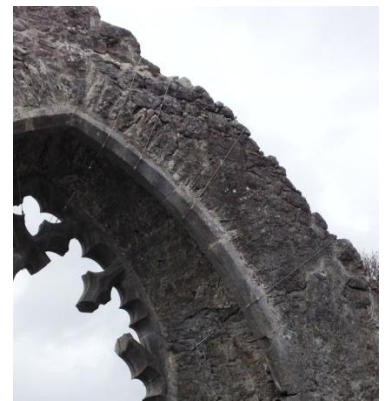
Mortar set and ropes removed.



*Completed works, external face
Stainless steel tie wires are barely visible*



Completed works, internal face



Wall head and gable generally:



View of gable wall head from west, before works



*Before works, west side of gable
Extensive root system caused huge damage.*



West side of gable during works, rough racking underway

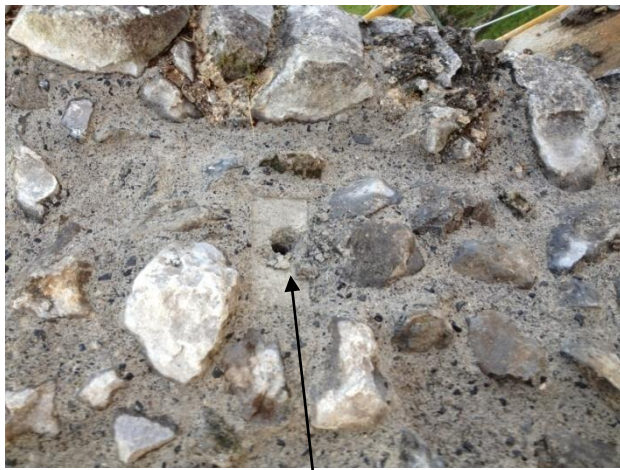
*General view from south of works underway
on gable wall head.*





Views of limecrete under-barge with stainless steel reinforcing bars being put in place.

Markers for later insertion of ss pins following initial set of limecrete under-barge. Wall was drilled and pins inserted as per Eng. spec.



Hole drilled for insertion of threaded bar



Rough racking complete on top of gable.

Below, general views internal face, work near complete.



Sill and area below sill:



Above, rough racking of sill nearly complete



*Completed consolidation
of sill.*

5. Consolidation of overhanging pier on inner face of North Nave Wall adjacent to 19th Century Church, including partial rebuilding as necessary.

Repair in this area consisted of the rebuilding of masonry where necessary to support overhanging unstable facing stones at higher levels. Because of the relatively shallow depth of the missing facing stones it was necessary to build the new masonry out to the face of the wall. It was not possible to achieve sufficient stability by using shallow stones and keeping back from the wall face and finishing 'rough raked' which was successfully done elsewhere. Re-pointing and pinning was undertaken where necessary.



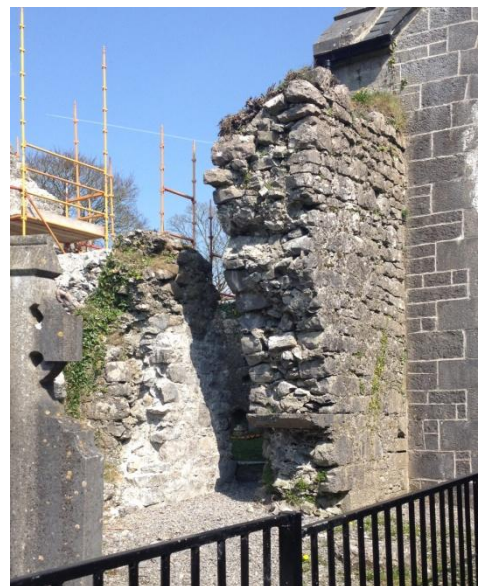
Side view (from east) showing rebuilt wall face

Stone used was sourced from stone dump in north corner of the graveyard. This work was done early in the job so that the best quality facing stones could be chosen from the stone dump. (Facing stones were not generally required for consolidation in other parts.)

Same view showing wall prior to works.



