



STRUCTURAL REPORT

SCEGGS Darlinghurst – Wilkinson Building

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Date: 02 May 2022

PREPARED FOR
Smart Design Studio
14 Stokes Avenue
Alexandria NSW 2015

Structural Methodology Report

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Author:	Phil O'Hara
Verifier:	Trudy Myers

Northrop Consulting Engineers Pty Ltd

ACN 064 775 088 | ABN 81 094 433 100

Level 11, 345 George Street, Sydney NSW 2000

02 9241 4188 | sydney@northrop.com.au | www.northrop.com.au

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1.0 Introduction

Northrop Consulting Engineers have been engaged by Sandrick Project Directions to provide structural engineering services for Wilkinson House at SCEGGS Darlinghurst.

This report has been prepared to provide a methodology report on the façade retention and excavation for the adaptive reuse of Wilkinson House.

Refer Site Plan below:

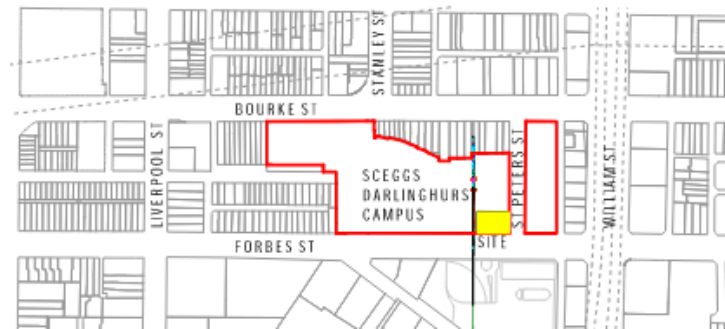


Figure 1 - Site plan

2.0 Existing Structure

The existing structure of Wilkinson House was constructed in 1901. The structure consists of timber floors supported by loadbearing masonry walls. The masonry walls provide lateral stability to the structure.

The existing façade is a double brick masonry structure, supporting the internal floor joists. The existing façade is restrained laterally by the floor joists at floor level, and take the load back to the internal masonry walls. The existing façade is founded on high level rock, on what appears to be a brick footing.

3.0 Proposed Development

The proposed Wilkinson House development includes the removal of most of the internal walls and floors inside Wilkinson House. The existing façade of the building will be maintained, to protect the heritage significance of these walls. The existing foyer at Ground level on Forbes Street has also been earmarked to be maintained.

The internal structure will be replaced with concrete slabs supported on concrete columns. Concrete shear walls will be introduced to provide lateral stability to the building. The existing façade will not be relied upon to provide lateral stability or to take vertical load for the new structure, to avoid compromising the integrity and overloading the existing walls.

The new structural design will allow for larger floor to floor heights and provide a flexible floor layout to improve the learning spaces for the students and teachers.

The new structural floor plates will be installed at the same or similar level as the existing floor levels, with an additional level proposed to the top floor, Level 3. The existing LG slab RL is proposed to be dropped 700mm from its current level, and the extent of LG will continue for the full length of the building, excluding the zone below the existing GF foyer. Currently LG only occupies one third of the building footprint, on the northern part of the building.

4.0 Structural Engineering

In this section we outline the anticipated ground conditions, proposed footing solutions and proposed superstructure solutions.

Geotechnical Conditions

A geotechnical assessment has been undertaken on the site as part of the previous Masterplan Redevelopment. The Geotechnical Investigation for the Wilkinson House Redevelopment was undertaken by Douglas Partners, and the findings of this assessment can be found in their Report 86514.03.R.001 Rev 0 dated 14th October 2021.

The geotechnical report states that the existing basement of Wilkinson House is founded on sandstone. The sandstone is generally of medium to high strength with a preliminary allowable bearing pressure of 3.5MPa. The use of pad and strip footings have been recommended as suitable foundations for this material.

The existing footings to the façade walls are bearing on medium strength rock, the geotechnical report notes there is unlikely a need to underpin the existing foundations. This will need to be monitored on site during excavation to ensure all footings are indeed sitting on suitable rock. From high level conversations with the geotechnical engineer, it is expected the rock face can be cut vertically a distance 300 – 500mm off the face of the existing wall. Rock bolts or pins may be required to stabilise any areas that are jointed or fractured. Where rock bolts cannot be used (such as the eastern façade as the bolts will cross the boundary into Forbes Lane) a concrete retaining wall can be introduced to retain the vertical cut face. If any low or very low strength bands of rock are encountered in the vertical face, localised shotcreting is recommended to prevent weathering and deterioration of the rock face.

On the western boundary, a vertical rock face exists which forms the basement of the Joan Freeman Building. The proposed excavation to the Wilkinson House LG level (of up to 2.5m) will result in a slither of rock being left under the existing western brick wall and its footing. The geotechnical report notes this remaining wedge of rock will be unstable, and will require strengthening. To stabilise this footing and brick wall, underpinning will be required to take the load down to the BEL of Wilkinson House, with a cantilevered footing to rectify any lateral loads or over turning that may be induced on the wall.

