



**Method Statement to discharge condition 5 of Listed Building
Consent for the barn at Old Tong Farm**

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Fig 1: South elevation of dilapidated barn at Old Tong Farm

Brief description of the building.

The barn

The building is curtilage listed and is within the residential boundary of Old Tong Farm (G II*).

The building has terminal gables both ends—the roof being clad in hand-made clay tiles. White painted softwood featheredge weatherboard cladding to the walls, with inserted modern joinery and an up-and-over garage door to the north end of the frame. The principal frame member (tie-beam) on the north elevation has been cut through to form the large opening for the garage door. The building is single storey and consists of four-bays.

There is a concrete ground floor on two levels in the barn, the highest of the floor levels is below the outside ground level on the north elevation. The bay posts are of a small cross-section, and there is no sole-plate at the base of the bay posts, the majority of bay posts have their base(s) encased in the concrete floor. The wall infill studs, that were visible on the west elevation, are modern softwood insertions between bay posts.

The roof frame is a gabled, clasped purlin roof (side purlin) with collars set on bay-divided common rafter sets. Apart from the end gable trusses, the intermediate roof trusses are formed by a collared common rafter set that steps to the side of the tie-beam and are not principal rafters that tenon into the ends of the tie-beam.

The building has severely racked towards the east and is currently only prevented from total collapse by the modern stable structure at its east supporting the frame at the eaves. This modern stable structure will be demolished as part of the approved works, so some extensive temporary propping will need to be carried out to the existing building prior to this stable block being demolished.

Survey method.

A visual inspection was carried out to the timber-frame of the barn at Old Tong Farm on the 5th of February 2024 in order to assess the barn structure and take site measurements to produce frame survey and repair drawings.

Throughout the survey, the main barn doors were kept open to assist in lighting the barn interior, in addition, a torch was used to view the timbers in more detail.

The purpose of the survey was to identify structural timbers that required repair, replacement or re-instatement of a missing timber as a minimum in order to maintain the structural integrity of the barn and to return the timber-frame to its primary function, load-bearing. The survey will look at like-for-like replacements and timber-to-timber splice repairs. Previous interventions and alterations have already been carried out to the frame, of which are modern softwood to infill the walls and modern additions to form cross-frame bracing.

Timbers are inspected both visually and physically 'hands on' where rot was suspected and access was good. Where inaccessible, the timbers have been visually inspected only. Recommendations for repair and replacement are then shown on the survey drawings of the structural frame, colour-coded for the various repair methods proposed (drawings numbered PP-25Q-02, 03, 04, and PP-25Q-05 at their current revisions).

Limitations of the survey: Access was limited in the bay 4 (north) and bay 3 due to storage of items. The east wall was clad both inside and out and covering any existing studwork.

General observations.

The framework walls and roof typology and construction details indicate that the barn is likely to have been constructed no earlier than early-mid 19C, towards the end of the Georgian era / beginning of the Victorian era. An OS map dated 1871-1890 shows the barn in its current location (map on KCC heritage maps).

Eaves-plates are joined in their length by face-halved-and-bladed-scarfs.

Rafters are cut to a thin ridge-board, and its width / depth is orientated as modern rafters are.

Wall (longitudinal) bracing is achieved with small cross-section straight bracing from bay post to eaves-plate.

Wall truss (lateral) bracing was relying on softwood bolted to tie-beam and post, ineffective.

There are no sole-plates visible to the framework and a number of post bases are concealed in the concrete floor.

A high proportion of softwood has been used to infill the walls and used as a framework for the windows and weatherboard cladding.

The roof structure is relatively untouched but has softwood stud to make up the secondary timbers in the gable end and used as a framework for windows and weatherboard cladding.

The joinery and up-and-over garage door are all modern interventions and in a very poor condition.

The weatherboard is softwood painted white; unusual for a barn as houses and domestic structures were generally painted white whereas agricultural outbuilding were generally painted black, or if in oak featheredge weatherboard, left natural. Again, the weatherboarding is a relatively modern intervention and so too is the colour choice.

As with typically Victorian era timber-framing, the oak cross-sections are less generous than earlier frames and main bay posts are generally undersized.

Remaining timber-framed elements show that the original construction of the timber-frame was oak.

The approach to repairs.

The barn benefits from both planning permission and listed building consent for the frame to be dismantled and taken off site to repair the remaining timbers and re-frame the building to return the structure to a load-bearing timber-frame as part of the conversion works.

The barn will be supported via adjustable steel props and the use of heavy-duty ratchet straps – 50mm wide to temporarily tie elements together.

