20142789

Greenbank Synagogue

Intrusive Structural Survey Report

Initial Issue 10/02/2016

Contents

Document Control

Revision	Originator	Checked By	Reviewed By	Approved By	Issued to	Issue Date
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The above signatures confirm that:

- the ***originator*** has to the best of their ability produced a document of high quality work, and made any amendments as required during the checking and reviewing process
- the ***checker*** has completed a line by line check using source data and agreed changes to be made with the originator
- the ***reviewer*** has completed a high level review and agreed any changes/corrections with the originator and ensured they have been completed
- the ***approver*** has confirmed that the check and review has been completed by persons appropriately qualified and that the document is fit for issue

1 Summary

This summary gives an overview of the findings of the intrusive structural survey. Further assessment (investigations, structural analysis and structural design) will be required as part of the detailed design of alteration works, and as part of the maintenance of the building in its current configuration. Such further assessment is outside the scope of this report. This further assessment (investigations, structural analysis and structural design) will be required to inform a detailed specification of structural works for the proposed retention, refurbishment, and alterations.

Structurally adequate items: 1. Generally, the building is in a reasonable state of repair and currently appears serviceable excluding the below items.
Structural items presenting risk and requiring further consideration or treatment in due course: 2. Roof coverings and waterproofing are generally in a poor state of repair and there is clear water ingress into the structure. This is exacerbated by the complex arrangement of flat concrete roofs, buttresses, steel protruding through concrete and historic window detailing etc. 3. External elevation will require localised masonry repairs and repointing.
Key items requiring structural and other works: 4. Masonry piers and buttresses have suffered deformation owing to both steel corrosion and poor waterproofing. These require repairs. 5. Window repairs 6. Steel lintels are generally in poor condition and require replacement. 7. Truss Ends and columns are of serious concern and require exposing, inspecting and remedial measures to reinstate integrity and improve stability of the roof structure.

2 Introduction

2.1 General

This report advises on the findings of an intrusive investigation to determine the building fabric and general condition at the above. Aspects of the premises were inspected by BDI at the time of investigations. This report does not constitute a structural survey or building condition survey.

It is proposed to convert the existing synagogue into residential apartments with internal amenity space.

3 Description

3.1 General

The building is a grade II* former listed synagogue.

The existing building comprises three storeys including a basement. The first floor is mainly galleried with a large central atrium.

The front and rear of the building there are a labyrinth of small rooms.

The building is set in grounds within the Sefton Park Conservation Area within Liverpool.

3.2 History

The building is currently unoccupied and we understand it has been since 2007.

A Heritage Statement has been completed by Jenny Wetton Conservations. The salient points from this are:

- Grade II* listed building
- Listed in 1983 and upgraded to II* in 2008
- Synagogue dates from 1936-37
- Designed by Alderman Alfred Ernest Shennan of Liverpool

Alterations to original structure

A number of alterations are identified in the Heritage Statement;

- 1950s single storey annexe added to the south
- Restored in 1961 owing to 1959 fire
- In 1981 a full survey of the structure was completed and £120000 of necessary repairs identified
    - Roof found to be in an unsafe condition and close to collapse
    - Steel ties to roof trusses had been so badly corroded there was very little steel left
    - New steel sections were welded to the existing

3.3 Assumed Structural Form Prior to Investigations

The listing refers to the construction as 'Reinforced Concrete and Steel with Upholland golden brick facings and a tiled roof, the building has a rectangular basilica plan form. Set on sloping ground there is a ground floor basement and a raised ground floor to the rear.'

Building plans and sections from 1935 ascertained from Liverpool Archives indicated a steel frame with reinforced concrete floors and roof areas. Masonry facades are also indicated. The roof structure is not apparent.

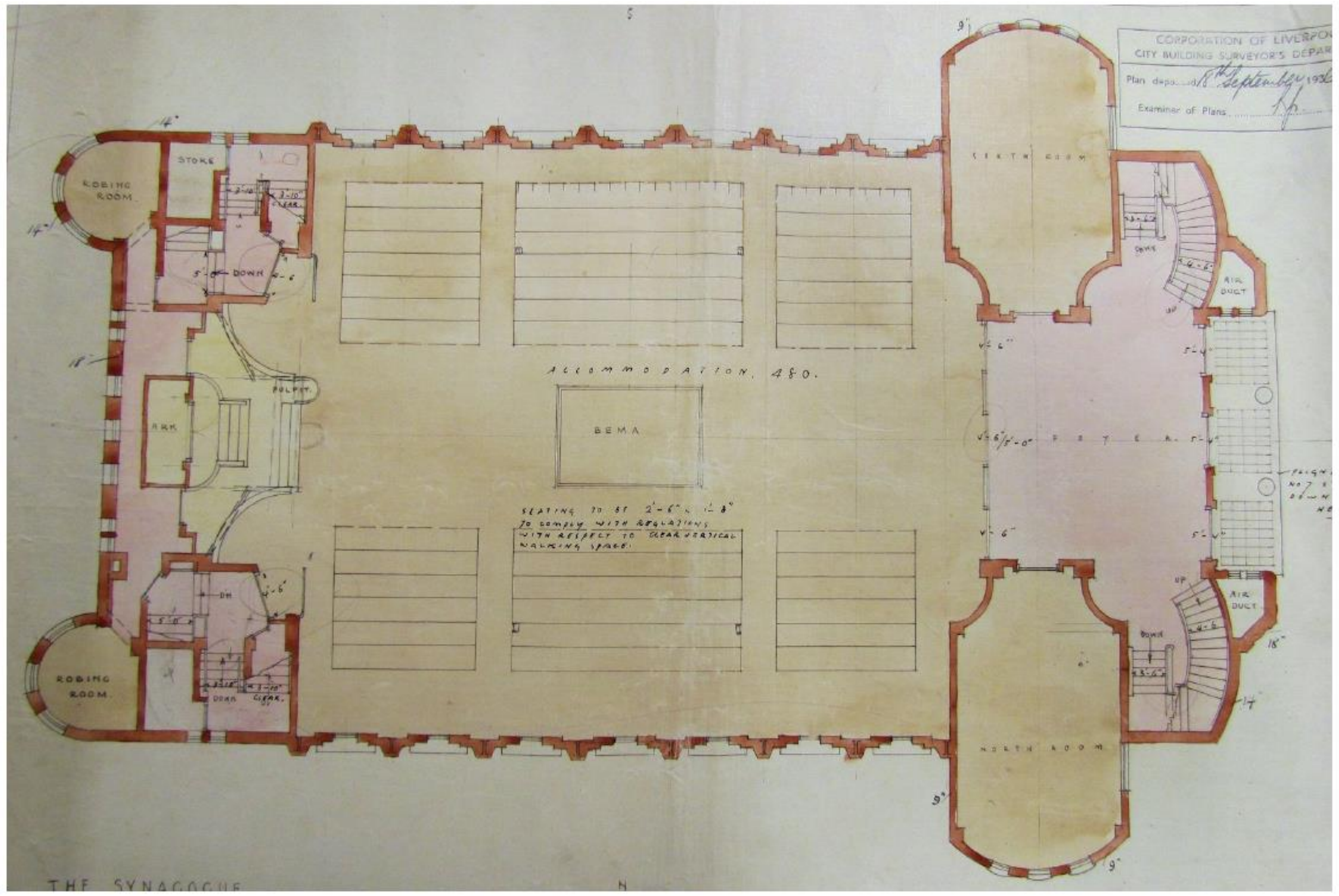


Figure 1 Ground Floor Building Plan 1935

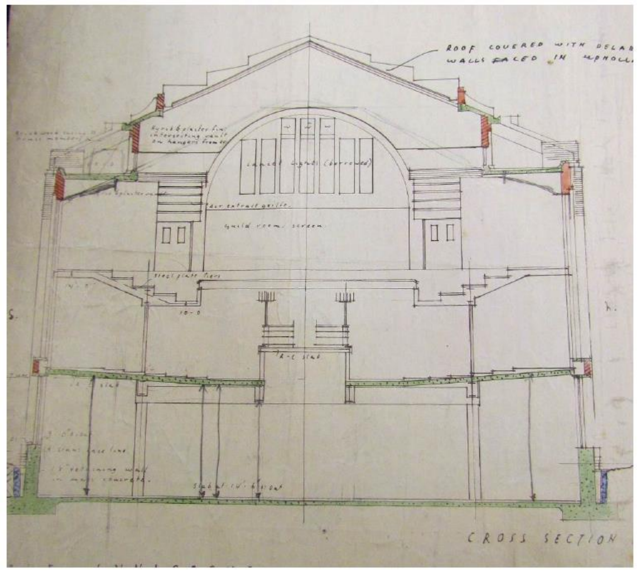


Figure 2 Section 1935

4 Visual Inspection

A visual inspection was completed on 7th and 8th of January 2016.

