PRE-PLANNING STRUCTURAL FEASIBILITY REPORT

CHRIST CHURCH PRIMARY SCHOOL

Client: London Diocesan Board for Schools

Report Reference: SE1131 / SFR / 110814 / A

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Contents

1.0 Introduction

The following report discusses the structural issues of the proposed refurbishment of Christ Church Primary School. The school is located in the London Borough of Camden and the refurbishment is limited to the existing buildings on the school site.

1.1 Brief and Scope

This report has been produced for the London Diocesan Board for Schools to accompany the design information being submitted for the Listed Building Consent of Christ Church Primary School. The report aims to review the architectural proposals produced by SCABAL Architects for the site and discuss the structural implications of these as well as suggesting proposals for how the architectural intentions can be realised.

The report will therefore contain a brief description of the existing building construction, an explanation of the current architectural proposals and a discussion of the structural implications and proposals.

The focus of this report is limited to the structural aspects of the existing building and the structural design elements of the new proposals. A detailed review and commentary of other aspects of the building are outside of the scope of this report.

1.2 Available Information

The comments presented within this report are based on the information available to Iesis Special Structures, which has been summarised below, in addition to information gathered from inspections of the site.

The main items referred to within this report have been listed below for clarity:

- Architectural existing building general arrangement drawings and elevations produced by SCABAL dated July 2014
- Architectural proposed general arrangement drawings and elevations produced by SCABAL dated July 2014
- Building topographical survey produced by Glen Survey Ltd. dated June 2013

2.0 Site Description

The school is located in the London Borough of Camden in the area of Hampstead. The site is bounded to the North by Christchurch Hill and to the West by a public footpath which is at an elevated level to the site. To the East and South of the site are existing blocks of flats up to five storeys in height which are primarily clad in masonry.

The site generally falls from West to East and along the Western boundary of the site a retaining wall exists forming the aforementioned high level footpath.

2.1 Existing Buildings

The school buildings were originally built circa 1855 and were granted Grade II listed status in 1974. Various small alterations were carried out to the existing buildings in the 20th century, but the exterior of the buildings remain largely as the original.

The buildings are principally formed as load bearing masonry structures with yellow stock bricks and stonework features. The roof and floor structures are principally in timber with timber roof trusses forming the pitched roof profiles.

A plan of the existing building has been included in Appendix A and shows the principal areas of the existing buildings.

3.0 Architectural Proposals

The architectural proposals for the refurbishment of the existing buildings can be separated in to several areas for the purposes of discussion. These are the South Wing, Central Block, North Wing, main hall block and kitchen, and the external works. Each of the areas has therefore been discussed separately in the following paragraphs.

3.1 South Wing

The main focus of the refurbishment works is in the South Wing of the existing building with the addition of a new mezzanine floor being incorporated within the existing building envelope. As part of the works for this new mezzanine floor the existing roof trusses will require alteration in order to provide sufficient headroom to the new floor level. New doorways will also be required through the existing masonry wall and chimney stack. These alterations are shown on SCABAL drawing 537-P150 and 537-P151.

In addition to the above a new staircase is required within the South Wing in order to access the mezzanine level. This will involve the removal of a section of the existing floor structure.

Alterations are also proposed to the existing windows in this area of the building including the upward extension of one of the windows and the lowering of the structural opening in two others.

3.2 Central Block

The proposals for the central block are limited to the removal of several sections of existing load bearing masonry walls in order to improve the existing internal layouts. It is also proposed to transform two of the existing windows in to doorways one with access to the North playground. The locations of these are shown in Appendix A.

3.3 North Wing

The refurbishment of the North wing is limited to the removal of several non-structural timber stud walls and the alteration of one of the existing windows to allow for a new doorway. For details of the alterations to the existing windows refer to SCABAL drawings 537-P201 and 537-P202.

3.4 Main Hall Block and Kitchen

As with the central block it is proposed that several sections of existing load bearing walls are removed as part of the refurbishment works in order to improve the layouts. The locations of these are shown in Appendix A.

3.5 External Works

The most notable element of the proposed external works on the site is the removal of the existing porch link and its replacement with a new canopy structure, which would be installed in the area around the Northern playground. This is to be adjacent to the building but will be supported independently.

In addition to the above it is proposed that a single section of the boundary wall is removed in order to provide a new access on to the site.