Due to the required excavation into the bedrock material, and the sensitivity of the existing masonry façade, the geotechnical report outlines the risks associated due to vibrations that will occur when excavating the rock. The report outlines the required construction and excavation methodology to minimise in ground vibrations to acceptable levels and to minimise the risk of damaging the existing heritage façade. It is recommended for vibration monitoring to be undertaken during excavation works.

Structural Systems

The proposed building comprises of three suspended post-tensioned slabs supported on concrete columns, a concrete slab on ground, and a steel roof.

As noted above, all new foundations will be designed as concrete pad and strip footings and designed for an allowable bearing capacity of 3500kPa.

The lateral stability of the structure will be provided by two concrete shear walls and the concrete lift shaft.

Floor plates have been designed as a one way post tensioned slab support on a combination of upturn and downturn beams to suit the architectural planning of the floor plates. The floors are then supported vertically on concrete columns and walls. Where the concrete columns are located hard up against the existing façade, it is proposed to use a steel sheet form work system to enable the columns to be located as close to the existing façade as possible, without loading the façade. This will allow for the columns to be set back and avoid them from protrude too far into the learning spaces and impact the spatial set out of the rooms.

Where conventional formwork and back propping cannot be utilized for the floor slabs (such as over the existing foyer) a deep trapezoidal deck profile has been adopted to avoid any back propping requirements. The metal deck will be supported by the bottom flange of the steel beams, which assists in reducing the overall depth of the structure (which would traditionally involve the metal deck formwork sitting on top of the steel beam). The overall structural depth of this system is 305mm. The steel beam will be encased in concrete which will provide the necessary fire protection to the beam, however the bottom flange of the steel beam will remain exposed, and will require fire protection.

The floor plates will require a positive connection into the existing façade to provide permanent lateral support to the façade. The current thought process on this is to adopt a tothing detail of the concrete into the existing façade, which would already exist at the existing floor joist locations. Alternatively, a steel angle with masonry anchors at regular centres could be considered, or a sleeved dowel that is grout filled after post-tensioning the floor plates.

5.0 Methodology Statement

5.1 In order to maintain stability to the existing masonry façade after the existing timber floors and loadbearing masonry walls are removed inside the building, a temporary structure will need to be installed prior to any demolition. As noted above, the intent is to retain the majority of the existing building facade, and the existing Ground Floor Foyer at the entry off Forbes Street. Refer first page of SK01 left hand side for typical section.

5.2 The temporary structure will consist of a structural steel frame that will have horizontal elements installed above the existing floor level. These horizontal members will clamp the existing façade, through the existing windows that will be removed. The horizontal members will span back to vertical trusses that will provide the lateral stability to the façade. This temporary structural system has been used many times successfully on heritage buildings, particularly in the CBD.

5.3 New foundations will be required to support the temporary retention structure. It is likely the new foundation will have to be installed at the existing natural ground level, and to be socketed below the proposed bulk excavation level. Refer page 5 of SK01.

5.4 To be able to install the vertical trusses, localise holes will need to be made through the existing floors to allow the steel work through. Provided these steel elements do not clash with any primary structural elements, there should be minimal impact on the integrity of the existing floor. Alternatively, if the location of the steel work is not favourable, localised temporary propping may be required.

5.5 Careful planning and coordination will be required when setting out the temporary retention structure, to ensure that it does not compromise or conflict with the new concrete structure.