4.1 External

The external elevations were inspected in detail using an access platform. The external inspection also included some intrusive investigations.

The external elevations we noted to generally be relatively plumb.

E1

Some outward leaning of the side elevations was noted to the columns at the buttress or truss positions this was measured at a maximum of around 5mm per metre.

E2

We noted no evidence of sloping bed-joints or cracking that would be considered to be indicative of active or progressive foundation movement or settlement.

E3

The windows to the external elevation have lintels formed with either arched heads or flat horizontal heads.

In the instances of windows and doors with arched heads these are formed with arched brick lintels.

In the instances where the window have flat horizontal heads lintels within the outer leaf brickwork have been formed with either flat steel plate or steel bars built into the bed joints either side of the window reveal. In many instances these flat plate or bar mild steel lintels have corroded resulting in rust expansion causing cracking in the bed joints at the reveals.

Figure 3 Corroding window lintel

It is apparent that to preserve the building existing mild steel lintels should be removed and replaced with proprietary galvanised steel angle lintels.

E4

The left and right side elevation to the main hall section of the building contain a number or splay brick columns that are positioned to correspond to the roof truss positions. As identified internally these brick columns contain steel channels fixed back to back.

Many of these brick columns have vertical cracking at high level.

Figure 4 Cracking to external masonry columns

The cracking to the external columns has been caused by corrosion and rust expansion of the encased steel channels.

Figure 5 Exposed Steel Channel Columns to external masonry columns

A section of encased steel channel column was exposed to the left elevation. We established that the upper section of the masonry has been rebuilt in the past and the columns have in their upper section been encased in concrete. Corrosion where observed was noted to be relatively minor.

The corrosion however is clearly progressive as cracking has been caused within the concrete encased and rebuilt sections of the brick piers.

E5

Generally the masonry to the elevations are in reasonable condition there are some areas where bricks have locally spalled due to frost damage and water damage due to leaking rainwater good and poor roof edge drips.

Spalling and deterioration of the mortar point and brickwork is particularly prevalent to the rear elevation. Local rebuilding will be required to restore the brickwork to this façade.

Figure 6 Eroded and frost damaged masonry

Generally all elevations will require repointing with localised brickwork repairs.

A complicating factor in restoring the brickwork is the availability of the non-standard sized bricks. In this regard it would be prudent to agree with the conservation officer where areas of landscape and external stair walls can be demolished to provide a supply of bricks for the use in the main façade.

E6

There are feature masonry “window boxes” to the external elevations. Generally these consist of feature brickwork supported on what appears to be an insitu cantilevered concrete slab.

It appears that the top of the masonry feature has been infilled with insitu concrete and the middle section of the masonry feature may be hollow.

Water and vegetation root ingress into these masonry window features has created significant damage and movement and many of these features to the left, rear and right elevation require repairs and local/total rebuilding.

Figure 7 Masonry window box feature note damage and concrete infill to top.

Whilst not a structural defect the window frames are seated directly above the window box features. The window frames are steel and have significant corrosion. This appears in part due to the concrete infill of the window box being at the same level as the bottom of the frame.

In addition the glazing in the leaded windows appears to have dropped over time resulting in bulging to the glass at the bottom of the frame.

Repairs will be required to the window frames and the glazing and the detail between concrete infill/brick window box and window frame needs improving for future durability.

Figure 8 Corrosion to window frame and bulging of leaded window glazing.

E7

The flat roof coverings generally are of concern there are a number of flat roofs to all elevations which have an asphalt finish, most of these appear to hold water and in one instance the outlet has been roofed over.

The detailing of the asphalt roofing is poor where the coverings abut parapet and upstand walls and as such leakage of water into the structure is occurring.

Figure 9 Failed or poor detailing of roof coverings leading to water ingress.

Figure 10 Ponding of water on flat roofs.

The refurbishment of the building should include and anticipate new roof coverings to flat roofs.

E8

The pitched roof over the main prayer hall is slate covered and appears in reasonable condition.

The ridge has been formed with a folded plastic or tin flashing which appears to be poorly fitted.

We would suggest that it would appropriate to install a new tiled ridge to this roof.

Flashings between the tiled pitched roof and the end gables are formed with a mixture of lead flashings and flash bands. New flashings are likely to be required.

Figure 11 Flashings in lead and flash band. Note ridge formed in folded plastic or metal sheet.

Whilst not a structural concern it apparent that the roof arrangement of flat and pitched roofs, asphalt, upstands, brick buttresses and parapets is extremely complicated with many abutments of multiple materials. This will require careful detailing to ensure that the systems adopted are effective in addressing water ingress.

4.2 Internal Roof

We undertook an inspection within the interior of the main roof over the prayer hall.

Access was gained from the rear left stairwell.

Within the roof space we were able to access the length of the roof via a walkway at the apex of the trusses.

IR1

The steel roof trusses were noted to be of riveted and bolted construction and are formed in Steel angles and I sections. The trusses are circa 2.0m deep.

The trusses support the vaulted ceiling with a series of curved angles suspended from the underside of the truss. The curved vaulted ceiling appears to have been formed in boards and plaster.

The trusses where visible appear to be in reasonable condition for their age with only light surface corrosion evident.

IR2

We were interested to note that the roof structure appears to have a dynamic motion which whilst not visible was perceivable.

The motion within the roof structure appears to relative to the weight which the trusses support in concrete and masonry and is probable triggered or excited by the wind loading on the structure.

Dynamic motion within the roof is of concern, it is likely that the modifications to the roof trusses completed in the 1980's may have made the roof weaker with less fixity between the trusses and columns.

In addition fatigue is potentially an issue in this structure and this will require some further consideration.

It would be worthwhile undertaking some monitoring of the roof motion to understand this issue and consider this issue further.

5 Intrusive Investigations

Intrusive investigations were completed on 7th-8th January 2016. Marked up plans indicated the intrusive investigations are appended to this document.

5.1 Trial Holes

A single trial hole was completed to the North of the building.

T1

Trial Hole 1 indicated a strip footing. From inspection it appeared that the footing was integral with column pad foundations.

It was also apparent that the lower half of the basement wall was cast in-situ concrete clad in masonry.

5.2 Hand Auguring

A number of hand augurs were completed around the site. The soil profiles identified are appended to this document.

HA1

The ground profile in HA1 is characterised by significant made ground overlying clay.

Water was not encountered.

HA2

HA2 was similar to HA1.

HA3

The ground profile in HA3 is characterised by topsoil over wet sands.

HA4

The ground profile in HA4 is characterised by wet sand.

5.3 Floor

The floor was exposed and inspected in a number of areas. The locations are identified in the mark-ups appended to this document.

F1

The underside of the ground floor slab was inspected from the room below. A cast in-situ slab was identified. Whilst the slab appeared serviceable, reinforcement was exposed and deteriorating in some areas. The surface to the slab also appeared to be covered in smoke residue. The slab was supported on load bearing masonry walls.

Figure 11 Reinforcement exposed

F2

The floor to the upper gallery was exposed from above. The structural floor appeared to be formed in cast in-situ concrete.

Floor finishes comprised timber boards supported on timber battens.

When inspected from below, it is apparent that the concrete is sloping to follow the tiered gallery seating.

Steel plates, possibly part of a steel beam were visible from the top side, forming steps within the gallery.

F3

The basement slab was cored through.

The basement slab consisted of a 150mm unreinforced brick aggregate concrete with presence of ash and coal.

Below the slab was 100mm of brick rubble hardcore. Upon completion of the coring, water was standing within the brick rubble hardcore.

5.4 Structural Elements

Structural elements were inspected and exposed in a number of areas. The locations are identified in the mark-ups within.

