

## St Michael’s Uniting Church

**Document:** Technical Report

**Project No:** 324001

**Date:** 22/04/2024

**Subject:** Inspection Report and Concept Sketches

**Page:** 1 of 11

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## Introduction

Sheer Force Engineering (SFE) have been engaged by The Uniting Church in Australia to undertake a visual structural inspection and subsequent reporting to the existing elements at St Michael’s Uniting Church located at 120 Collins Street, Melbourne.

Our inspection was undertaken at specific locations to facilitate the following possible future modification works to be undertaken at the building:

- Modification to lower floor level of main seating church area to assist with DDA access (generally raising floor level to match existing western and eastern entry doors)
- New openings and wall removal to the back-of-house areas
- Introduction of new heating elements proposed to be hung from the ceiling and roof structure of the main church area. Figure 1 shows a plan view of the church at level 01.

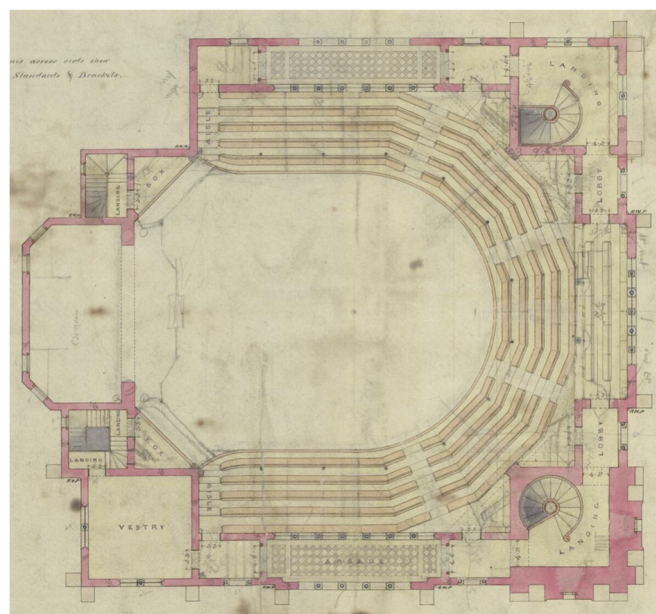


Figure 1 – Plan View of Church (level 01 view)

Two separate inspections were undertaken on the 20<sup>th</sup> of February 2024 and the 10<sup>th</sup> of April 2024.

### Structural Characteristics

SFE have also been provided with existing documentation for the building which is dated circa 1866. Based on our separate site inspections and review of the provided documentation, we understand the building to comprise the following structural elements:

- Bluestone bearing pads supporting brick piers within the sub-floor
- Timber hardwood joist and bearer to main church floor
- Timber floorboards throughout
- Multi-skin un-reinforced masonry load-bearing walls
- Timber framed ceiling and roof structure.

The floor finish and timber floorboards were temporarily removed at select locations within the main church area to facilitate a visual inspection of the sub-floor area. The specific details of the sub-floor were found to comprise the following elements:

#### Lowest Seating Area:

- **220 x 100 hardwood bearer** spanning generally in an east-west direction. Spanning between 1.4-1.6m
- **220 x 85 hardwood joist** at 450 intervals spanning between 2.4-2.6m in the north-south direction.

#### Next Level (raked) seating area:

- **220 x 85 hardwood bearer** spanning in a radial form (generally parallel with seating) between 1.3-1.6m.
- **140 x 70 hardwood joist** at 350 intervals spanning between 2.4-2.6m

The condition of the inspected timbers was found to be quite good considering their age. There was no obvious signs of significant rot or deterioration that would drastically influence the structural performance of the timber members.

The sub-floor condition was found to be quite dry and free from significant dampness, indicating that the sub-floor area is well ventilated. There was a good level of consistency observed with the spacing and sizing of the inspected timbers at the areas which were witnessed.

### Floor Level Modifications

For the lower seating area, based on the inspected structure and proposed change in level which is required to match the lowest seating area with the east and west entries (approximately 733mm). The following structural arrangement is proposed...