4.0 Discussion of Structural Implications and Proposals

This section of the report will discuss the impact of the various architectural proposals and evaluate possible structural solutions. In order to do this the principal elements of the refurbishment have been itemised in the sections below and discussed individually.

4.1 Alteration to Roof Trusses within South Wing

As discussed in section 3.1 of this report to allow for the installation of the new mezzanine floor the existing roof trusses in the South Wing need to be modified to provide sufficient headroom to the new floor level.

The existing timber trusses are formed as a simple A frame with a timber tie beam at the base of the truss. It is the lowest horizontal tie member of this arrangement which causes issues with the proposed new layout. In order to allow for the removal of this horizontal tie member it is proposed that new raking steel ties are introduced in the formation shown within Appendix B. These new steel members are envisaged as being hot rolled steel angle sections however high strength steel tension rods or other sections could be considered to suit the desired aesthetic.

Initial structural modelling of this adjusted roof truss formation indicates anticipated movements of around 2mm at each end of the truss which is considered to be within acceptable limits. Further analysis will however need to be carried out to confirm these figures and assess the risk of any damage to the existing building fabric.

In order to avoid the need for temporary works to the roof structure it is intended that the new steel tie members are installed prior to the removal of the existing horizontal timber tie section.

4.2 Construction of Mezzanine floor within South Wing

It is intended that the construction of the new mezzanine floor will be in the form of timber floor joists spanning between steel universal beam sections that will be supported at each end by the existing masonry walls. It is envisaged that the new steel beams will be built in to pockets carefully formed in the existing masonry walls however this will be confirmed following an intrusive survey of the wall construction.

The steel floor beams will be located either side of the existing window locations to allow the fixing in the existing walls and to provide the proposed setback in the floor construction to be formed. The timber floor joists will then span between the steel beams supported on joist hangers fixed to the steels. This structural arrangement has been indicatively shown within Appendix B.

4.3 Formation of New Doorways within South Wing

The formation of the new doorways through the existing masonry wall and chimney stack within the South Wing will require substantial temporary works. It is envisaged that a temporary tower will be required to support needle beams that will restrain the existing chimney stack and support the masonry walls above the level of the new openings.

Following the installation of the temporary needle beams and frame it will be possible to create the new opening in the wall and put in place a series of new steel lintel beams which will support the chimney stack and wall above. As soon as these lintel beams have been successfully installed the temporary support frame and needle beams can be removed and any holes created in the masonry sympathetically repaired. These proposals have been indicatively shown in Appendix B.

4.4 Formation of New Staircase within South Wing

The formation of this new staircase will require a new void to be created in the first floor structure. This will likely require the introduction of new steel beams to trim the opening and support the existing floor joists. The stairs themselves are envisaged to be timber in construction with the half landing built on new timber posts supported at ground floor level. Full details of this will be developed following intrusive investigations in to the exact floor construction.

4.5 Formation of New Openings in Load Bearing Masonry Walls

The formation of new openings within the load bearing masonry walls will once again require an amount of temporary works. It will be necessary to introduce temporary steel needle beams above the proposed new opening with props from the needle beams down to ground level.

Following the installation of the needle beams the proposed new opening in the wall can carefully be formed in the existing masonry. Depending on the size of the opening and the details of the existing foundations a new steel lintel or steel box frame will be introduced to transfer the load from the wall above to the existing foundations. As soon as the new support structure is in place the temporary needle beams and props can then be removed. The locations of these box frames and lintels have been indicated on the plan layout included within Appendix A.

4.6 Alterations to Existing Windows

In essence the proposed alterations to the existing windows will either involve the lifting of the window head level or the lowering of the cill level. Where the cill level is lowered the stonework and masonry beneath the window will be carefully removed and a new opening formed as indicated on the architects details without the need for any large temporary works.

Where the window head level is being raised temporary needle beams will need to be installed in the same manner as those discussed in section 4.5 of this report. When the temporary support has been installed a new lintel can be introduced and the existing stone window façade can be carefully dismantled and re constructed at the higher level as per the architects proposed details. For more information refer to the architects details on SCABAL drawings 537-P201 and 537-P202.

4.7 Installation of New Canopy Structure to North Playground

The proposed new canopy structure is to be constructed directly adjacent to the existing building as indicated on SCABAL drawing 537-P220. The structure itself will however be entirely structurally independent with separate foundations constructed adjacent to the existing building. A new cantilevered steel frame will then be installed on the new foundation supporting a glazed roof structure as per the architects proposed details.

The steel frame is envisaged as being formed primarily in structural tee sections with fully welded connections to the main curved structural column and cantilever beam. The lateral tee sections will then be bolted to the primary cantilever steels as indicated on the proposed details.

5.0 Summary

It has been shown through the discussion of the structural implications, contained in section 4 of this report, that the architectural proposals, produced by SCABAL, are generally feasible. A further detailed design analysis will be required of these structural elements at the next stage of the design process following the conclusion of any further opening up works required.

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APPENDIX A

Plan of Site

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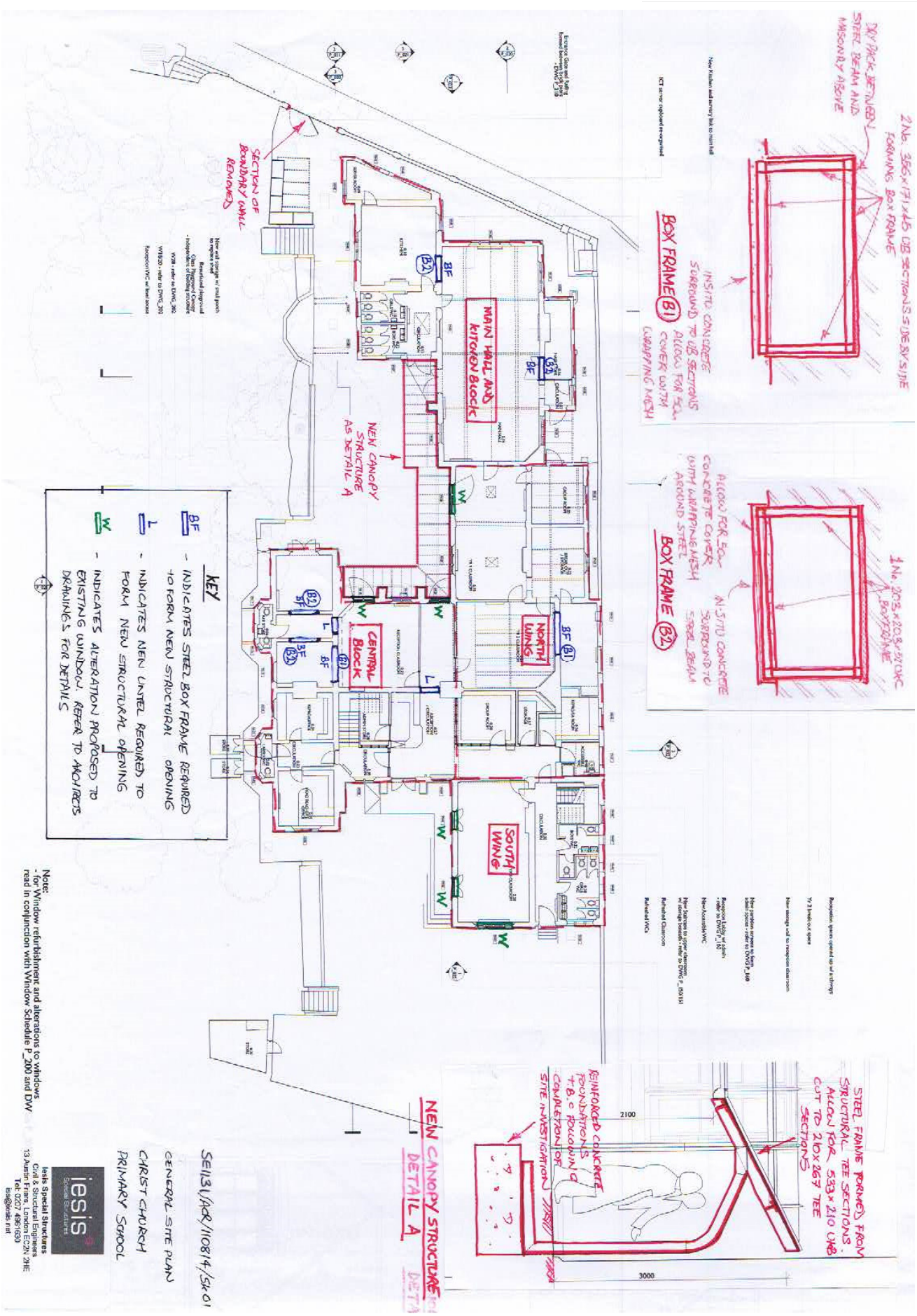