S1 External Columns

External columns were exposed.

The columns comprised of what appeared to be two steel channels back to back with a 10mm steel packer plate.

The level of corrosion of the packer plate was significant. The columns had surface rust present to all surfaces.

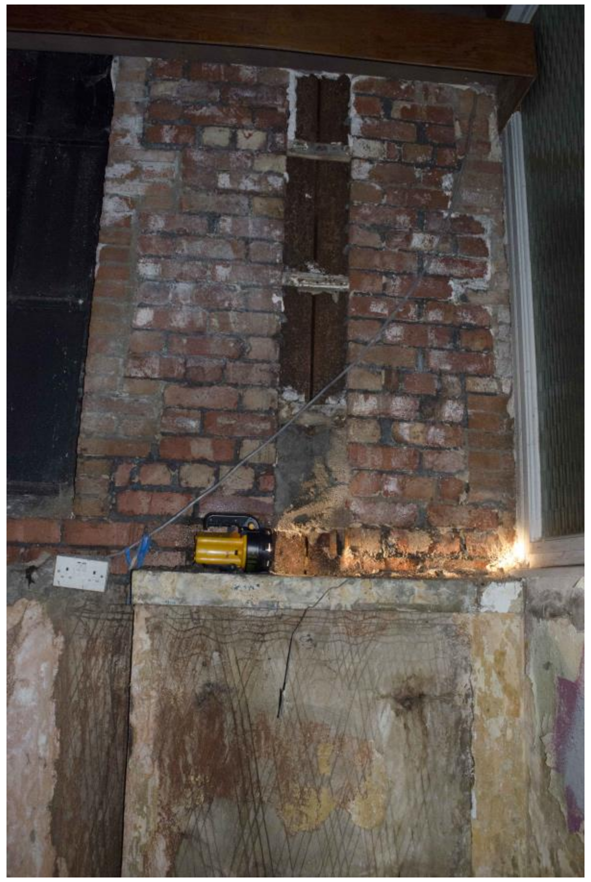


Figure 12 Exposed External Column

The column base comprised of riveted connections fixing to steel plates affixed to the concrete plinth.

S2 Internal Columns

Internal columns were exposed. Steel I beams with riveted plates on both the top and bottom flange were identified. Column dimensions are indicated within the appendix.

Figure 12 Exposed Internal Column

S3 Primary Beams

Internal column heads were exposed to determine primary beam sizes as indicated.

S4 Secondary Beams

Internal column heads were exposed to determine secondary beam sizes as indicated

S5 Gallery Beams

Gallery beams were exposed in a single location only; at an internal column head.

Gallery beams were confirmed to be steel and in a grid pattern. Sizes and condition were not ascertained owing to limitations in exposure avoiding damage to listed finishes.

S6 Truss Ends Internal

Truss ends were exposed internally by removing boxing and plaster. Upon removal of plaster significant rust was present on the inside face of plaster. Water was also present on the face of the steel.

The bottom chord of the truss runs through a concrete flat roof. It was clear from inspection that some of the original concrete had been cut back and replaced. Retrofitted welded steel plate strengthening was also visible.

Figure 14 Exposed internal truss end

Our visual inspection suggests that the fixings from the columns to bottom chord of the truss have been historically removed. Significant corrosion has occurred with the steel at the bottom chord end on both the column and truss delaminating.

Figure 15 Exposed internal truss end showing retrofitted steel

S7 Truss Ends External

The buttresses at roof level contain the main steel roof trusses. There are steel trusses to each buttress and also steel trusses within the end gables of the main prayer hall.

The brick buttresses have been rebuilt, this appears to have been completed when the roof trusses were repaired in the early 1980's

The brick buttress are hollow and are capped in brickwork and then over capped with a steel copping which is screwed to the brickwork.

We exposed the steel trusses within the brick buttress for inspection.

The interior of the buttress was noted to be wet with moisture being visible on the encased steel truss.

The remedial works completed within the 1980's appears to have consisted of exposing the steel trusses and cleaning down and painting the trusses. Parts of the trusses appear to have been wrapped in a petrolatum textile tape such as "Denso"

Corrosion appears to have continued since these works as the paint finishes have failed and corrosion and rust is evident.

The roof trusses are significant structures that provide support to the buttresses, the lower flat concrete roof between the buttresses, the vertical wall between buttresses with the arch windows and the concrete roof over this section plus the general roof coverings. There is significant load from these elements amounting to we estimate around 20 to 25 Tonne at each truss/column position.

This represents a significant concern in relation to the future life expectancy of the building structure. Failure of the truss within the brick buttress would result in a catastrophic failure of the roof structure.

From our inspection both within the buttress and internally within the boxed our corbels that the repairs to the roof trusses effectively weakened the fixity between the truss and the column and increased the load on the remaining connections.

In repairing and preserving these trusses they will need exposing by taking down the existing brick buttresses as undertaken back in the 1980's.

Once exposed the trusses will need to blast cleaned and inspected and then a comprehensive corrosion protection system will need to be adopted.

Where the existing trusses mass through the lower flat concrete roof there appears to be an issue with water ingress and this detail/arrangement will need careful consideration and modification to address this weak point in the protection of the structure.

Timber

We noted during the course of inspections a number of timber elements which are suffering from dry rot.

6 Conclusions

6.1 Assumed Structural Form Post Investigation

6.1.1 Structural Form

The structural form is similar to that assumed pre investigation.

The structural generally comprises:

- Cast in-situ assumed reinforced concrete first floor gallery
- First floor gallery supported on steel framework including cantilevered elements supported on four internal columns. Structural steelwork is generally aligned to a grid lining through with the external columns
- Cast in-situ assumed reinforced concrete ground floor
- Ground floor supported on steel framework supported on four internal columns. Structural steelwork is generally aligned to a grid lining through with the external columns
- Steel roof trusses supporting assumed reinforced concrete flat roof slabs, upper external walls and pitched timber rafter roof, supported on steel columns within the external walls
- Flat roofs to front and back of building formed in cast in-situ assumed reinforced concrete supported on load bearing masonry
- Arches to ceiling formed in plasterwork hung off trusses with steel and timber framework
- Ground bearing basement slab
- Strip foundations with pad foundations to load bearing masonry walls and steel columns
- Cast in-situ assumed reinforced concrete retaining walls around external perimeter of basement
- Masonry cladding to external elevations. Elements of masonry are load bearing.

6.1.2 Structural Materials

The following is currently assumed from the historic age of the building.

Framing

- Design to BS449
- Structural steel with constant sections cast from rolls and built up with riveting
- Riveted connections

Steel is highly susceptible to corrosion exacerbates by airborne salts due to the close proximity to the sea. Should corrosion occur, loss of strength is likely to occur from loss of section.

Steel is also prone to brittle fracture. Brittle fractures are likely to occur where there are severe stress concentrations. The risk of brittle fracture is likely to increase where material changes occur owing to fire.

6.2 Structural Condition

From the heritage statement we understand that the building has been subjected to fire damage on two separate occasions. The extent of fire damage is not clear.

We also understand that in 1981 a full survey of the structure was completed and £120000 of necessary repairs identified. At this time the roof found to be in an unsafe condition and close to collapse such that steel ties to roof trusses had been so badly corroded there was very little steel left. New steel sections were welded to the existing. This included removal of masonry cladding above roof level to the roof truss ends.

6.2.1 Roof Trusses

The intrusive investigations completed identified the work completed to the truss ends. It is apparent from our investigations that whilst the new steelwork appears in reasonable condition, the roof trusses have continued to corrode at their ends. It is also apparent that continued water ingress has occurred in these areas.

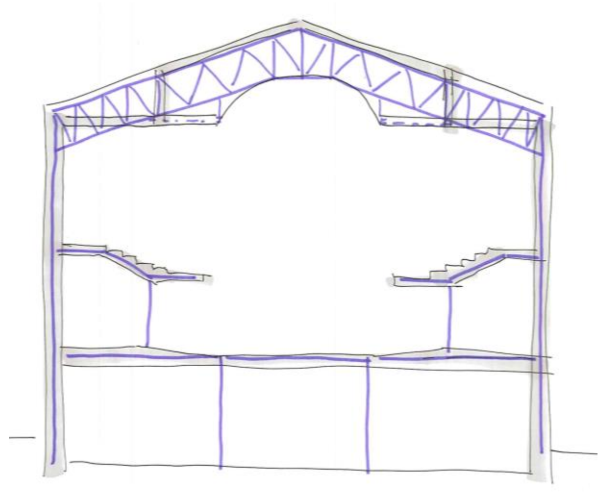
The works completed did not appear to have included significant corrosion protection, the paint and wrapping that has been seen externally appeared to have been completed to quite a poor standard and active corrosion still appears to be present.