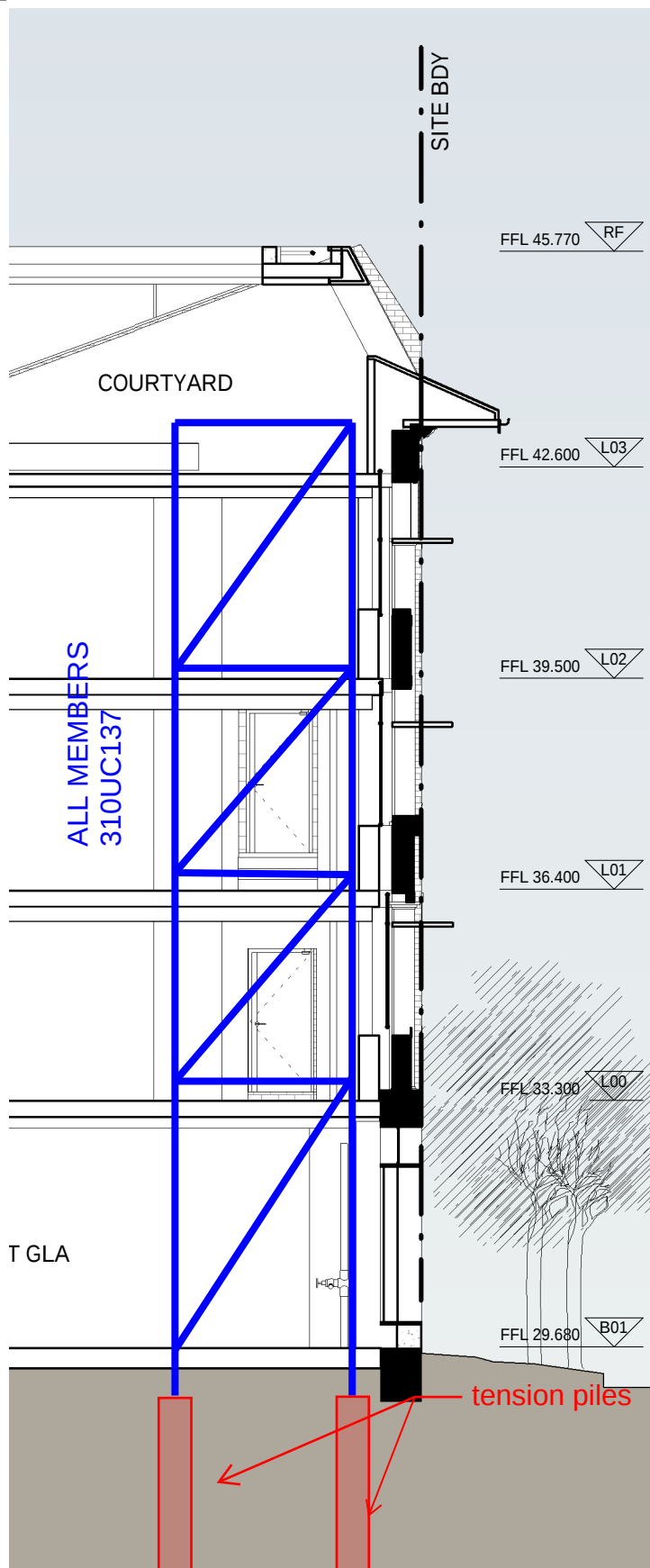
5.6 The new concrete structure will need to be installed, prior to the removal of the temporary steel retention structure.

5.7 To provide construction access into the existing Wilkinson house building to facilitate demolition of the structure and removal of waste, an existing column on the Northern Façade will need to be temporarily removed. A steel frame has been proposed to temporarily support the vertical weight of the wall over. Once the new building has been constructed, the existing column will be rebuilt, and the temporary steel frame will be removed. Refer page 6 of SK01.

6.0 Summary

Provided the works described in the methodology statement and precautions taken as per the geotechnical report are carried out in a professional workmanlike manner we see no reason why the façade and excavation works cannot be carried out successfully.

APPENDIX A



PRELIMINARY
NOT FOR CONSTRUCTION

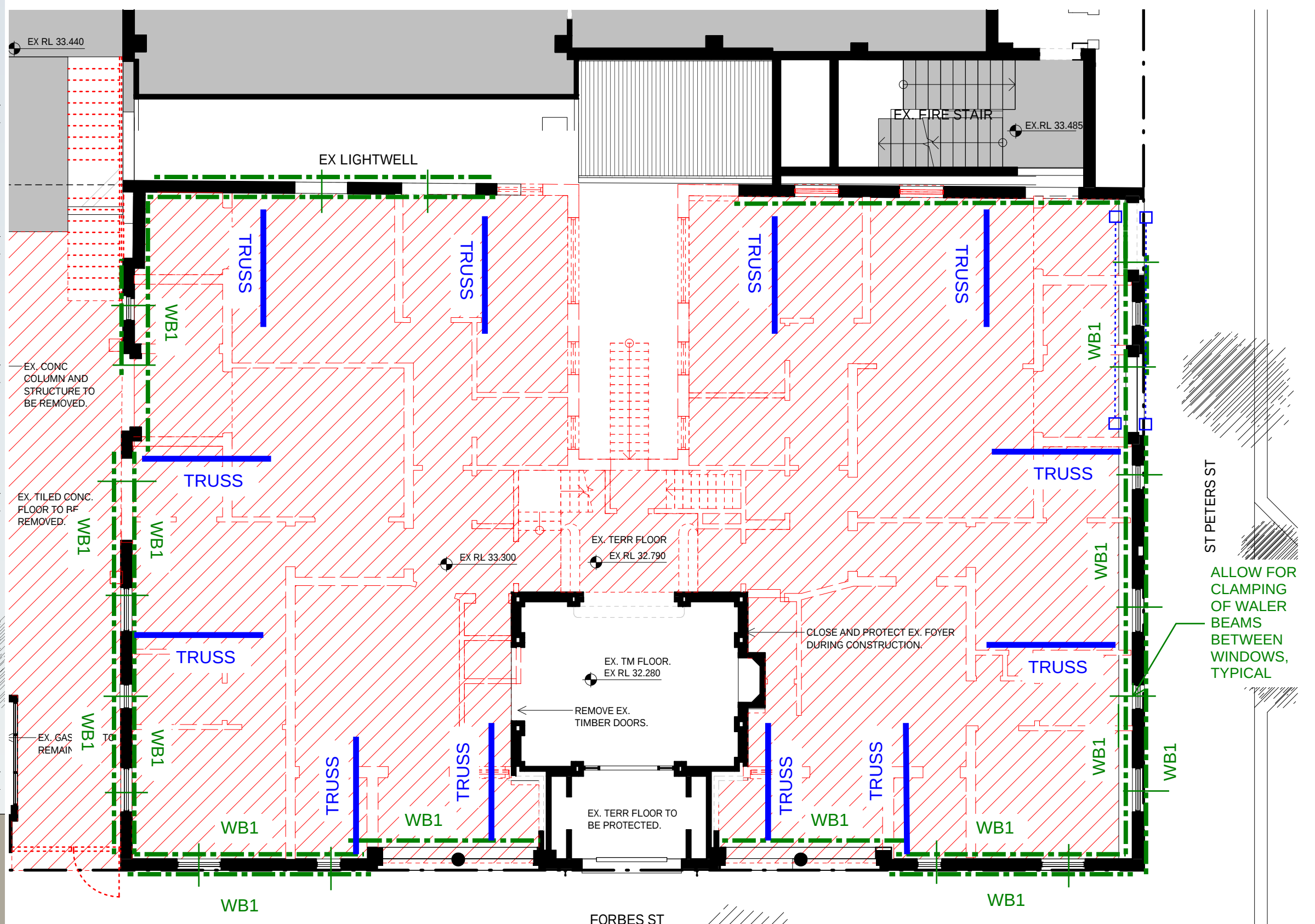
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P1	FOR INFORMATION	11.06.21
P2	FOR INFORMATION	07.07.21
P3	FOR INFORMATION	27.07.21
P4	FOR INFORMATION	02.08.21