- Timber framed dwarf walls running parallel and immediately above the existing timber bearers. Comprising **90 x 45MGP10** members, including vertical and top/bottom plate.
- New timber joists **240 x 45 F17** kiln dried hardwood at 450mm maximum intervals spanning perpendicular to the dwarf walls (location to generally match existing joist locations).
- Nominal dwarf walls running in parallel with new joists at discrete locations to allow for strap bracing
- Strap bracing bays in the north-south and east-west directions for lateral rigidity.
- Red-tongue structural flooring throughout.

Figure 2 and Figure 3 illustrate this proposed arrangement in cross-section view looking east and north respectively at a representative bluestone pad support location.

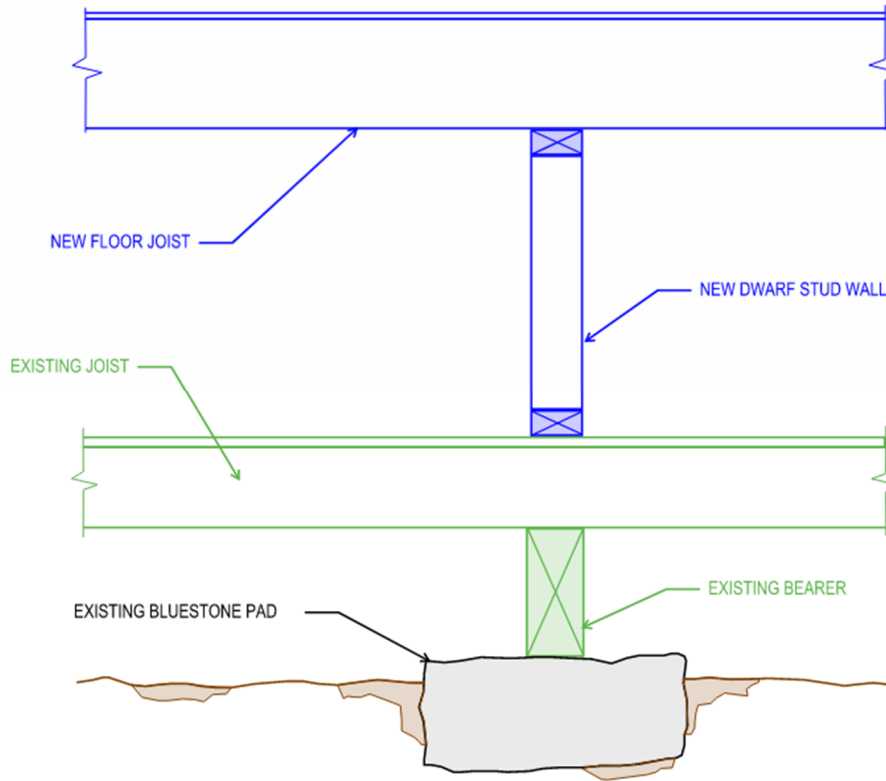


Figure 2 – Cross-section view (looking east) of floor build-up to achieve required level