The work completed to the roof trusses has removed the fixity between the bottom chord of the trusses and the columns. This has created a significant load concentration on a single point; the connection between the top chord of the trusses and the columns. Furthermore removal of the bottom chord of the truss has led the truss connection having a significant decrease in stiffness. The decrease in stiffness allows the trusses to move to a greater degree.

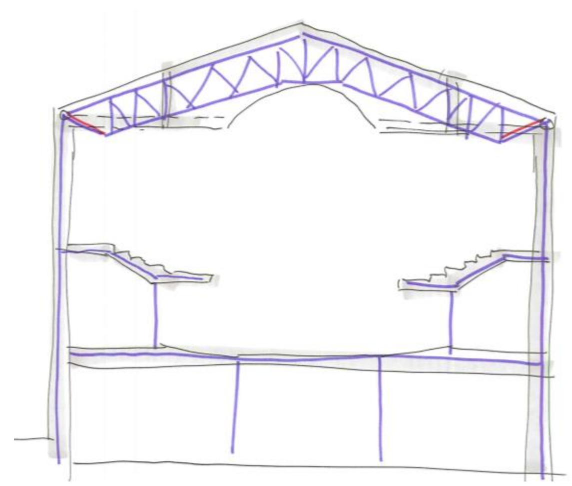
In its original support condition the trusses would have provided lateral stability to the columns and masonry walls through stiffness in the connection. The decrease in stiffness has led the truss connection to act as a pin; this has led the fundamental support conditions to the columns to change, now acting as a cantilever. This has resulted in the truss being more susceptible to deflection and the columns more susceptible to lateral loads causing sway. This is observed in the significant cracking identified to the internal ceiling and the external masonry piers.

The load on the truss connections is significant. Given the high load concentration of load, current state of corrosion and possible effects of previous fires, it is our opinion that the truss connections are prone to brittle fracture. Brittle fracture of a truss connection would be catastrophic as the truss has little redundancy.

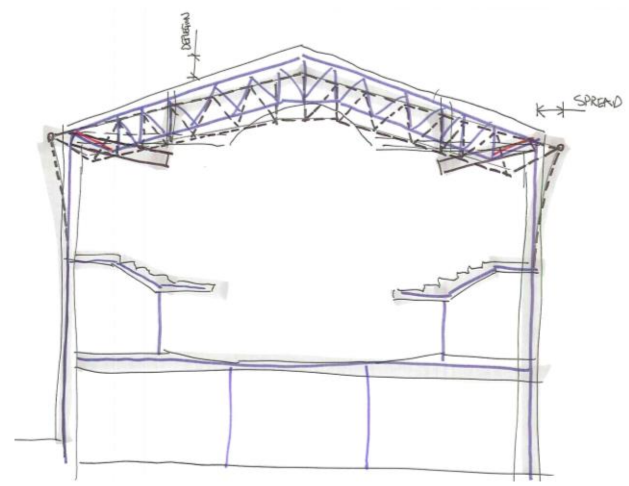
The notable movement observed within the roof structure at the time of the survey suggests that the roof is subjected to repeated fluctuating loads causing movement. Fatigue of the structure owing to this fluctuation is likely which could lead to joint failure at stress concentration points.



Truss elevation indicating original configuration



Truss elevation indicating amended configuration



Truss elevation indicating spread of truss and vertical deflection owing to amended end configuration

6.2.2 Flat Roofs

Flat roof slabs of concrete construction generally appear in reasonable condition and currently serviceable.

Our visual inspection identified isolated locations where reinforcement is visible and has corroded. The concrete is not currently spalling.

6.2.3 Internal Floors and Steelwork including Internal Columns

Internal floors of concrete construction generally appear in reasonable condition and currently serviceable.

Internal steel framing generally appears in reasonable condition and currently serviceable.

6.2.4 External Columns

External columns exposed both internally and external show surface rusting along their height.

Steel packer between pairs of assumed PFC columns have badly corroded.

At the column heads significant corrosion is present.

6.2.5 Masonry Walls

Defects noted within the structural walls included bed joint cracking.

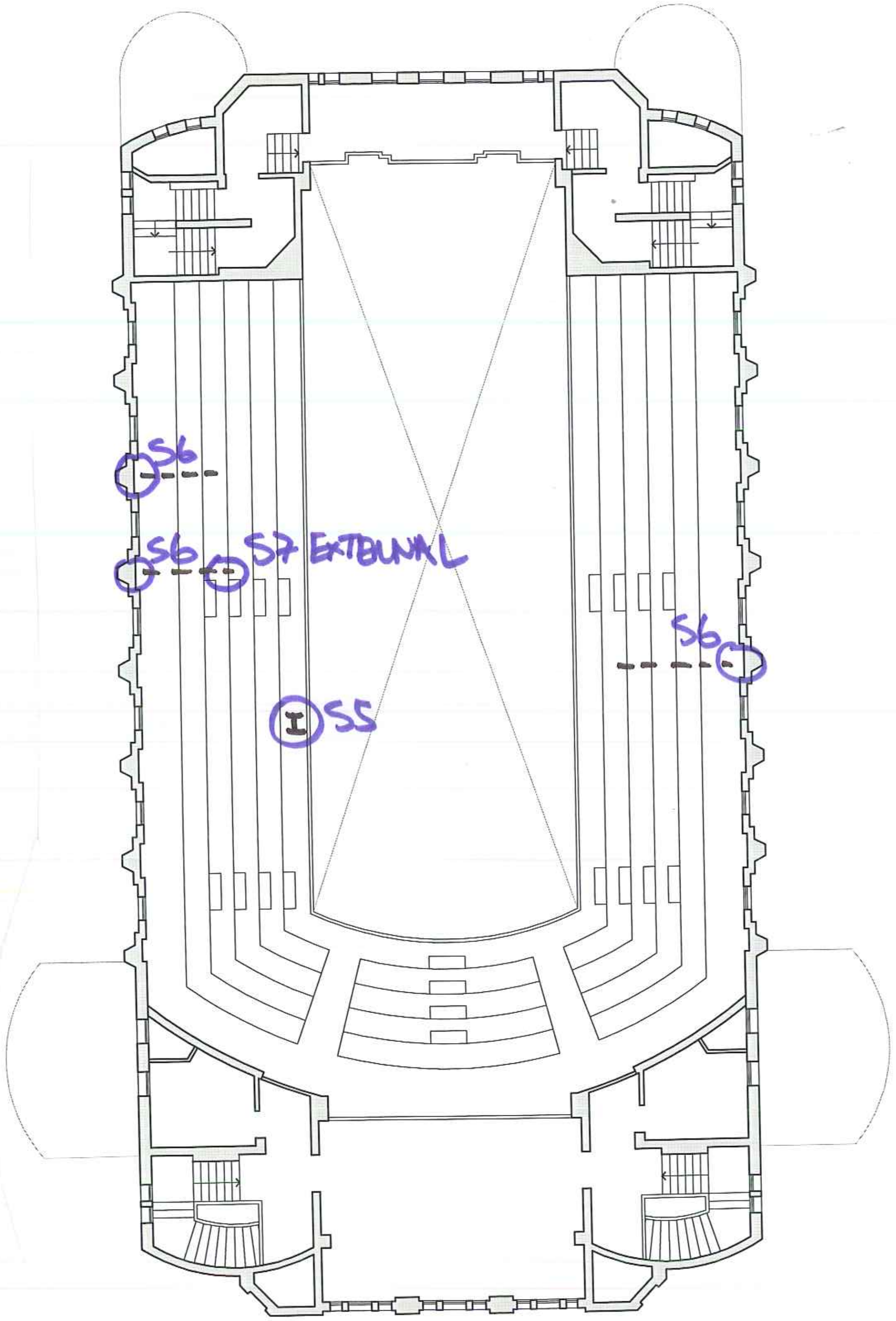
The majority of defects noted within the masonry walls can be attributed to corrosion of steel internally, and water ingress from poor waterproofing detailing.