DWG TITLE

smart design studio

14 STOKES AVE
ALEXANDRIA NSW 2015
TEL +61 2 8332 4333
NOM ARCH WILLIAM SMART 6381

TEMPORARY WORKS FOR FACADE
RETENTION - PRELIMINARY DESIGN



WB1 - 200UC 46.2
ALL STEEL TO BE
LOCATED ABOVE THE
EXISTING FLOOR LEVEL

ST PETERS ST

FORBES ST

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SCALE
1:100 @ A3 UNO

PROJECT
2022 WILKINSON
DRAWN SENIOR Q
DRAFT DRAFT

Date:	02.11.21	Project No:	211000
Project:	SCEGGS - WILKINSON HOUSE		
Title:	FACADE RETENTION		
Drawing No:	TW-SK01	Revision:	2
Drawn:	T.MYERS	Scale:	1:100



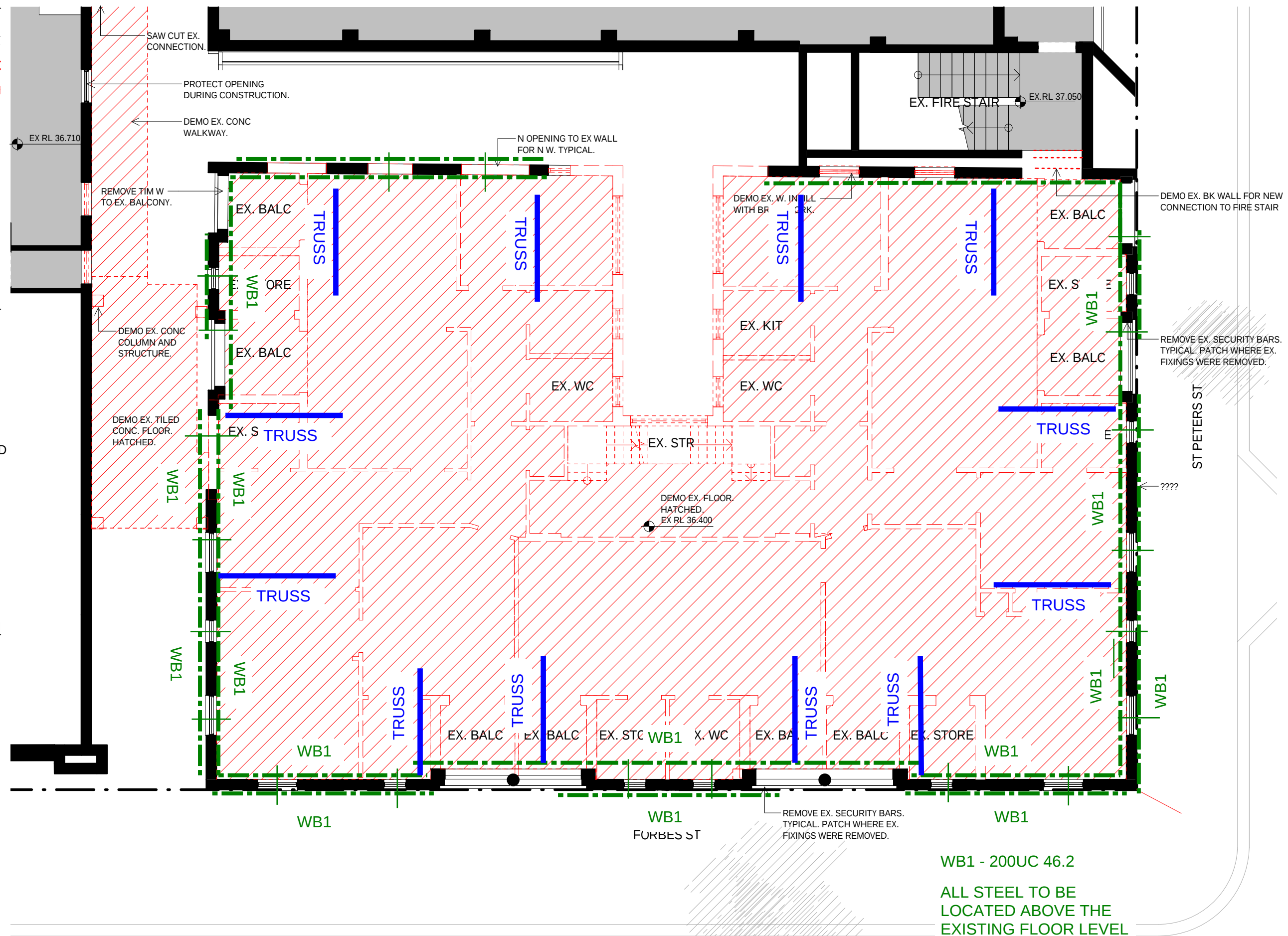
EXISTING WALL RETAINED (GREY SHOWS DETAIL)

