Our Ref: 2021.07.09-JHF-Ltr Rpt-All Saints Church, Kempston (Weathervane)

VIA EMAIL:

Steve Stanford - steve.h.stanford@gmail.com

Cc: Laurane Bubbins - lbubbins@btconnect.com

Date: 9 July 2021

Dear Steve

Ref: All Saints Church, Church End, Kempston, Bedford MK43 8RH – Tower Weathervane

Following our site visit on 15 June 2021 to inspect the existing weathervane arrangement, we write as promised to outline the findings from our visit, with a view to proposing an alternative support method when the weathervane is replaced,

With the above in mind, we have visually appraised the tower and associated roof structure from ground level/within the belfry and subsequently made our own observations/opinions. For the purpose of this letter, the tower shall be taken to be on the West elevation of the Church and, therefore, the East elevation of the tower overlooks the nave.

Our insurers require us to highlight the following provisos and limitations:-

1. No trial pits, opening up works or other forms of invasive investigation were carried out as part of this appraisal. Observations made in this report are based on a visual appraisal of the exposed building structure visible from floor level externally and internally. Comments may also be included on non-structural elements, but these should be treated as information only as they are beyond the realm of our professional expertise.

2. Our Appraisal is based on observations made on the date of our visit shown above. As some of the defects noted within this appraisal may by progressive, no responsibility can be accepted for defects that were not evident at the date of our visit, or conditions that may have deteriorated since our visit.

3. This letter is not intended to be a full list of defects or conditions, but instead focuses on the most salient structural items considered appropriate to the structural form of the building, the use of the building and its overall structural condition given the purpose of the report. This appraisal is prepared without prejudice and items listed are the most salient points, bearing in mind the purpose of the appraisal. It should therefore not be considered as a ‘Full Structural Survey’.

4. This letter is prepared for the sole purpose as a brief letter based advisory report and is for the sole use of the named Client and their professional advisors only. The use of this letter by third parties is not allowed without the written authority of Wright Consulting. No responsibility can be accepted for any consequences of this information being passed to a third party who may act upon its contents/recommendations. Nothing contained in this letter shall be construed to give any rights or benefits to anyone other than the named Client and Wright Consulting, and all duties and

responsibilities undertaken are for the sole and exclusive benefit of the named Client and not for the benefit of any other party. In particular, Wright Consulting does not intend, without its written consent, for this letter to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the named Client. Use of the letter by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this letter, other than the named Client, agrees by virtue of its use to indemnify and hold Wright Consulting harmless from and against all claims, losses and damages, arising out of or resulting from the performance of the work by Wright Consulting.

5. The recommendations contained in this letter represent Wright Consulting's professional opinions, exercising the reasonable duty of care required of an experienced Structural Engineering Consultant. Wright Consulting does not warrant or guarantee that the property is free of hazardous or potentially hazardous materials or conditions.

Description

All Saints Church is located on a largely flat site to the West of River Great Ouse. The Church is Listed Grade I of architectural interest and is, therefore, protected under the Planning (Listed Building & Conservation Areas) Act of 1990 under list entry number: 1349075. The List entry describes the Church as follows:-

KEMPSTON RURAL CHURCH EhU TL 04NW 11/205 Church of All Saints

13.7.1964 - I

Parish church of coursed limestone rubble. Much of the church is C15 and Perpendicular although there are remains of Norman work at the base of the West tower and in the chancel where there are blocked Norman windows. The 3- bay arcades are Early English. The upper storey of the tower, nave and chancel are all C15, as is the two storey south porch which has a tierceron- star vault. The nave wall has two painted panels depicting the Creation of Eve, the Temptation, Discovery and Expulsion.

Listing NGR: TL0153147994

As the description suggests, the Church has been altered and extended several times during its life, although there appears to be no substantial alterations to the Church tower. The Church is constructed as a loadbearing mass masonry structure, largely relying on its cross walled nature and overall mass to resist lateral loads.

The church has been constructed in traditional stonework (limestone) with stone dressings/quoins. The roof of the Church is generally plain clay tile finished, although the tower has a substantially patched lead sheet finish.

Having briefly reviewed the location of the Church on the British Geological Society's website, it appears that it is likely to have been constructed on Felmersham Member (Sand and Gravel) Superficial Deposits which overlay a Great Oolite Group (Limestone and [subequal/subordinate] Argillaceous Rocks, Interbedded) Bedrock Formation. Without an intrusive site investigation, the subsoils cannot be confirmed,

however, given the overall lack of substantial cracking or movements within the Church, it is likely that it is constructed on a stable formation such as sand and gravel.

Whilst no investigation was undertaken into the foul and surface water drainage from the Church as part of this appraisal, it is a recommendation of this report that the outfalls from the foul and surface water drainage are checked and maintained to ensure they outfall at least 5m away from the building footprint and, if possible, into a suitable public drainage system.

Sketch details of the existing construction are included in Appendix A and photographs taken during our visit are attached in Appendix B.

Observations

It appears that the tower has been refurbished several times during its life, with the latest addition being a modern structural steel framework within the belfry to support the 10 bells (dated 1976), as well as small areas of external repointing in a cementitious mortar which appear to have been undertaken in the mid to late 20th Century (1960s). Given the soft nature of the lime mortar in which the walls have been built, once the surface water is behind the cementitious pointing, it is able to track internally into the tower structure with only limited ability to escape. There are, therefore, numerous areas where, as part of a 'freeze-thaw' effect, the pointing has fallen from the external surface or is currently loose and vulnerable to disturbance.

The 1970's bell frame is formed in structural steelwork and a photograph of the general arrangement is included in the appendix of this report. However, the Belfry Floor and First Floor structures all appeared to be formed traditionally with suspended timber beams supporting timber common joists. Although the new steelwork is essentially tying/stiffening the tower in two directions, generally there is limited cracking within the tower visible internally despite the new steel frame being supported on concrete padstones cast into the external walls. Whilst we understand that the bells are rung on a regular basis, the walls at first floor and belfry level are not cracked and we would, therefore, suggest that there has been limited movement related to the use of the bells internally. That said, the significant vibration that the use of the bells will deliver, may disturb some of the loose external cementitious pointing at parapet level.

The existing shallowly pitched roof structure consists of timber common rafters spanning between a centrally located ridge beam (spanning East to West) and the North and South external stone walls, with purlins at mid-span. The ridge beam has previously been strengthened with steel metal plates fixed to each side and the bottom face of the beam. This ridge beam is also supported at mid-span via another timber beam spanning between the North and South external walls at a slightly off perpendicular angle. This beam is supported on a clay tile and cement mortar corbel construction bedded into the external walls.

The existing weathervane is centrally located to the tower roof and consists of a timber post approximately 4m high, with 2m high decorative metalwork above. The timber post is laterally restrained in the East and West directions via 0.8m high timber braces at its base and via 4 No. metal cables fixed at its apex and to metal eyes embedded in the stone parapet. The weathervane's support post and braces penetrate the lead roof finishes and due to the poor condition of the timber post and associated poorly detailed flashing detail, it has been noted that rainwater is leaking through the roof finishes at this location in heavy rain. A

number of repairs to the leadwork have been undertaken over the past 10 years, but although the water ingress has reduced, it is still present. This ongoing water ingress is causing the timber post to decay at its base and the metal shims between the ridge beam and its strengthening plates have begun to corrode.

Recommendations

As a consequence of it's Listed status, any alterations or extensive repairs require Listed Building Consent or Church of England Faculty approval as appropriate. The following recommendations should, therefore, form part of an overall appraisal of the Church and within the long term maintenance regime for the Church.

The PCC have suggested that they would like to replace the weathervane and if possible, support it via a steel framework above roof finish level. This will allow the lead roof finishes to be continuous, with no penetrations that could lead to future water ingress. The proposed steelwork will consist of PFC members fixed to the 300mm thick parapet walls, that will in turn support principal beams spanning the full width of the tower. These principal beams will support the new weathervane and braced support post on short perpendicular secondary beams. We have produced a conceptual arrangement sketch (SK001) for the proposed steelwork to allow further discussion. However, until a detailed analysis of the steelwork is undertaken, it is unclear whether the steel beams will be able to span the full width of the roof and avoid clashing with the existing roof ridge. In addition, the proposed steelwork may have a negative effect on the parapet walls, potentially causing cracking in the future due to the stiffening effect of the steelwork and the new proposed loads that will be applied to them.

We have therefore researched into alternatives and would highly recommend using a bespoke flagpole system that is braced at its top with tension cables fixed to the corners of the tower. These systems are commonly used to support weathervanes on church roofs and will be less invasive to the tower structure. The system usually consists of a lightweight aluminium or stainless steel pole braced at its apex to the corners of the tower with stainless steel tension cables and fixed to the roof structure/boards below with a suitably sized metal base plate. The pole and base plate usually arrive in two parts to allow for easier construction and are bolted or screwed together. The roofs lead is laid over the base plate and dressed up the pole. A skirt will be prewelded to the pole for the lead to be dressed under and prevent water ingress. This solution will be more lightweight, easier to construct and should be a cheaper option for the church. Sketch SK002 shows this option.

In addition to the above, we would also recommend that the cementitious pointing present to the inside face of the parapet walls be repointed with a suitable lime mortar, as and when the cement mortar fails. With this in mind, we would recommend the mortar be inspected on a biannual basis and repaired as necessary.

We trust this letter is suitable for your current needs, but should you have any further queries or concerns, please do not hesitate to contact us.

Yours sincerely

Josh Halton-Farrow **BEng (Hons) MEng CEng MIStructE**
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For Wright Consulting

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APPENDICES

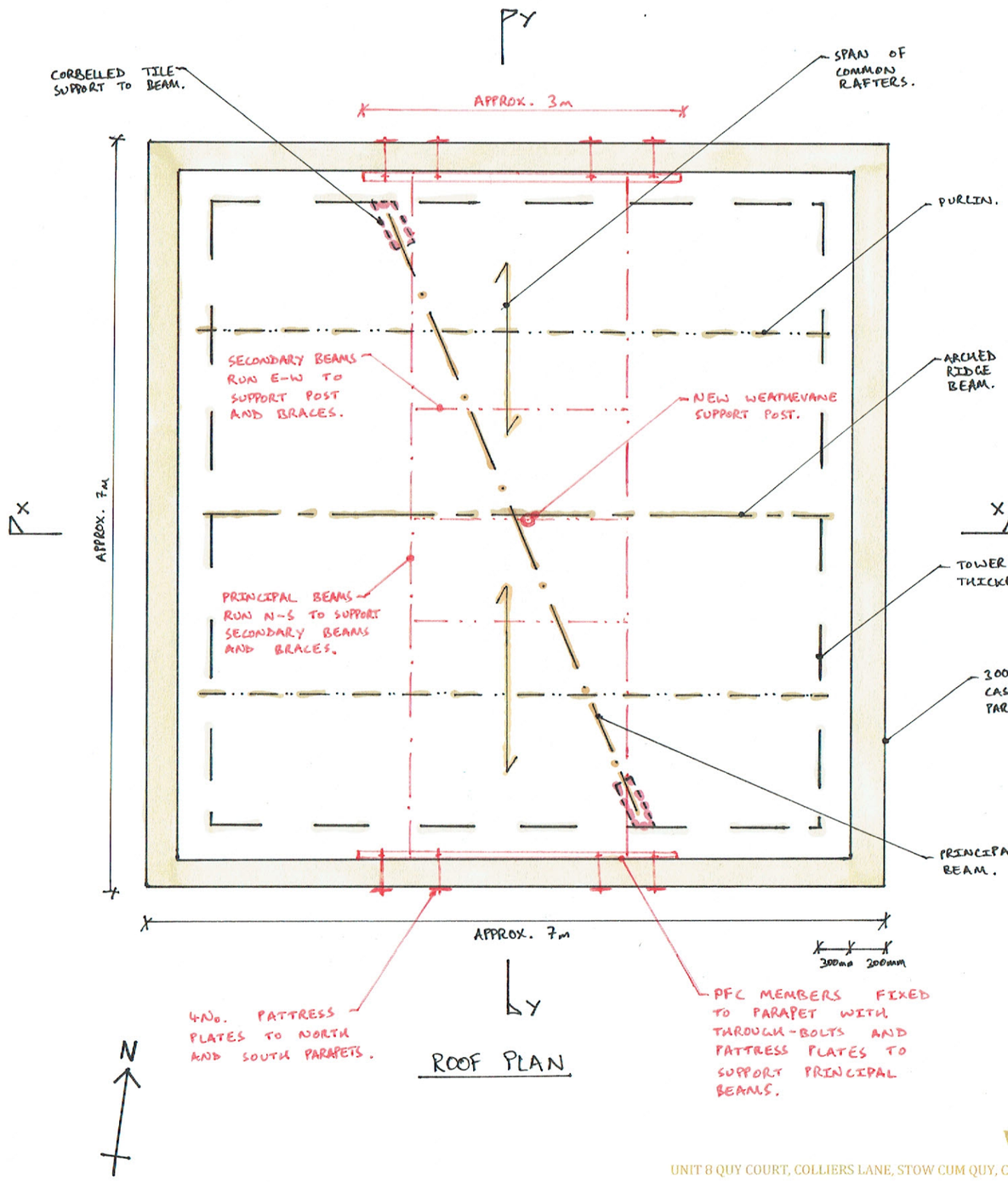
Appendix A – Sketches

PROJECT NAME: ALL SAINTS CHURCH, KEMPSTON – TOWER WEATHERVANE

No. : SK001

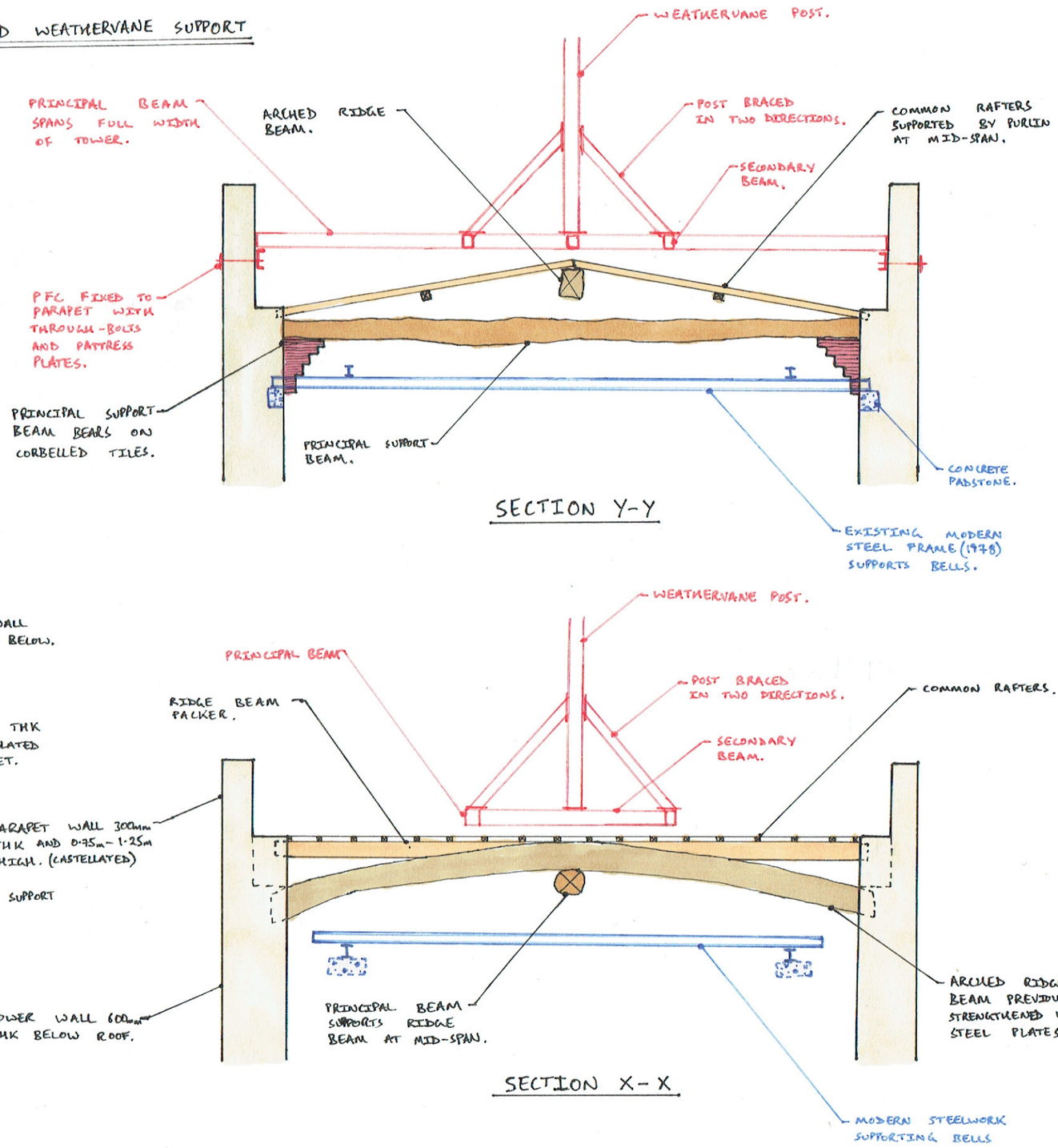
DATE: JUNE 2021

REV:



ROOF PLAN

PROPOSED WEATHERVANE SUPPORT



SECTION Y-Y

SECTION X-X

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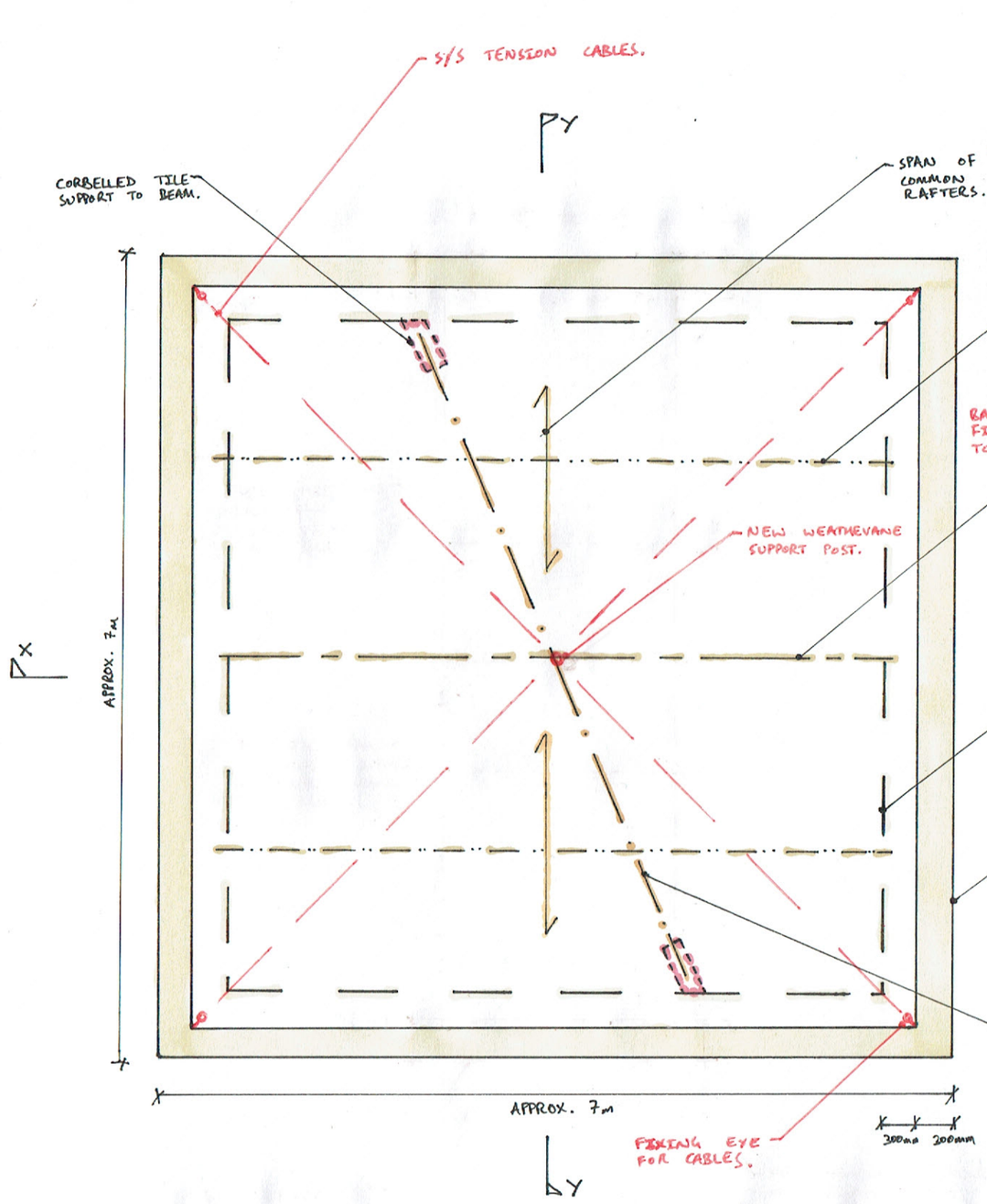
COMPANY REG. NO. 10102701 REGISTERED ADDRESS: MEETING HOUSE FARM, OULTON, NORWICH, NORFOLK NR11 6NZ

PROJECT NAME: ALL SAINTS CHURCH, KEMPSTON – TOWER WEATHERVANE

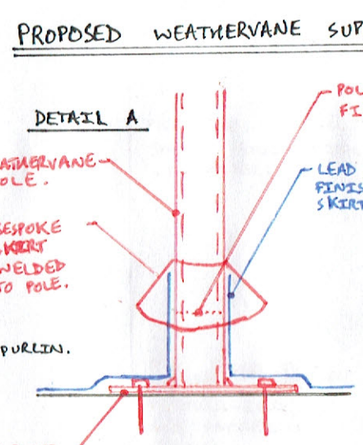
DATE: JUNE 2021

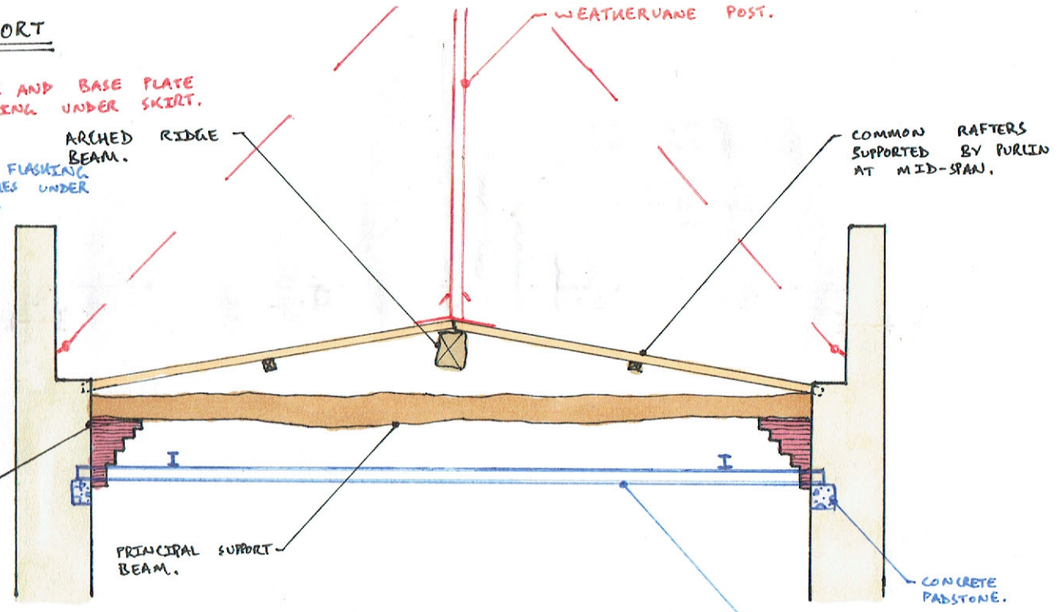
No. : SK002

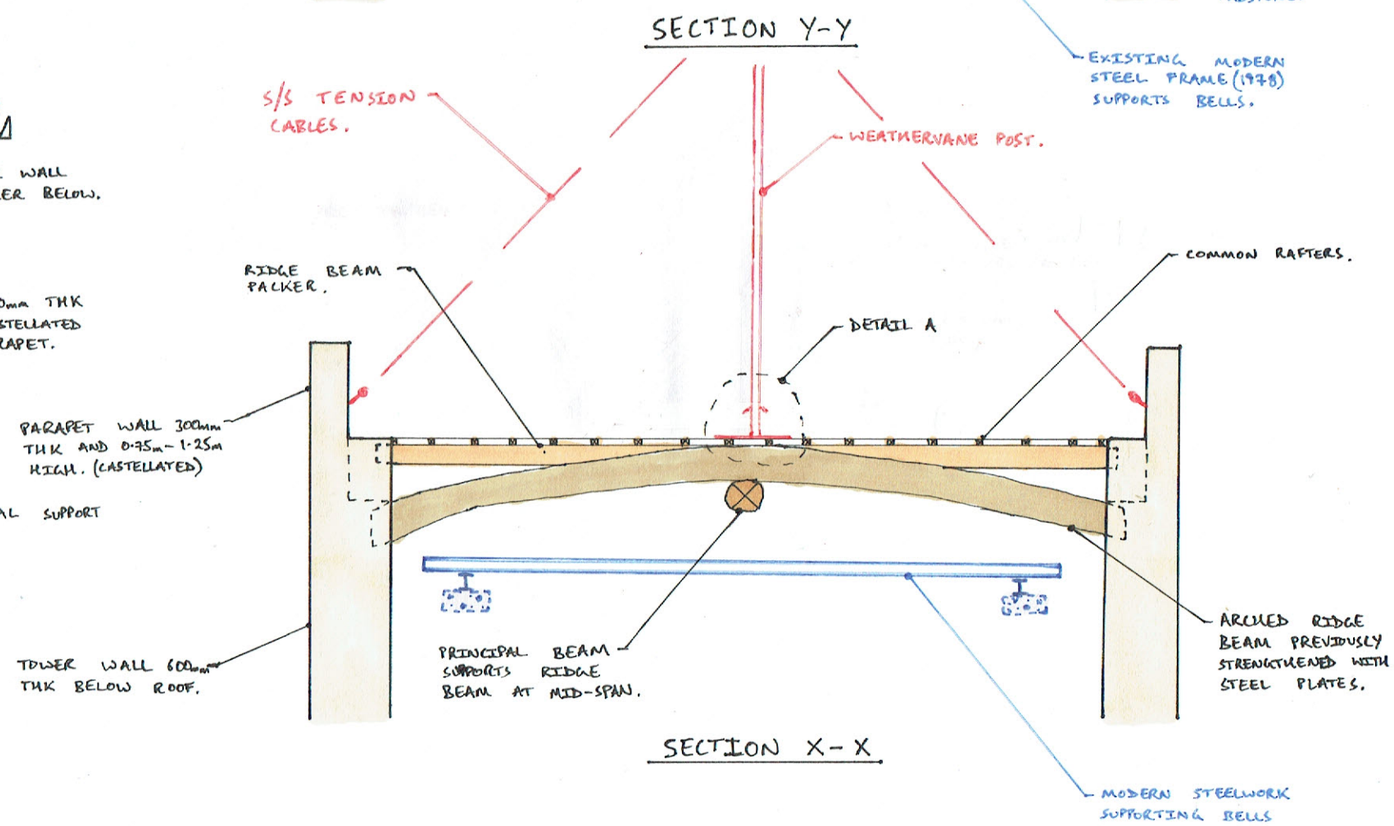
REV:



ROOF PLAN







SECTION X-X

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Appendix B – Photographs Taken During Visit

Photographs taken on 15/06/2021

Photograph 1 – South West corner of tower

Photograph 2 – South East corner of church

Photograph 3 – Tower roof finished in lead

Photograph 4 – Poor leadwork details around existing post

Photograph 5 – Principal support beam supporting strengthened ridge beam

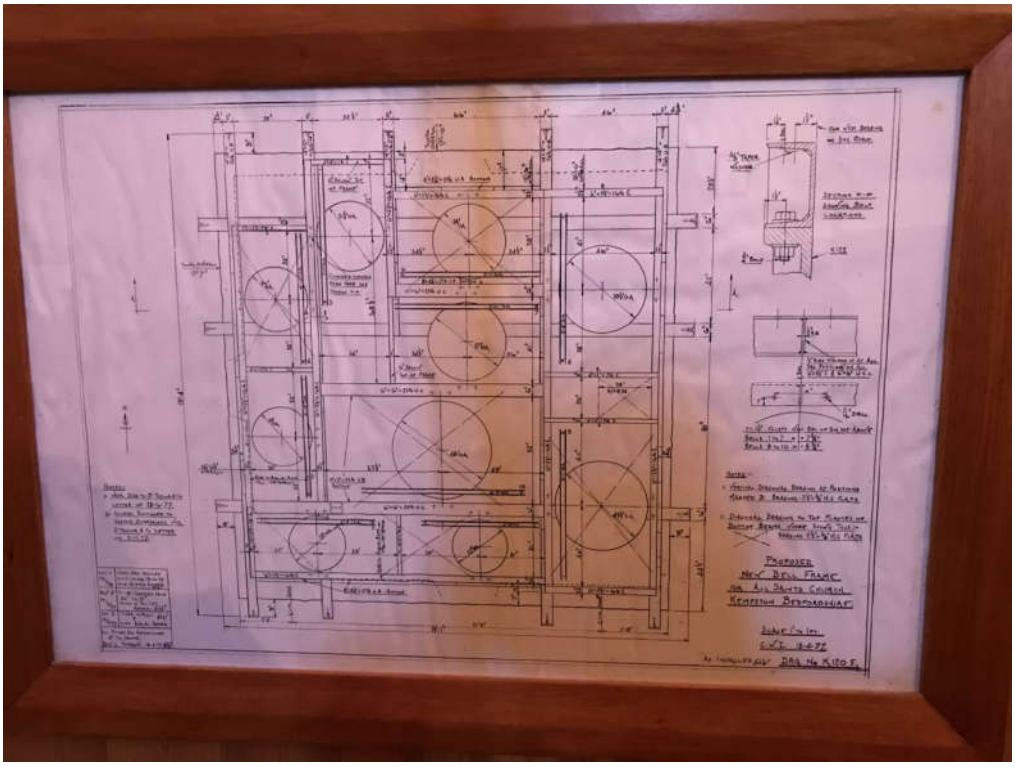
Photograph 6 – ‘Modern’ steelwork to support bells

Photograph 7 – Weathervane post fixed to side of ridge beam

Photograph 8 – Principal support beam bearing on corbelled tile construction

Photograph 9 – Ridge beam support

Photograph 10 – ‘Modern’ steelwork supporting bells



Photograph 11 – Plan of ‘modern’ steelwork proposal (1978)

Photograph 12 – Flagpole fixed to parapet wall