7 Further Investigations

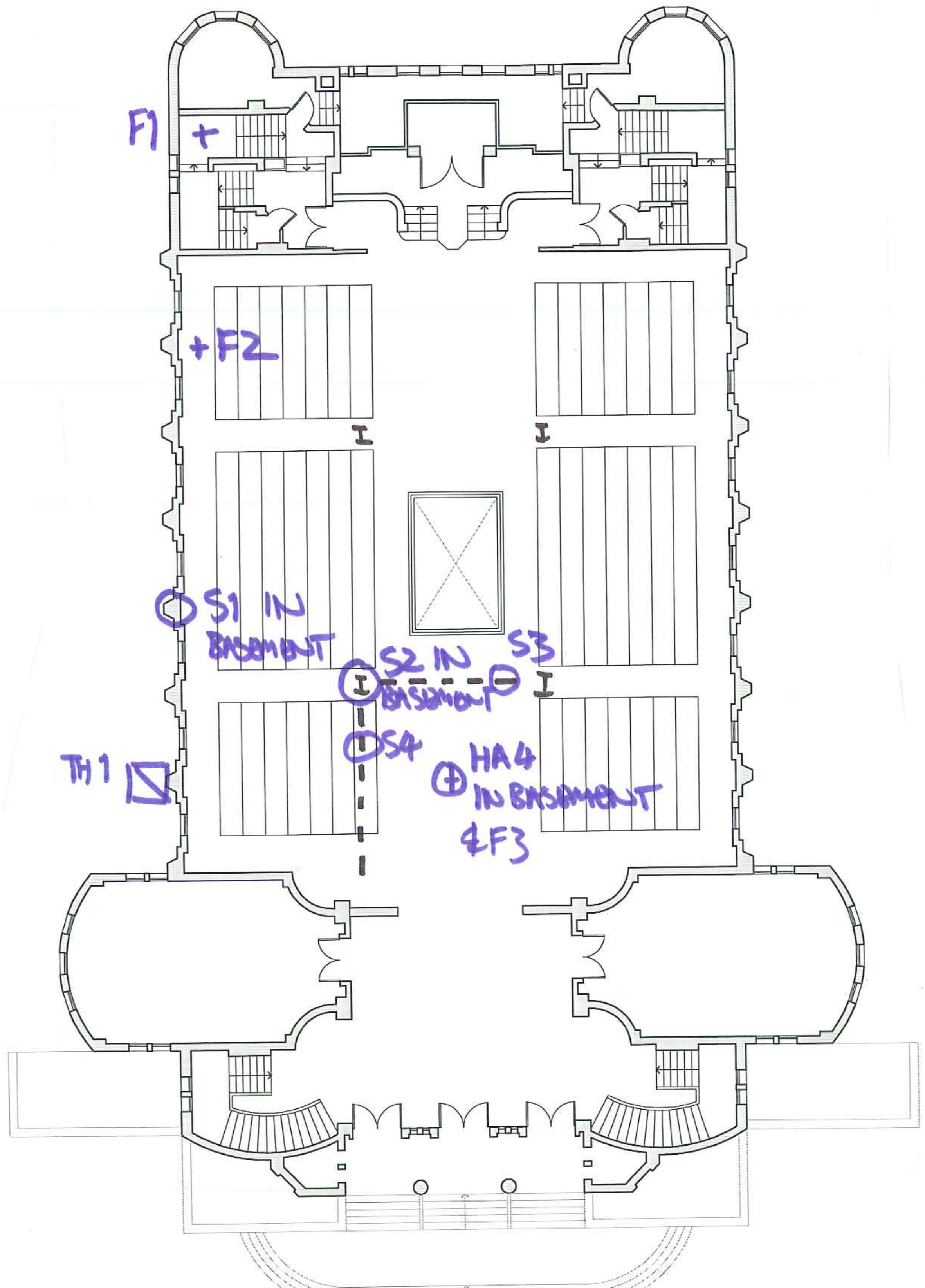
The below indicates the recommended schedule of investigations, searches and surveys.

Survey / Investigations	**Scope**	**Notes**
Opening up of all roof trusses ends both internally and externally	Open up all truss ends internally and externally for full visual and intrusive inspection to take place	This work is most likely to be completed as part of an early works package, during and after initial soft strip.
Concrete Survey	Inspect and report upon all concrete slabs to make recommendations on the anticipated service life expectancy and to make recommendations on remedial measures to extend service life. The survey should include: • Visual and intrusive inspection of concrete • Ferroscan Survey • Removal of concrete samples • Analysis to determine compressive strength, chloride ion content and carbonation depth	This work is most likely to be completed as part of an early works package, during and after initial soft strip.
Steel Corrosion Survey	Inspect and report upon all steel embedded within concrete or masonry to make recommendations on the anticipated service life expectancy and to make recommendations on remedial measure to extend service life. The survey should include: • Visual inspection of steelwork • Removal of mortar and concrete sample • Laboratory analysis to determine binder, moisture content, chloride and sulphate concentration • Measurement of thicknesses of element flange and web thicknesses to determine trends in corrosion	This work is most likely to be completed as part of an early works package, during and after initial soft strip.
Timber and damp survey	Timber and damp survey of the internal roof structure to assess condition of timber	This work is most likely to be completed as part of an early works package, during and after initial soft strip.
Further Surveys	Further surveys may be required	To be reviewed on an ongoing basis

Appendix A Intrusive Investigation Mark-ups



FIRST FLOOR



GROUND FLOOR

bdi Structural Engineering Solutions

Project: GREENBANK		Date: FEB '16
Title: INTRUSIVE INVESTIGATIONS		Drawn: JDY
Project No: 20142789	Sheet: SK06	Rev: P0

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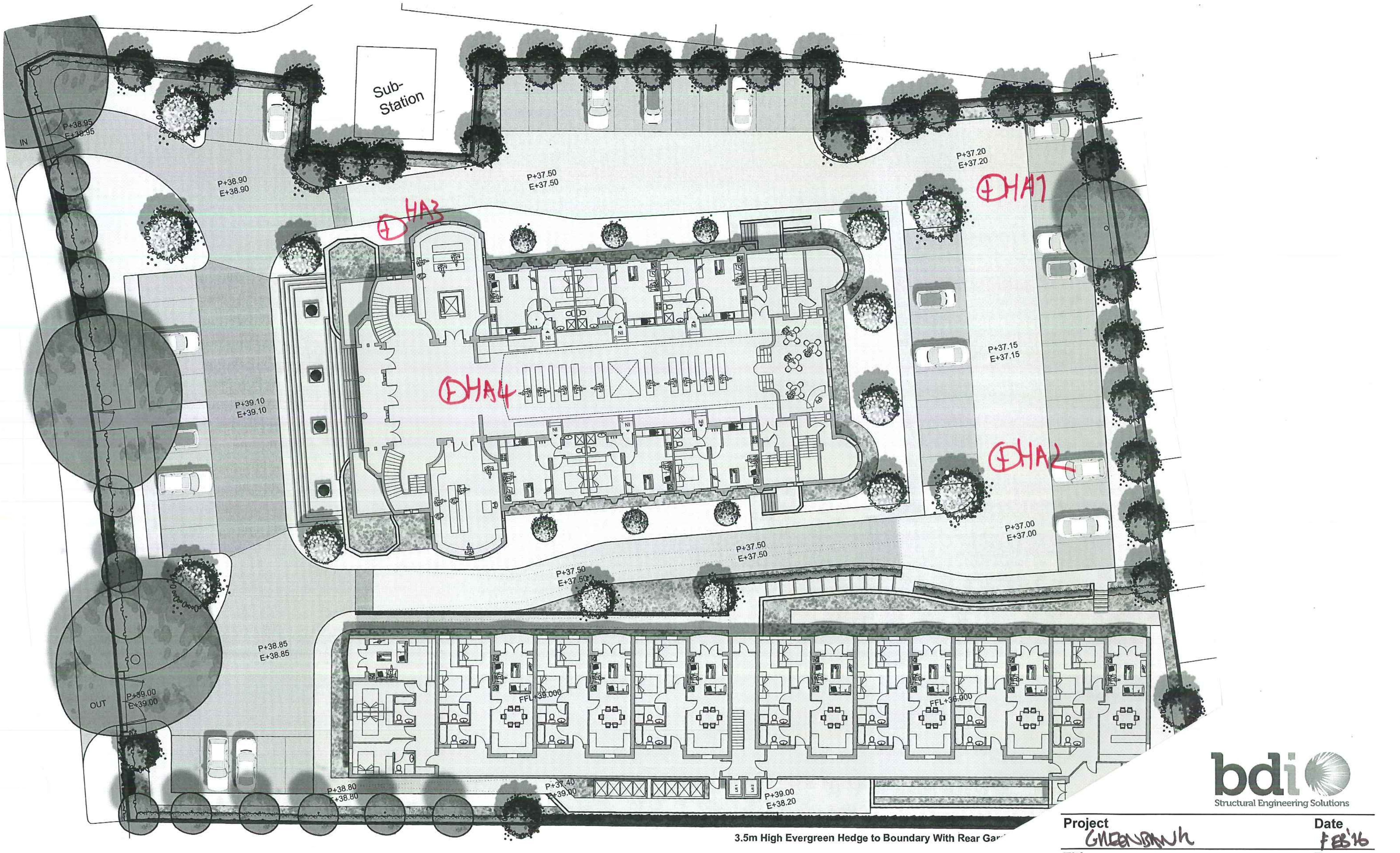