All imposed load and dead loads from wall and roof cladding are to be removed carefully by hand. The structural frame will need a limited amount of straightening and levelling in order to reconnect all timber-to-timber joints and enable a good fit to all structural junctions and connections.

Existing oak structural timbers are to be individually coded and identified (see method statement) to allow each individual timber being re-used to go back in the same location when re-erected.

The repairs are proposed to be carried out at our workshop and following traditional carpentry techniques and joints i.e. mortice and tenon. European green oak with a sawn finish will be used for larger structural replacements and full cross-section splices. European dry oak with a sawn finish will be used for smaller face splices. The use of same species timber and traditional carpentry techniques in the repair of the timber-frame makes the repairs compatible with the historic structure and construction system in which it was built, both technically and aesthetically. The splices will maximise the existing timber and cut to the appropriate size required to remove the decayed and damaged timber while allowing the structural frame to regain its primary function, loadbearing.

A combination of hand and power tools will be used to form the joints in both the existing and new timber in order to get a good fit. Smaller splices to be mechanically fixed and timber plugged while full size joints will be pinned with oak pegs cut to a taper.

Use of metal straps to reinforce the lap/dovetail joint at the eaves-plate/tie-beam interface is quite common. The structural engineer is to make any recommendations for necessary metal strap reinforcement to maintain the maximum number of existing timbers.

Timber species will be European oak and replacement and full-splice sizes are proposed to match existing timbers, **subject to structural engineer's recommendations**. A meeting on site with the structural engineer resulted in the engineer performing some preliminary calculations for timbers of concern and a number of the bay posts are required to be replaced with a larger cross-section of oak.

Method statement.

The following guidelines are for the essential repairs to the curtilage listed timber-framed barn outbuilding at Old Tong Farm. The structural repair of the timber-frame is part of a project of repair/conversion.

- Site security fencing to be set out and welfare facilities put in place.
- All services to be identified and made safe where required.
- Erect temporary support via adjustable steel props to eaves-plate and install heavy-duty ratchet straps alongside tie-beams to hold frame in position for the duration of the cladding strip and dismantling of the structural frame.
- Once the barn is structurally supported, and prior to cladding strip, demolish the adjacent structure of the modern stables to the east.
- Erect perimeter scaffolding and internal mobile scaffold towers.
- Strip roof tiles and fittings from the single storey building, grading and stacking securely ready to reinstate. Strip all tile-battens from the roof and dispose of, de-nail the rafters.
- Strip existing weatherboard and dispose of.
- All structural frame timbers are to be marked up with coloured tags which correspond to different colours for different elevations and each tag to be numbered from left to right. This tagging system will give each timber member its own unique location which will be recorded on the repair drawings. Softwood stud infills and bracing will not be recorded and kept but will be disposed of as these components are dismantled.
- Contact the Local Authority's Conservation Officer once the roof and wall claddings are stripped and tagged in order to agree timbers to be salvaged.

- Dismantle the existing framework beginning with the common rafters of the roof, taking down the rafters on a bay-by-bay basis. Leave the collared rafter sets in place (braced as necessary) until the lengths of purlin can be individually removed. Remove the purlin sections and collared rafter sets.
- Remove the softwood from the end frames and partition and dispose of.
- Remove the softwood bracing and wall infill studs and dispose of.
- Dismantle what remains of the north tie-beam (T5) and tie-beams (T4 & T3).
- Disconnect the scarf-joint in the eaves-plates and dismantle the eaves-plates through bays 3 & 4, starting at the north end bays. Dismantle the bay posts, removing the adjustable steel acro props and ratchet straps as work proceeds to the eaves-plates.
- Dismantle what remains of the south tie-beam (T1) and tie-beam (T2).
- Dismantle the remaining eaves-plates through bays 1 & 2. Dismantle the bay posts, removing the adjustable steel acro props and ratchet straps as work proceeds to the eaves-plates.
- Once the frame has been carefully dismantled and stacked to one side, strip out the perimeter scaffold access.
- Clear site of all waste and remove temporary welfare facilities.
- Load salvaged timbers onto transport vehicle and transport back to our secured framing yard.
- Repair framework to suit repair drawings, structural engineer's details and other minor repairs once the timbers are back at our workshop. Using the colour-coded numbering system adopted at dismantling, repositioned each timber in its original place.
- Traditional joints will be used to connect repaired/ replaced sections back into existing framework. Ideally, existing joints in primary plates i.e. arcade-plate (main eaves-plate) will be used in replacement sections where practical. Use power tools and hand tools to achieve an accurate joint and draw-bore to a tight connection with tapered oak pegs.
- Once the framework is fully repaired, and framework to walls have been completed in oak studs in-lieu of the modern softwood studs, the structural frame timbers can be transported back to site.
- Whilst the frame is being repaired off-site, the new base / footings and brick plinth will need to have been installed a minimum of 7 days prior to re-erection of the framework.
- The frame will be re-erected in a logical order, temporarily bracing, propping and strapping as required.

— Re-erection of the framework to proceed in the following order:

- ❖ Lay a stiff 3:1 sand and cement mortar bedding mix (10-20mm thick) on the masonry plinth and install the oak sole-plate, starting on the north elevation and then east elevation and so on. Working clockwise lay bedding mortar and sole-plate as work proceeds.
- ❖ Starting at the north end of the barn, erect bay posts to T5, 4 & 3, through bays 4 & 3. Temporarily brace bay posts in a plumb and true position.
- ❖ Insert relevant wall braces into post mortices in readiness for eaves-plate fitting.
- ❖ Insert full height wall studs (including window trimmer for WG 1b) into sole-plate mortices in readiness for eaves-plate fitting.
- ❖ Install eaves-plates through bays 4 & 5, fitting tenons of wall braces, bay posts and full height studs as the eaves-plates are installed. Note!! ensure the standing frame remains fully supported and braced temporarily until such time that the truss bracing and tie-beams have been fitted.

- ❖ Drive in tapered oak pegs from the outside face of the framework to draw-bore principal mortice and tenons of bay posts, window posts, eaves-plate scarf joints and arch braces.
- ❖ Trim oak pegs flush with the timber externally and trim with a 20mm protrusion internally.
- ❖ Insert truss (cross span) bracing into post mortices in readiness for the tie-beam to be fitted.
- ❖ Install tie-beams for T5 & 4, fitting the brace tenon into the mortice in the underside of the tie-beam as the tie-beams are installed.
- ❖ Drive in tapered oak pegs to the draw-bored mortice and tenons of the truss braces to the posts and tie-beams.
- ❖ Trim oak pegs with a 20mm protrusion from the face of the timbers.
- ❖ Erect the remaining bays 2 & 1 in the same manner as bays 4 & 3.
- ❖ Remove all temporary bracing.
- ❖ Insert wall studs that cut to a brace.
- ❖ Erect the north and south gable ends and temporarily brace the principal rafters in a plumb and true position.
- ❖ Drive in tapered oak pegs from the outside face of the framework to draw-bore principal mortice and tenons of end collar and principal rafter connection to tie-beams.
- ❖ Trim oak pegs flush with the timber externally and trim with a 20mm protrusion internally.
- ❖ Fit the cut studs to the principal rafters to complete the gable ends – leave out the studs adjacent to the purlins until the purlins have been fitted.
- ❖ Erect the collared rafter sets at T4, 3 & 2, temporarily bracing the rafter sets in a plumb and true position.
- ❖ Erect the purlins, fitting these into the housings in the collars.
- ❖ Erect the remaining common rafters and ridge board.

The timber-framed building has now been re-erected and is ready for the conversion works to begin.

Recommendations.

The initial survey of the frame showed that the majority of the roof can be salvaged and re-built from the eaves-plates up, replacing softwood inserted studs for oak. To take full advantage of this, and to put these timbers 'on show' as they would originally have been, it is recommended that the roof is insulated with a 'warm-roof' rather than between and underneath and therefore covering all the rafters.

Softwood insertions (studs and truss bracing) will be replaced with oak.

Discussions on site with a structural engineer with regard to repairing the framework has brought to light two areas of concern. Firstly, that the bay posts are of too small a cross-section to adequately resist wind loading without excessive deflection and that the tie-beams will need a blacksmith style tie-strap if the lap/dovetail joint of tie-beam to eaves-plate is found to be damaged or inadequate. The majority of the existing bay posts are also currently in the concrete floor slab (no sole-plate) and is likely to be decayed below the concrete floor.

The concrete floor slab and hence the base of the posts are currently at a much lower level than the access track to the north of the barn. Immediately north of this access track are natural hazards in the form of a pond that borders the track and rainwater run-off from the sloping land to the north puts this vulnerable building down-slope of this pond and water from the landscape north of the barn. The finished floor level of the barn should be raised, the barn should sit on a masonry plinth, and the land drainage and pond overflow should be improved in order to prevent unacceptable risk from times of excessive water run-off, and therefore avoid future damage to this curtilage listed structure.

The repairs to the timber-framed structure will follow the repair drawings and structural engineer's recommendations along with the 'approach to repairs' and 'method statement' sections in this document.