WALL TO BE DEMOLISHED

FLOOR TO BE DEMOLISHED

- 1 All dimensions to be verified on site.
- 2 Report any discrepancies or omissions to SDS prior to construction.
- 3 Refer to architect for ambiguous details or when clarification is required.
- 4 All drawings to be read in conjunction with specification.
- 5 All drawings to be read in conjunction with consultants' drawings.
- 6 All structure to structural engineer's details.

ISSUE	REASON	DATE
P1	FOR INFORMATION	20.08.21



LEGEND

EXISTING WALL RETAINED (GREY SHOWS DETAIL)

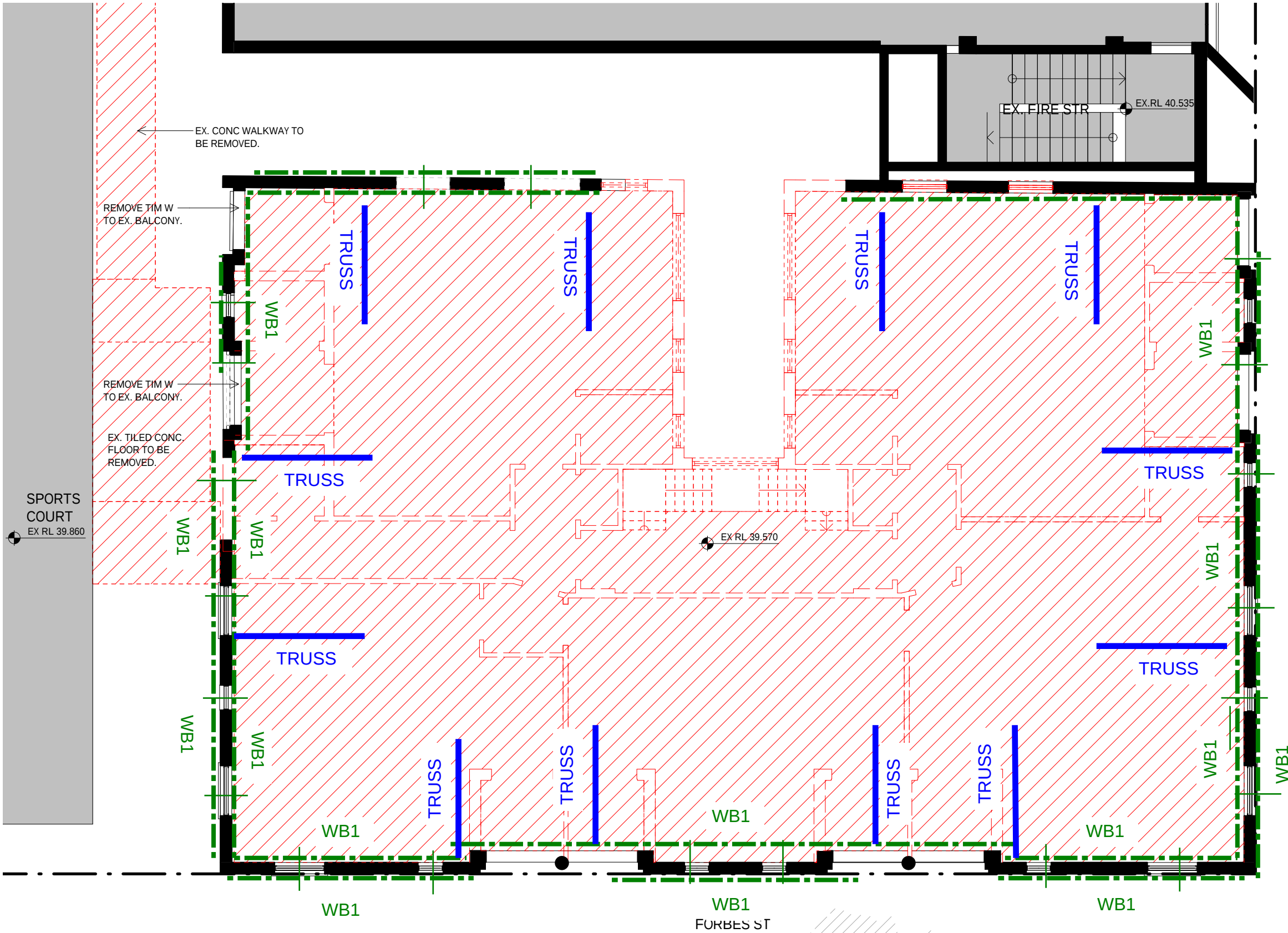
WALL TO BE DEMOLISHED

FLOOR TO BE DEMOLISHED

- NOTES
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PRELIMINARY