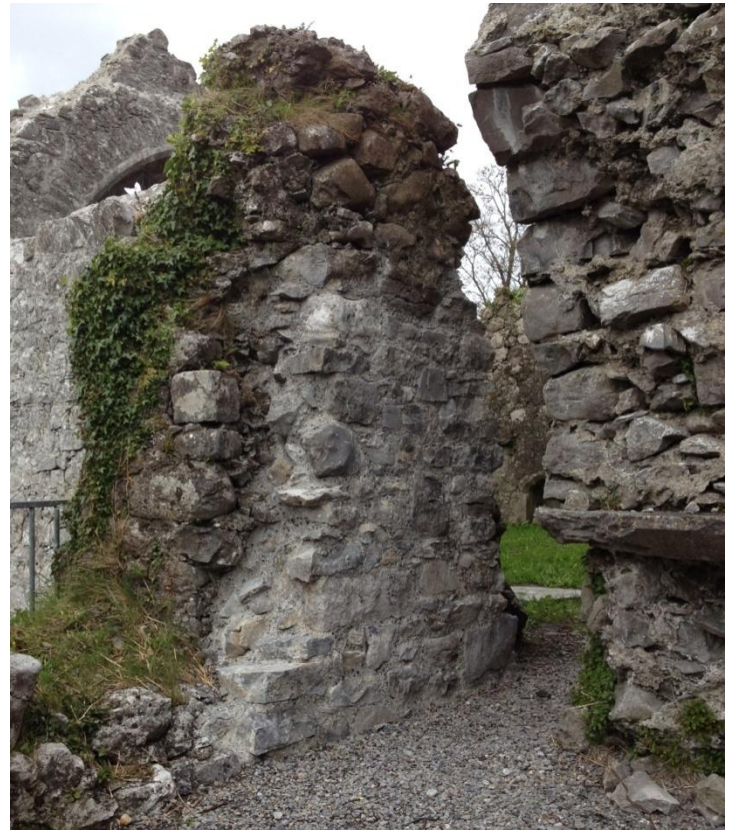
View of wall prior to repair



After repair.



Close up view prior to repair



After repair

7. Consolidation and stabilisation of west wall of north transept.

Extensive vegetation growth had done much damage to this section of the structure. Repair work included the treatment and careful removal of as much vegetation as possible. There was a huge build up of humus and soil on the wall head which had to be removed. This entailed the unavoidable dislodgement of small stones from the core of the wall and it was also necessary to re-bed some facing stones at the top of the wall. Small stones were saved and reinstated during rough racking of the wall head.

Root systems were so extensive and roots so large that it was not possible to remove many of them without dismantling much of the wall. This was not an option so the roots were left in place and treated with 'Roundup' (glyphosate). They were drilled and plastic tubes were inserted into the roots and these were left in place for further applications of treatment on an on-going basis until the plants would be completely dead.

The wall was grouted using tubes inserted on both sides of the wall. As the root systems die back this will give rise to voids in the wall fabric. However the grout inserted during this repair will help to ensure the on-going stability of the wall. It will be necessary to monitor the condition of this part of the structure, and, indeed, the whole structure, into the future.

The wall face was not generally reinstated in this area but the exposed core was consolidated using the rough racking method. Unsupported areas of facing stone were supported with core work held back at least 100mm from the wall face. The wall head was finished rough racked.



'Round-up was used to treat vegetation. ('Brushwood' which contains triclopir was not obtainable)

Above, views of west wall from the west prior to works
Most quoins stones had been robbed out but these were not reinstated as it would have been necessary to source new cut stone. A reasonable degree of stability was introduced by rough racking (to be monitored into the future).