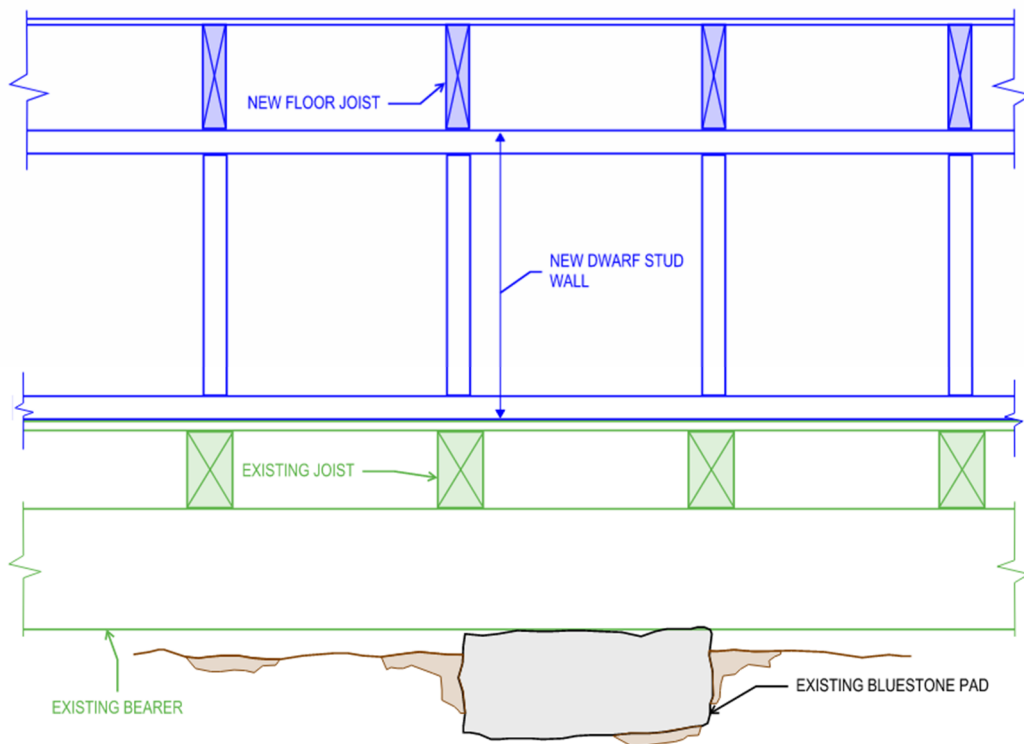


Figure 3 – Cross-section view (looking north) of floor build-up to achieve required level

For the current stage area, the proposed construction is as follows:

- Remove existing stage projection (the half-circle shape to the south)
- Remove existing top tier of stage across remaining extent of stage
- Re-install new bearer/packers ensuring load transmission applies load to existing lower-level joists (spacing assumed to be 450 cts) **190x45 MGP10**
- Install perpendicular spanning joists **190x45MGP10**
- Install red-tongue flooring (provide timber packing beneath flooring to achieve final required level)

## Wall Removal at Back of House Area

The walls generally around the back-of house area are multi-skin masonry walls and provide at least some notional support to the roof above based on our visual assessment.

We advise that steel support beams will be required in order to provide support to the roof structure to allow removal of the proposed back of house wall areas. Figure 4 indicates the proposed walls to be removed.

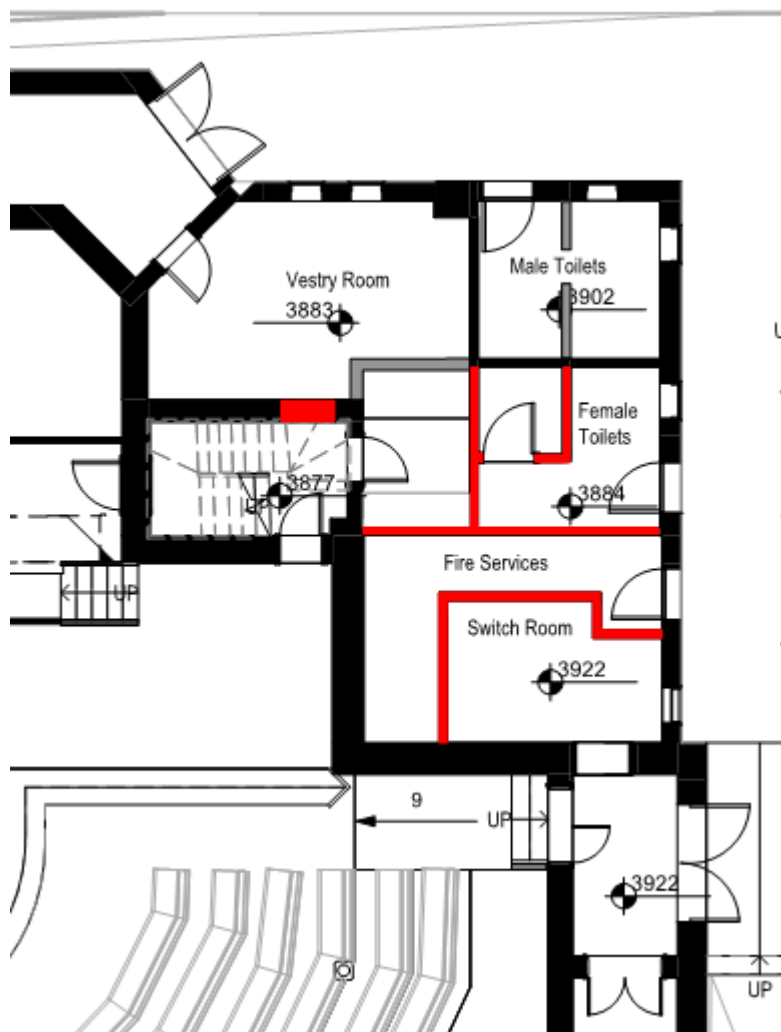


Figure 4 – Part plan of level 01 indicating proposed walls to be removed.