NOT FOR CONSTRUCTION

ISSUE	REASON	DATE
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WB1 - 200UC 46.2

ALL STEEL TO BE
LOCATED ABOVE THE
EXISTING FLOOR LEVEL

LEGEND

EXISTING WALL RETAINED (GREY SHOWS DETAIL)

WALL TO BE DEMOLISHED

FLOOR TO BE DEMOLISHED

- NOTES
- 1

All dimensions to be verified on site.
- 2

Report any discrepancies or omissions to SDS prior to construction.
- 3

Refer to architect for ambiguous details or when clarification is required.
- 4

All drawings to be read in conjunction with specification.
- 5

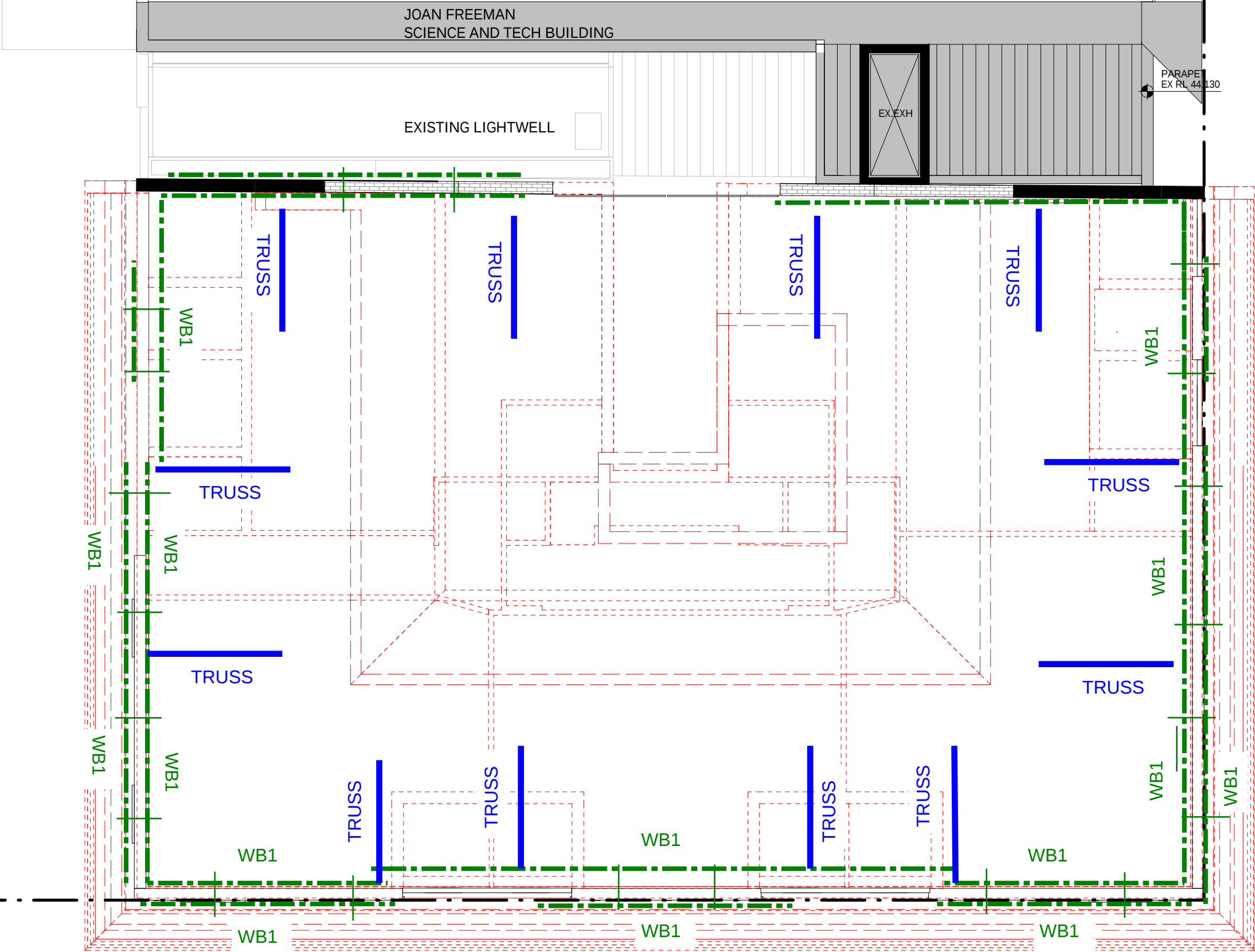
All drawings to be read in conjunction with consultants' drawings.
- 6

All structure to structural engineer's details.