bdi
Structural Engineering Solutions

Project		Date
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Project No	Sheet	Rev
20142789	SK07	P0

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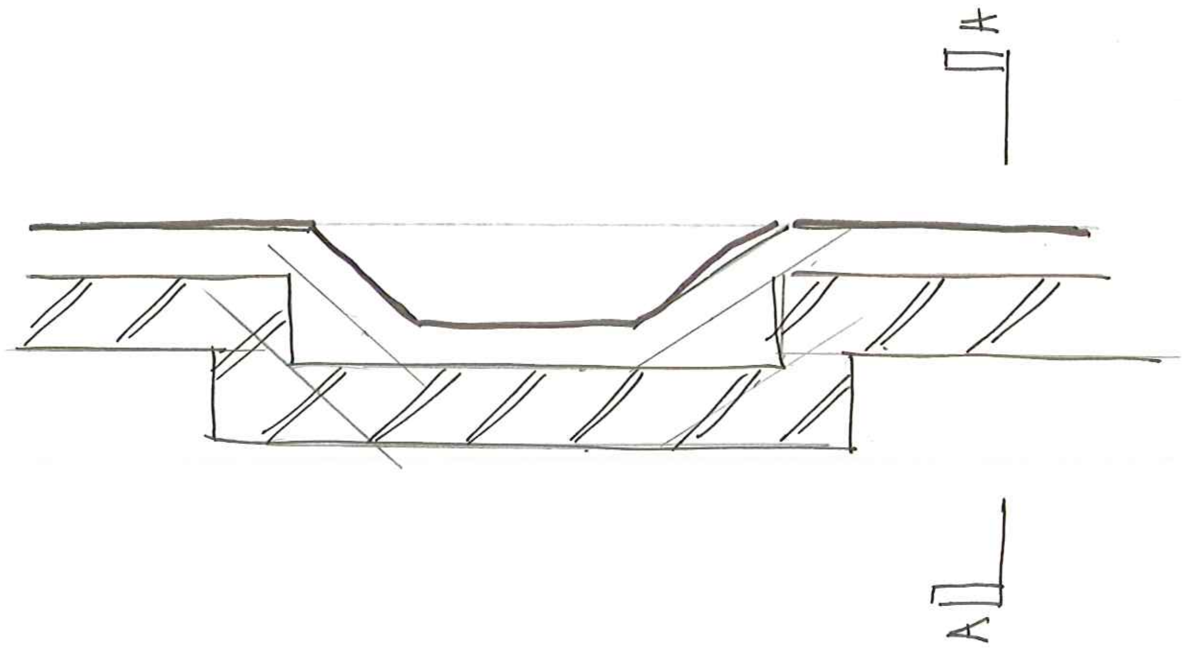
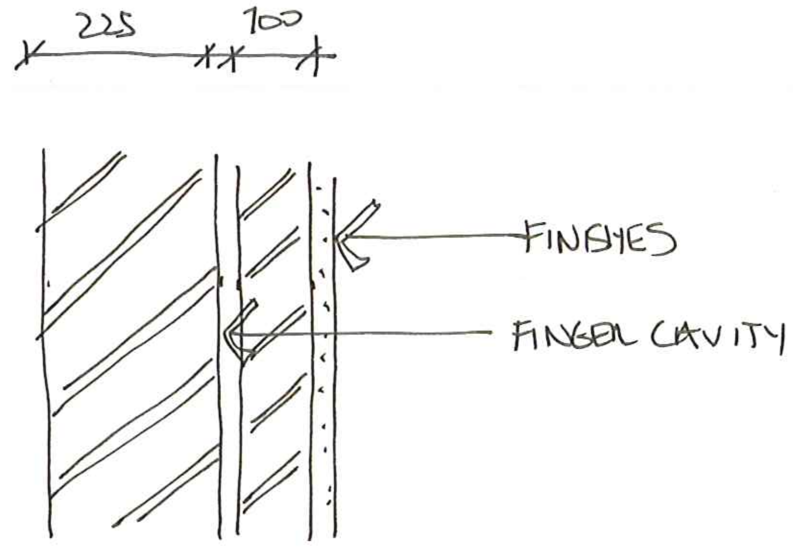
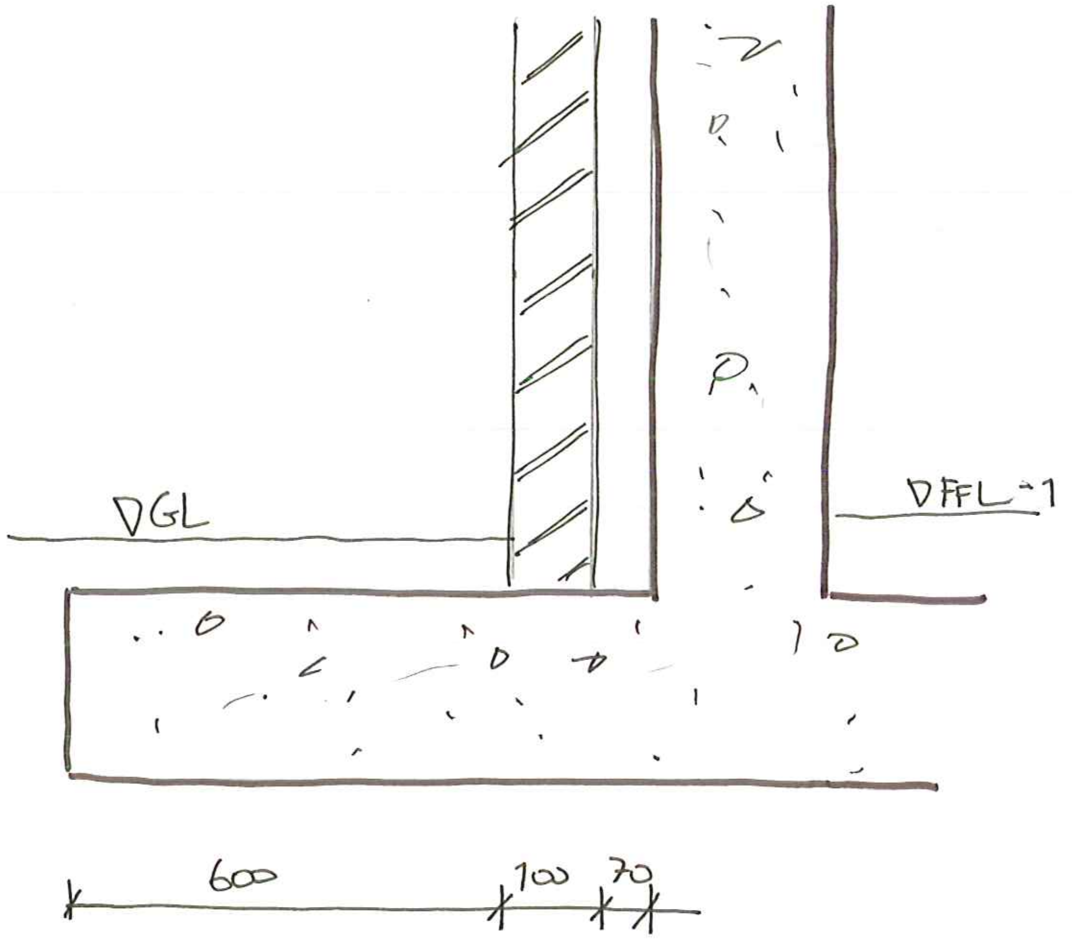
PLAN TH1