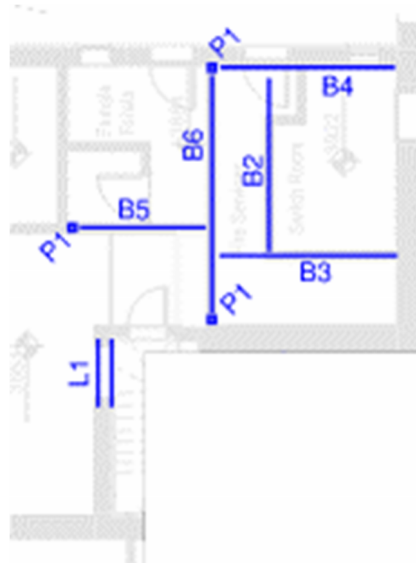


Figure 5 – Part plan of beams supporting roof structural to facilitate wall removal.

Figure 5 above shows a part plan with proposed beam layout for support of the lower roof to facilitate the proposed back-of-house wall removal. With the exception of beam B6 (which is a 250PFC) the proposed beams are all 150PFC members.

It is noted that visual access was limited during our site visit which prevented full confirmation of which walls were load-bearing and which walls were partition walls only. There is potential for the proposed steelwork to be refined following further inspection and analysis during later stages of design.

## Hanging New Heating Elements to Ceiling/Roof Structure

It is understood that heating elements are proposed to be hung from the existing roof/ceiling structure. We understand the order of magnitude of these loads to be between 100-200kg.

Inspection of the roof/ceiling space reveals that the structural support condition comprises:

- Primary support roof trusses spanning east-west
- Secondary radial trusses spanning between support posts (support post generally visible within main church area)
- Roof and ceiling rafter/joists supporting either ceiling or roof tiles depending on their location.

During our inspection of the ceiling space, it was noted that other post-installed items had been attached to the primary trusses via an electric motor and pulley arrangement. The arrangement was directly connected to primary roof truss elements.

We note that, provided that a similar support approach is adopted for the proposed heating elements (i.e. support arrangement hanging directly from the primary trusses), it is likely that this approach is structurally acceptable without further intervention.

It is noted that further detailed analysis will need to be undertaken in order to formally approve the loading and load locations.

Figure 6 shows a site image taken within the ceiling space which identifies an existing hung element from the primary truss member.



*Figure 6 – Photo taken within the ceiling space identifying primary support truss and hung element attached directly to the primary truss.*