PRELIMINARY

NOT FOR CONSTRUCTION

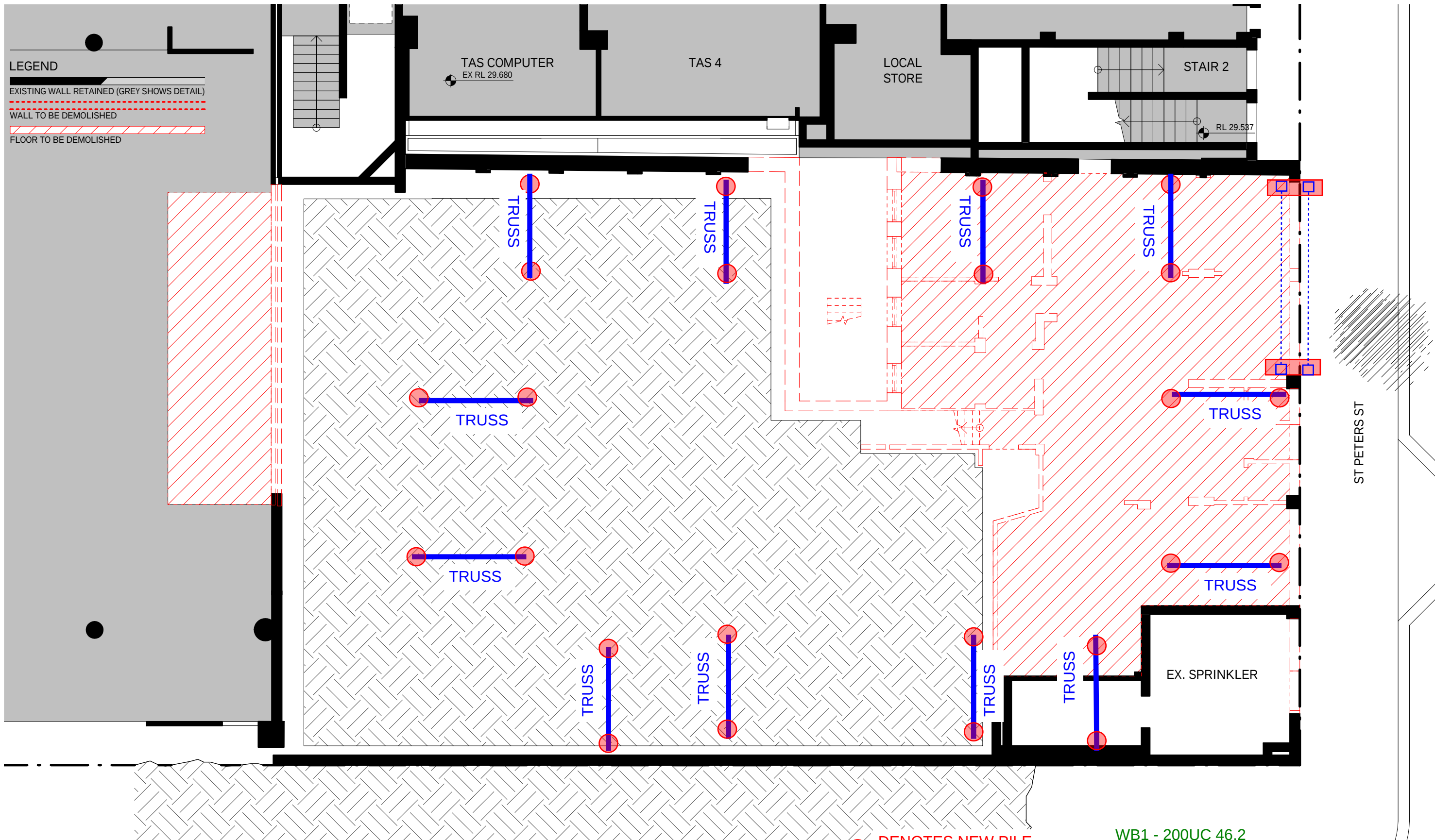
ISSUE	REASON	DATE
P1	FOR INFORMATION	20.08.21



WB1 - 200UC 46.2

ALL STEEL TO BE
LOCATED ABOVE THE
EXISTING FLOOR LEVEL





LEGEND

EXISTING WALL RETAINED (GREY SHOWS DETAIL)