Rough racking underway on west face



Consolidation of west face complete



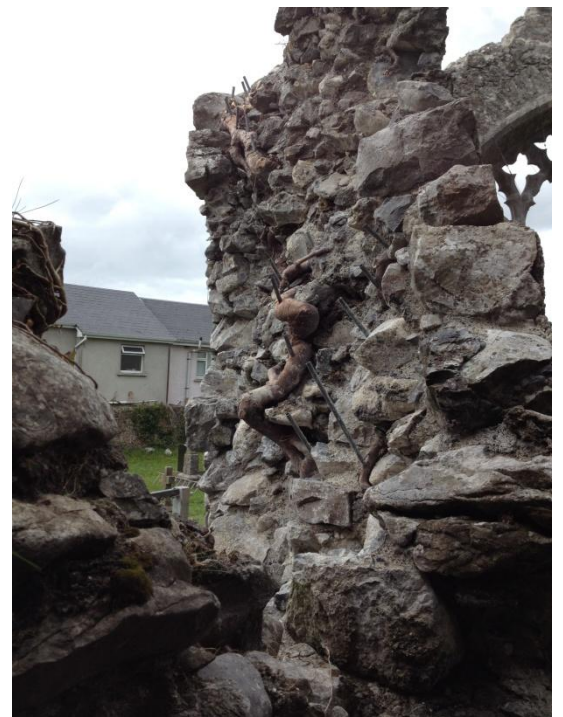
Close-up views of consolidated west face, and wall head.



Views (on the left) of west wall from south, prior to works



Views (on the right) of west wall from south following removal of much vegetation. Large roots had to be left in place.





Views of the wall head during removal of vegetation and soil and humus.



Wall head following consolidation.



View (on left) of inside (east) face of west wall prior to works and (on right) following removal of some vegetation.



Views of inside face prior to grouting and re-pointing.



Close up showing tubes left for application of weedkiller



View of inside face following grouting and re-pointing



Views of south end of inside face of wall following consolidation.

8. Consolidation and stabilisation of northern side of west wall of the nave and adjacent projecting masonry.

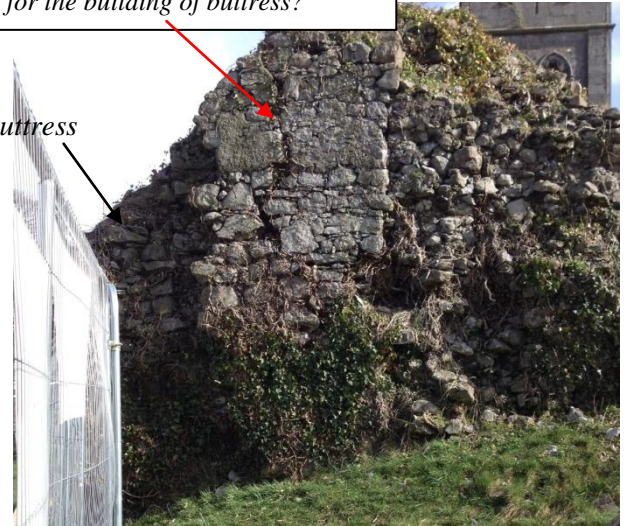
Dominic Delaney has discussed in his Archaeological Report the interesting but not readily interpreted features of this part of the ruin. The methods used for its consolidation were similar to those described for the west wall of the north transept. It was also covered with extensive vegetation and was quite unstable. Grouting was not done on this part of the structure.

Crack extending down gable wall which may have been the reason for the building of buttress?

Buttress



Outside (west) face prior to works



Outside face during removal of vegetation



Outer face during re-pointing and consolidation



Close up view of lower part of wall.





*Views of buttress from west before works (left) and after works (right)
Small stones and pinnings were inserted to stabilise overhanging stones.*



View of buttress from east, after works



View of outside face of wall after consolidation

View of exposed wall end from south after completion of works. Note 20th century concrete repair in foreground.



View of inside (east) face prior to works



Inside face after works. Works to the inner face consisted of the removal of vegetation and the consolidation of the wall head.

Conclusion

Extent of work undertaken was limited by financial constraints but the works which were completed were substantially as set out in the tender documents.

Despite the unfavourable time of year for the use of lime, the repair work was successful and mortar has set well.

This was largely as a result of the careful protection of the works which the contractor put in place. The winter of 2014/2015 was not severe which probably also helped.

Repairs are readily identifiable at present but should blend in well in the future as the mortar ages. Aggregates are from native local limestone which is appropriate, and appearance, while not identical to the original, is similar in character. Written and photographic records clearly identify repairs undertaken.

Every effort was made to specify and undertake consolidation and repair works which would ensure the stability and preservation of the ruined remains of St Mary's into the future. However the work was constrained by the funds available and not all parts of the structure were the subject of works and works which were undertaken were limited. On-going monitoring of the structure must form part of a management plan for these important remains.

Report prepared by Gerry McManus *completed June 2015*

Gerry McManus.