EXTERNAL WALLS



SECTION A-A



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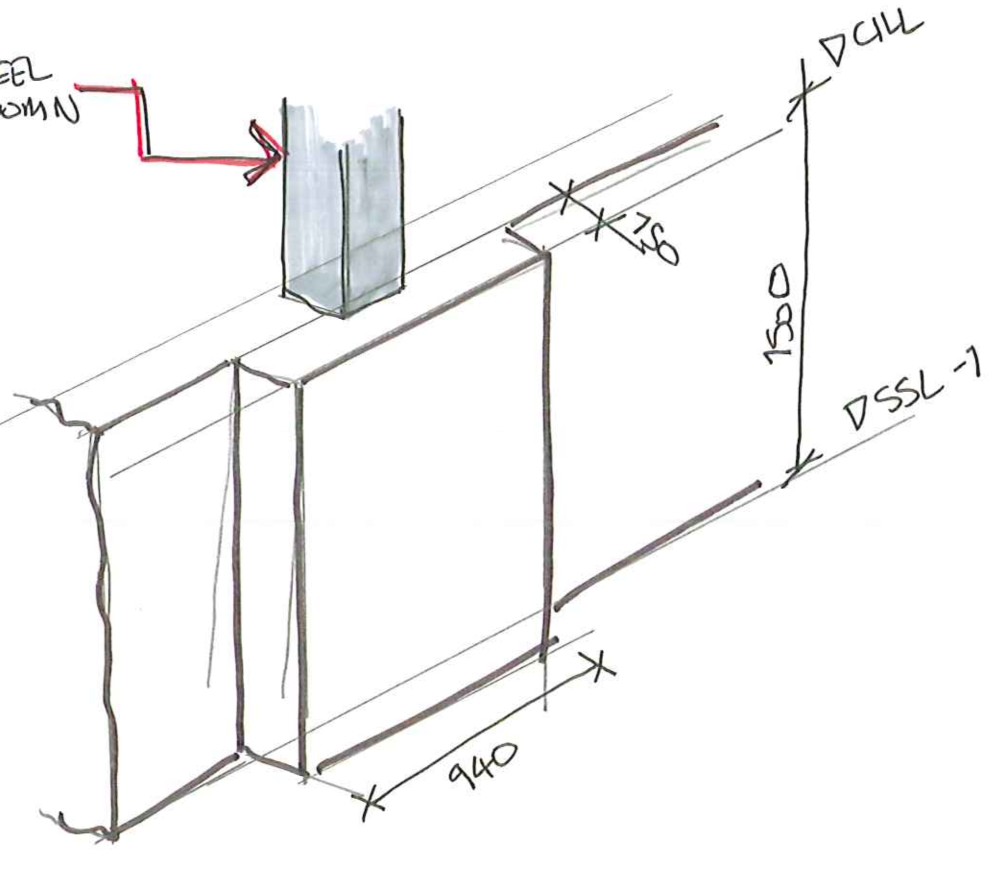
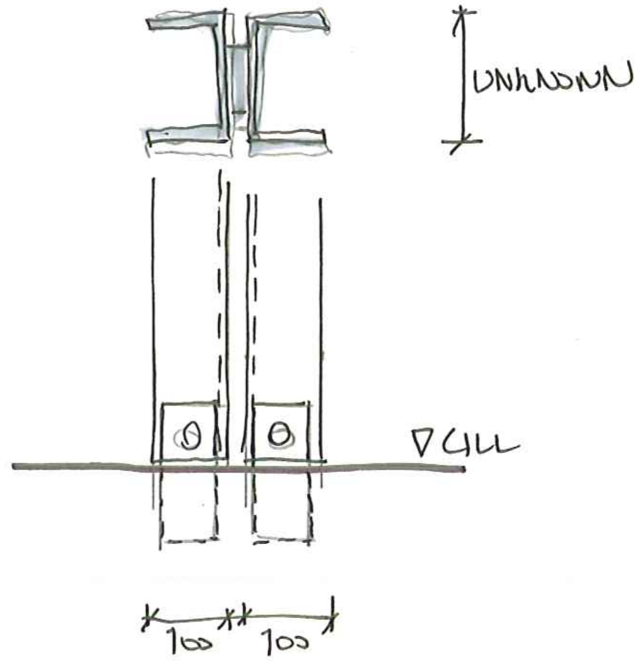
Project		Date
GREENBANK		FEB '16
Title		Drawn
INTRUSIVE INVESTIGATIONS		JDY
Project No	Sheet	Rev
20142784	SK08	P0