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APPENDIX B

Proposed New Structural Details to South Wing

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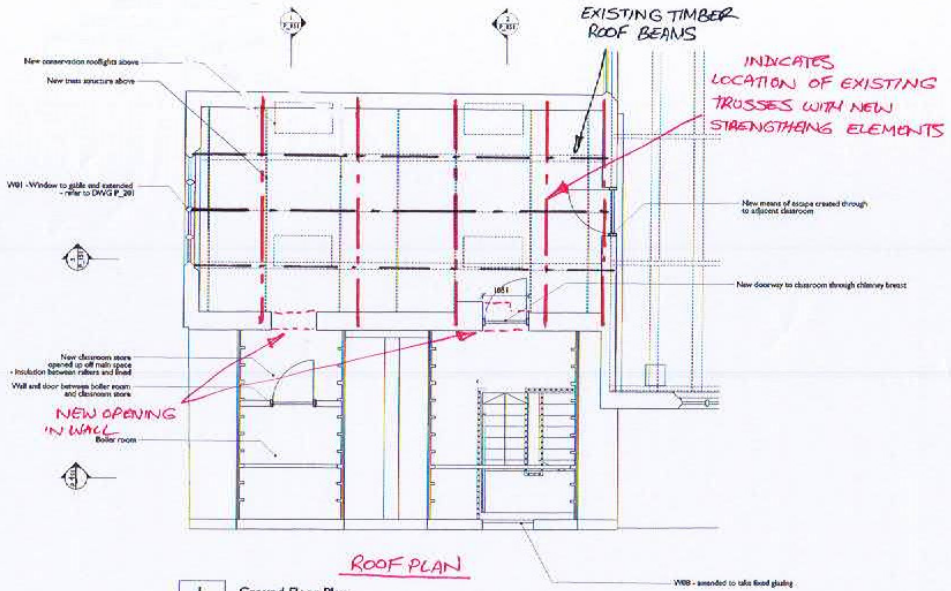
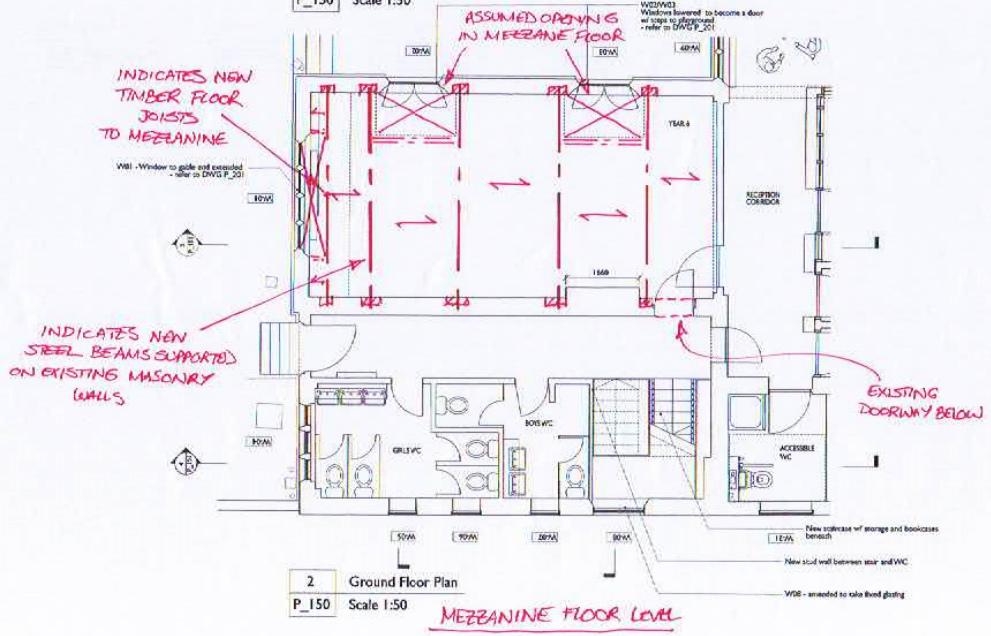
Note:
- for Window refurbishment and alterations to windows read in conjunction with Window Schedule P_200 and DWGs P_201/202





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SOUTH WING
GENERAL LAYOUTS

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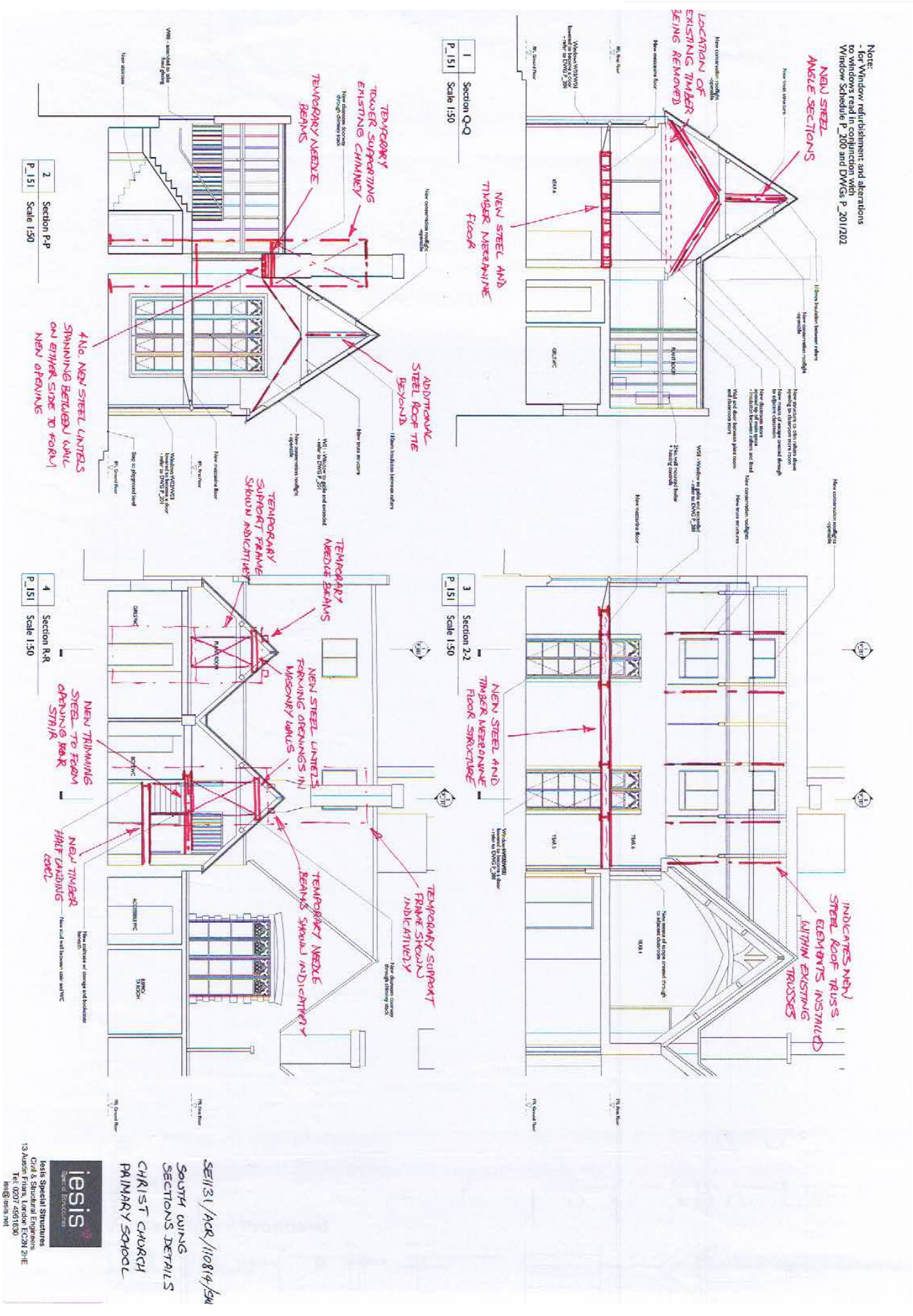

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APPENDIX C

Existing Below Ground Drainage Sketch Layout from CCTV Survey

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