WALL TO BE DEMOLISHED

FLOOR TO BE DEMOLISHED

TAS COMPUTER
EX RL 29.680

TAS 4

LOCAL
STORE

STAIR 2

RL 29.537

TRUSS

TRUSS

TRUSS

TRUSS

TRUSS

TRUSS

TRUSS

TRUSS

TRUSS

TRUSS

TRUSS

EX. SPRINKLER

ST PETERS ST

● DENOTES NEW PILE
TO SUPPORT TRUSS

WB1 - 200UC 46.2

ALL STEEL TO BE
LOCATED ABOVE THE
EXISTING FLOOR LEVEL

PRELIMINARY
CONSTRUCTION

- | | | | |
|---|---|---|--|
| 1 | All dimensions to be verified on site. | 4 | All drawings to be read in conjunction with specification. |
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STUD WALL / PARTITION

CONCRETE WALL

BLOCK WALL

BRICK WALL

EXISTING WALL RETAINED (GREY SHOWS DETAIL)

WALL TO BE DEMOLISHED

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SCALE
1:100 @ A3 UNO

PROJECT
2022 WILKINSON HOUSE

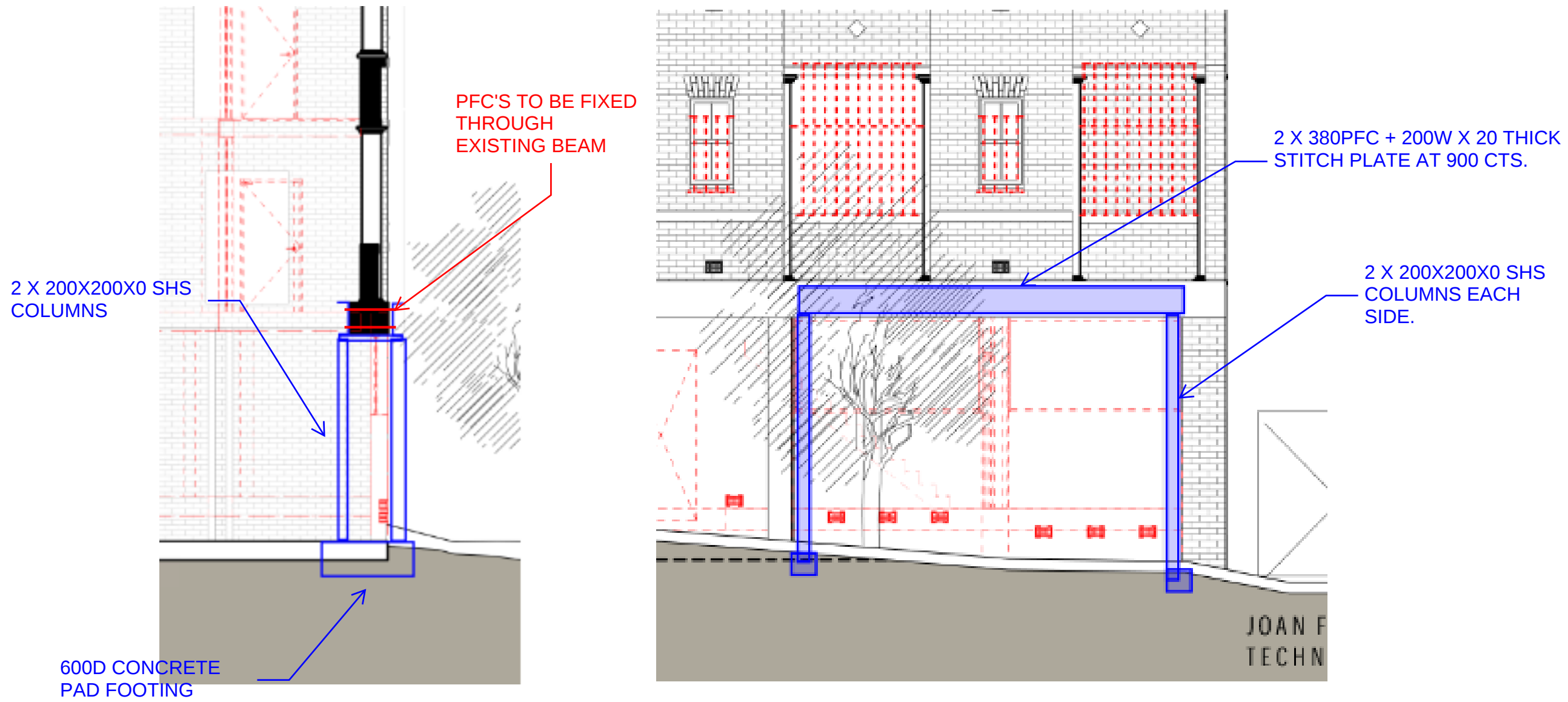
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DRAFTDRAFT DRAFT

DWG TITLE
LG DEMOLITION PLAN

DWG NO DA055 REV P1

smart design studio

14 STOKES AVE
ALEXANDRIA NSW 2015
TEL +61 2 8332 4333
NOM ARCH WILLIAM SMART 6381



TEMPORARY STEEL FRAMING FOR REMOVAL OF EXISTING CONCRETE COLUMN ON THE NORTHERN FACADE.