VISUAL S1





SECTION F3

20mm FINISHES	
30mm CONCRETE	
100mm CLINKER BRICK CONCRETE	
WET SAND	

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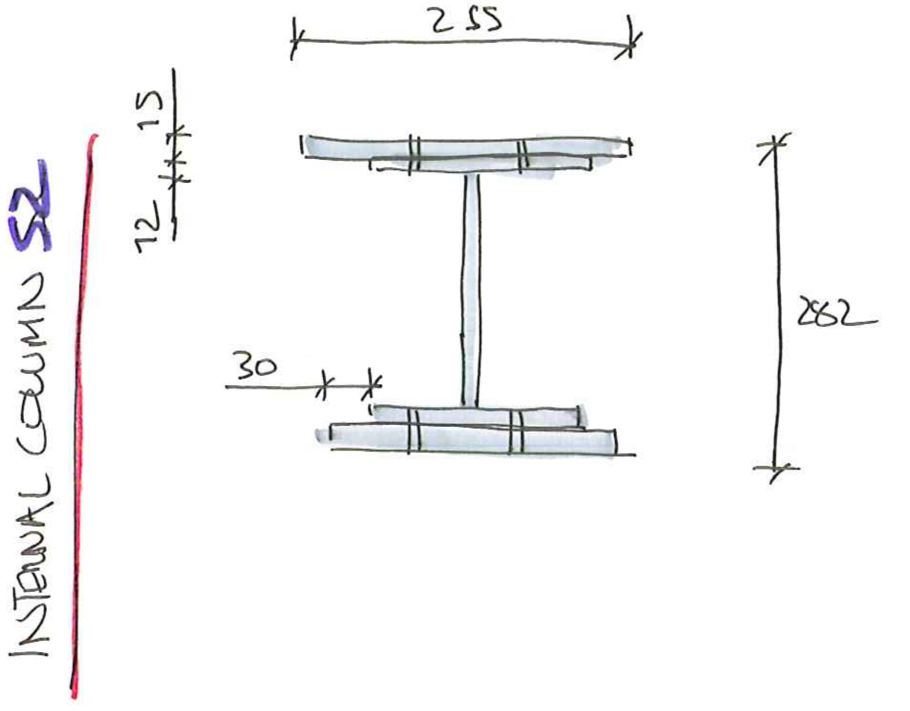
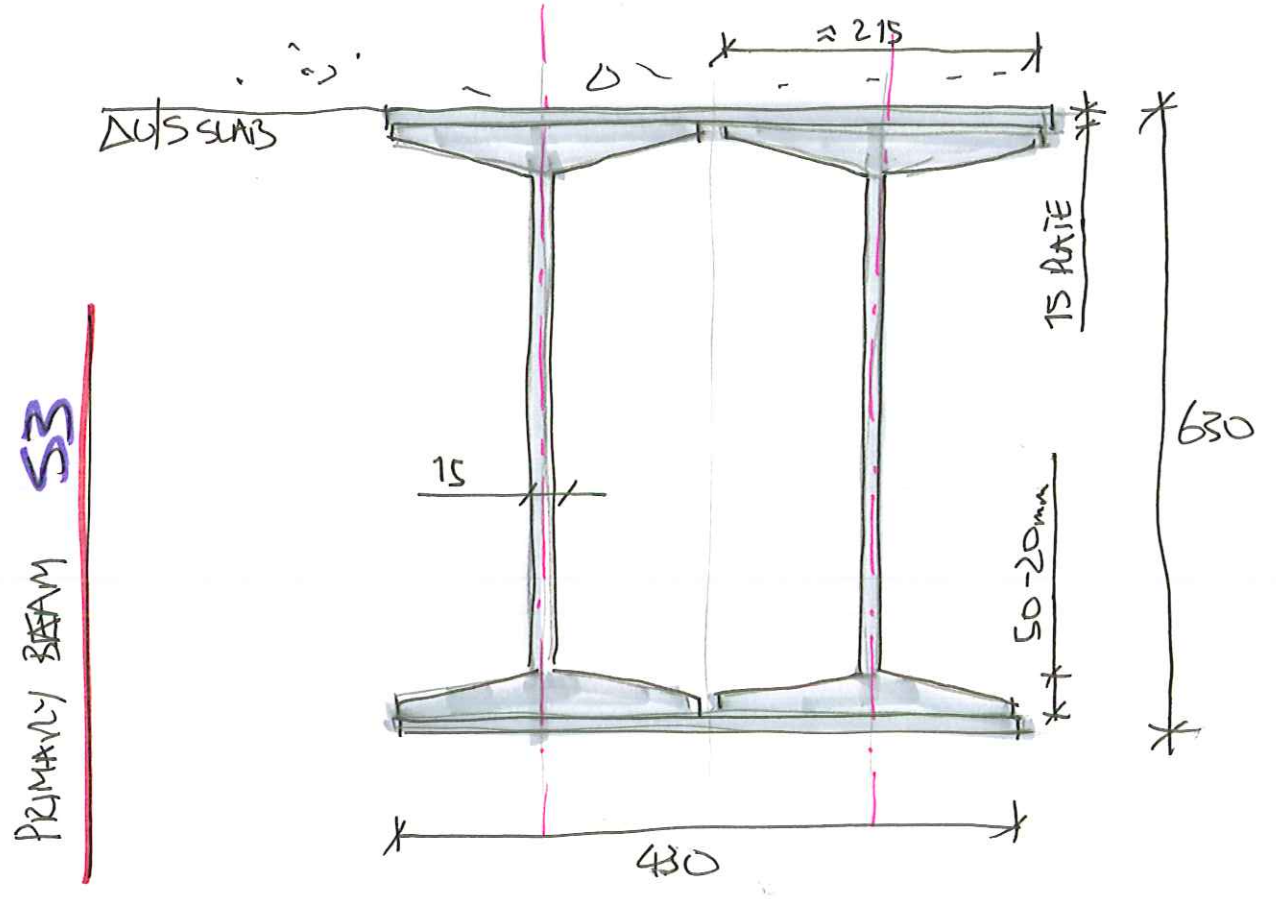
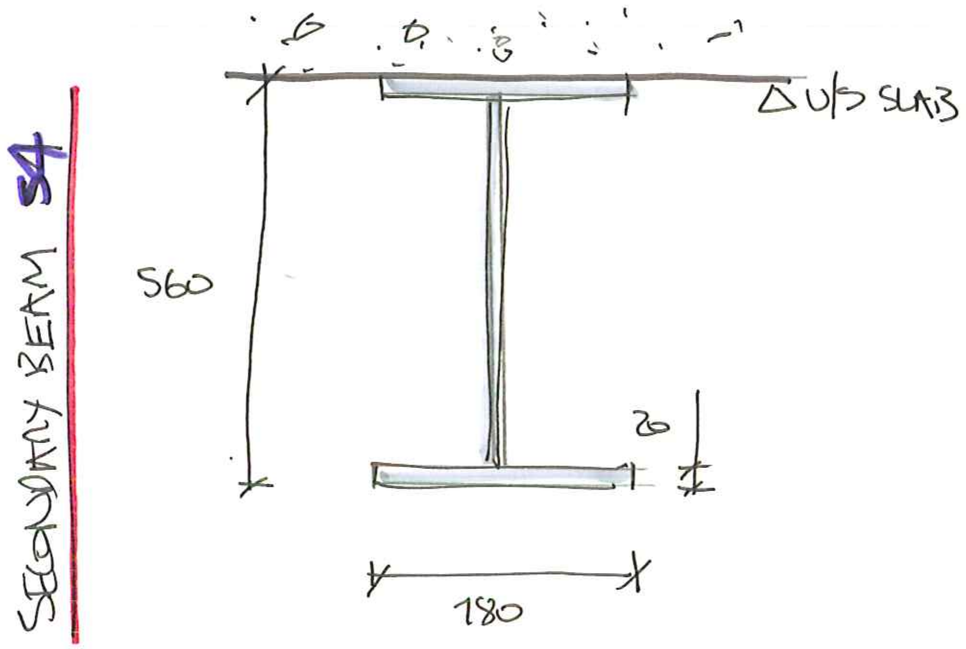
Project: GREEN BANK		Date: FEB'16
Title: INTRUSIVE INVESTIGATIONS		Drawn: JOY
Project No: 20142784	Sheet: Sk08	Rev: P0







Structural Engineering Solutions

Project	Date
GREEN BANK	FEB '16
Title	**Drawn**
INTRUSIVE INVESTIGATIONS	JDY
Project No / **Sheet**	**Rev**
20142784 / SK090	P0

Appendix B Hand Auguring

BDI Structural Solutions Crossford Court Dane Road Sale	Project Greenbank Synagogue				Job no. 20142789	
	Calcs for Hand Auger Logs				Start page no./Revision 1	
	Calcs by JDY	Calcs date 20/01/2016	Checked by	Checked date	Approved by	Approved date

BOREHOLE LOG

Borehole reference HA1 — Sheet 1 of 1

Water	Reduced Level (m)	Legend	Depth (m)	Description
	0.00			
	-0.40	X X X X	(0.40) 0.40	SANDY TOPSOIL WITH ORGANIC MATTER
	-2.50	X X X X X X X X X X X X X X X X X X X X X X	(2.10) 2.50	MADE GROUND WITH ORGANIC MATTER
	-3.00	X - X - - X - X - X - X -	(0.50) 3.00	Clayey MADE GROUND
	-3.50	- : - : - : : - : - : - - : - : - :	(0.50) 3.50	Soft to firm brown sandy CLAY Wet
	-4.00	- : - : - : : - : - : - - : - : - :	(0.50) 4.00	Firm brown sandy CLAY
				Borehole ends

Not shown to scale

Additional notes:

BDI Structural Solutions Crossford Court Dane Road Sale	Project Greenbank Synagogue				Job no. 20142789	
	Calcs for Hand Auger Logs				Start page no./Revision 2	
	Calcs by JDY	Calcs date 20/01/2016	Checked by	Checked date	Approved by	Approved date

BOREHOLE LOG

Borehole reference HA3 Sheet 1 of 1

Water	Reduced Level (m)	Legend	Depth (m)	Description
	0.00			
	-0.50	X X X X X X	(0.50) 0.50	TOPSOIL
	-1.30	: : : : : : : : : : : :	(0.80) 1.30	SAND
	-1.80	: : : : : : : : :	(0.50) 1.80	SAND Very Wet
				Borehole ends

Not shown to scale

Additional notes:

BDI Structural Solutions Crossford Court Dane Road Sale	Project Greenbank Synagogue			Job no. 20142789	
	Calcs for Hand Auger Logs			Start page no./Revision 3	
	Calcs by JDY	Calcs date 20/01/2016	Checked by	Checked date	Approved by	Approved date

BOREHOLE LOG

Borehole reference HA4				Sheet 1 of 1
Water	Reduced Level (m)	Legend	Depth (m)	Description
	0.00			
	-0.15	X X	0.15	SLAB
	-0.25	X X	0.25	BRICK HARDCORE
	-0.50	: : : : : :	(0.25) 0.50	Medium dense SAND Very Wet, Non Recoverable
				Borehole ends

Not shown to scale

Additional notes: