# 2019 GLAS Traditional Farm Buildings Grant Scheme Seminar

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Typical Structural Issues and Possible Solutions

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## **Principles of Conservation**

 Apply principles of conservation and in particular, minimum intervention. I.e. Keep as much as possible and change as little as possible whilst consolidating the structure.

# Structural Elements

- Roof
- Walls
- First Floor / Loft

# **Roof Coverings**

#### Common roof coverings

- o Natural Slate
- o Galvanised Iron
- o Thatch

- Typical Issues/Repairs:
  - Slipped slates usually due to corrosion of nails and/or rot of battens rather than problem with slate.
  - Slipped slates can be repaired by installing lead clips or stainless steel hooks.





• When 25% - 30% of slates have slipped you should consider full re-slate of roof.

- Allow 25% loss when removing existing slate.
- Source new natural slate to match existing dimensions, colour and texture.
- Salvaged slate should not be used as it creates a market which may be detrimental to existing buildings.
- Take care when replacing battens as new timber battens are generally thicker than original ones. This can lead to problems at junctions with adjoining structures or barges.



• Mix slate where possible to avoid large areas of a different colour.



 Provide lime parging to underside of slates. This provides additional protection water ingress and also resistance to wind suction.

# **Galvanised Iron Roof**

- Typical Issues/Repairs
  - Corrosion of fixings If replacing fixings, use galvanised mild steel with weather proofing washers. Take care not to damage corrugated sheets when using nail bar or hammer to remove fixings.
  - Corrosion of corrugated sheets It is possible to significantly extend the lifespan of the corrugated sheets by cleaning, removing rust and painting with a corrosion resistant paint.



# **Galvanised Iron Roof**



• When roof sheeting is excessively corroded, the only solution is to replace.

# **Galvanised Iron Roof**



#### Typical Issues/Repairs

- Roof structures will vary but generally rafters shall span from eaves to apex and may be supported by timber purlins. The purlins will span between gable walls, internal cross-walls and/or supporting timber trusses.
- Undulations in a roof will generally be due to undersized purlins deflecting over time and/or rot of purlin ends and/or rot of supporting Truss ends.
- Where timber is built into a damp wall it will be susceptible to rot. This is true for all timber elements such as wall plate; rafter ends; Truss ends, etc.
- If truss ends are rotten rotten section should be cut out and a galvanised steel 'shoe' or similar remedial detail installed on end of truss.
- Similarly, ends of rotten rafters should be cut out and the rafter spliced with a new treated timber rafter to extend past cut by 1 metre min.
- As much of the existing timber should be retained as possible.



 New Timbers constructed over existing so that ceiling could be maintained.



• Original Ceiling maintained internally.



New battens on existing timbers. Some timbers spliced.



• Existing timber purlins and rafters rotten due to water ingress



 Existing purlins and rafters retained where possible. Rotten ends cut out and spliced. (Note felt used as weather shield, removed as works progressed)



Diagonal strut cut out to accommodate water tank.



• If it looks dangerous, prevent access and seek advice.



• Cracking in down-stand beam reported. Opening up identified cracking perpendicular to grain.



 Crack in bottom of timber beam perpendicular to grain



• Timber beam failed in bending.

#### Typical Issues/Repairs

- Lean outwards in wall This can be due to rotation at foundation level and/or horizontal thrust from roof.
- Walls generally 450mm to 600mm thick Rule of thumb If in excess of one third thickness of wall out of plumb over height, action is required.
- Lean could be historic. Perhaps monitor by fixing bracket internally to allow use of plumb line. When used outside can be inaccurate due to wind. If ongoing movement recorded identify source.
- Rotation at foundation can be caused by undermining of wall base by excavation for drain or lowering of yard. Remove drain if undermining foundation and fill with concrete.
- Can also be caused by rainwater discharging to ground softening earth at base of wall. – Fix rainwater goods and discharge to soak away or water course away from building.
- Rot of timber lintels These should be replaced with oak or precast concrete lintels depending on spans, and agreement with Heritage Council.
- Extremely important to diagnose cause of movement so as to provide appropriate remedy.



 Arches need to be temporarily propped until they can be re-built.



 Cracking in return walls caused by rotting of timbers imbedded in wall



 Paint on beams, etc bearing into wall can be good indicator of movement of walls. When was beam last painted or cracks filled?



 Cracking in gable wall as result of movement of front wall



 Stitching of crack using stainless steel twisted rods and chemical grout.



 Cracks may no longer be opening up and can be stitched and filled.



 Undersized rafters and lack of adequate horizontal tie shall contribute to rotation of the walls.



 Significant rotation of rear wall. Ground conditions very poor in close proximity to Shannon River



- Solutions considered:
  - Insufficient internal walls to 'stitch' back to.
  - Pattress plates and steel ties would render internal of shed unusable.
  - Conservation officer was amenable to construction of concrete buttresses to halt rotation of wall. (not a GLAS project)



 Bulge in wall and previously installed pattress plates.



 Cement based render removed to reveal large sections of timber embedded in wall. Pattress plates would never solve the problem.

### First Floors/Lofts

#### Typical Issues/Repairs

- Rot to ends of joists where embedded in damp walls. May be possible to cut out rot and splice floor joists if sufficient space available to seat new timber into wall. Alternatively new timber or steel wall plate can be inserted under existing joists to support.
- Undersized joists Existing joists may be strengthened by fixing new timber joists along side the existing if necessary
- Rot/infestation to floor boards Woodworm will generally attack softer sap wood or hard wood that has been softened by moisture. Floor boards in many cases will have to be replaced. It may be possible to treat larger timber sections for woodworm.

## Conclusion

- Although these are some common problems, every structure will present its own particular issues.
- It is important to carry out a detailed inspection and understand the construction, history of the building, and cause of defects before proceeding.
- It is essential to remember that as much of the original material should be kept where possible.

Thank you for your time and attention.