## Structural Concept Design

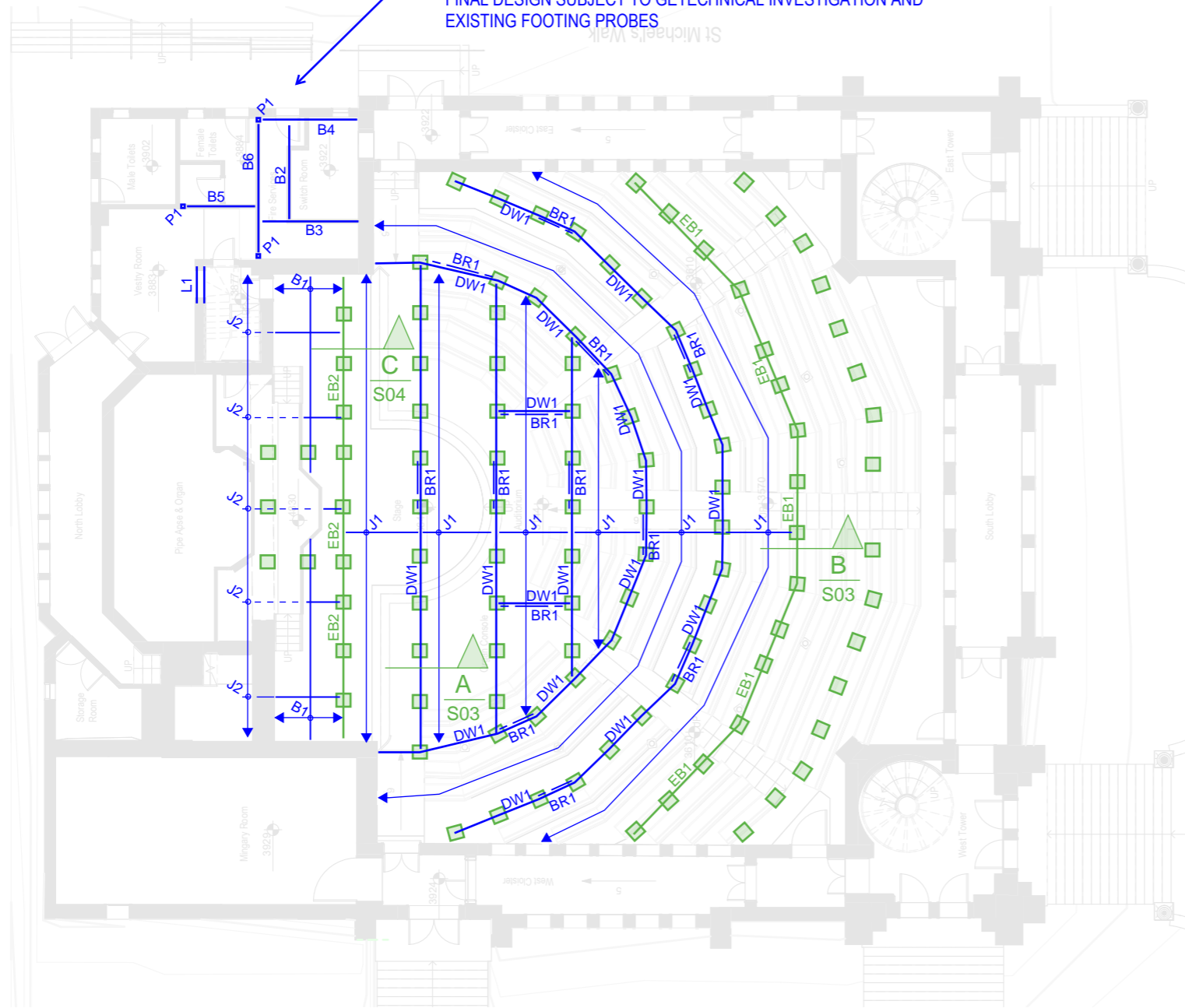
Refer to Appendix A for structural concept sketches for the proposed floor arrangement to facilitate the change in levels. Also see Appendix A for structural concept sketches of new steel beams to facilitate back-of-house wall removal as outlined within this report.

## Appendix A: Structural Concept Sketches





ALLOW FOR PAD FOOTING AND/OR EXISTING STRIP FOOTING ENLARGEMENT UNDER ALL P1 COLUMNS BY MEANS OF DRILL AND EPOXY TO THE SIDE OF EXISTING FOOTING ELEMENTS, FINAL DESIGN SUBJECT TO GETECHNICAL INVESTIGATION AND EXISTING FOOTING PROBES



**MEMBER SCHEDULE**

TAG	SIZE	COMMENTS
J1	240 x 45 F17 KDHW	SPACING TO MATCH EXISTING JOISTS MAX 450
J2	190 x 45 MGP10	MAX 450 CTS.
B1	190 x 45 MGP10	MAX 450 CTS.
DW1	STUD DWARF WALL	90x45 MGP10 STUDS AND PLATES
BR1	STRAP BRACE	BRACE BAY FOR LATERAL RESTRAINT
B2	150PFC	ROOF SUPPORT BEAM
B3	150PFC	ROOF SUPPORT BEAM
B4	150PFC	ROOF SUPPORT BEAM
B5	150PFC	ROOF SUPPORT BEAM
B6	250PFC	ROOF SUPPORT BEAM
P1	89x6SHS	ROOF SUPPORT COLUMN
L1	2/150x10x10 EA	MULTI SKIN WALL LINTEL BEAM
EB1	220 x 85	EXISTING HARDWOOD TIMBER BEARER
EB2	220 x 100	EXISTING HARDWOOD TIMBER BEARER

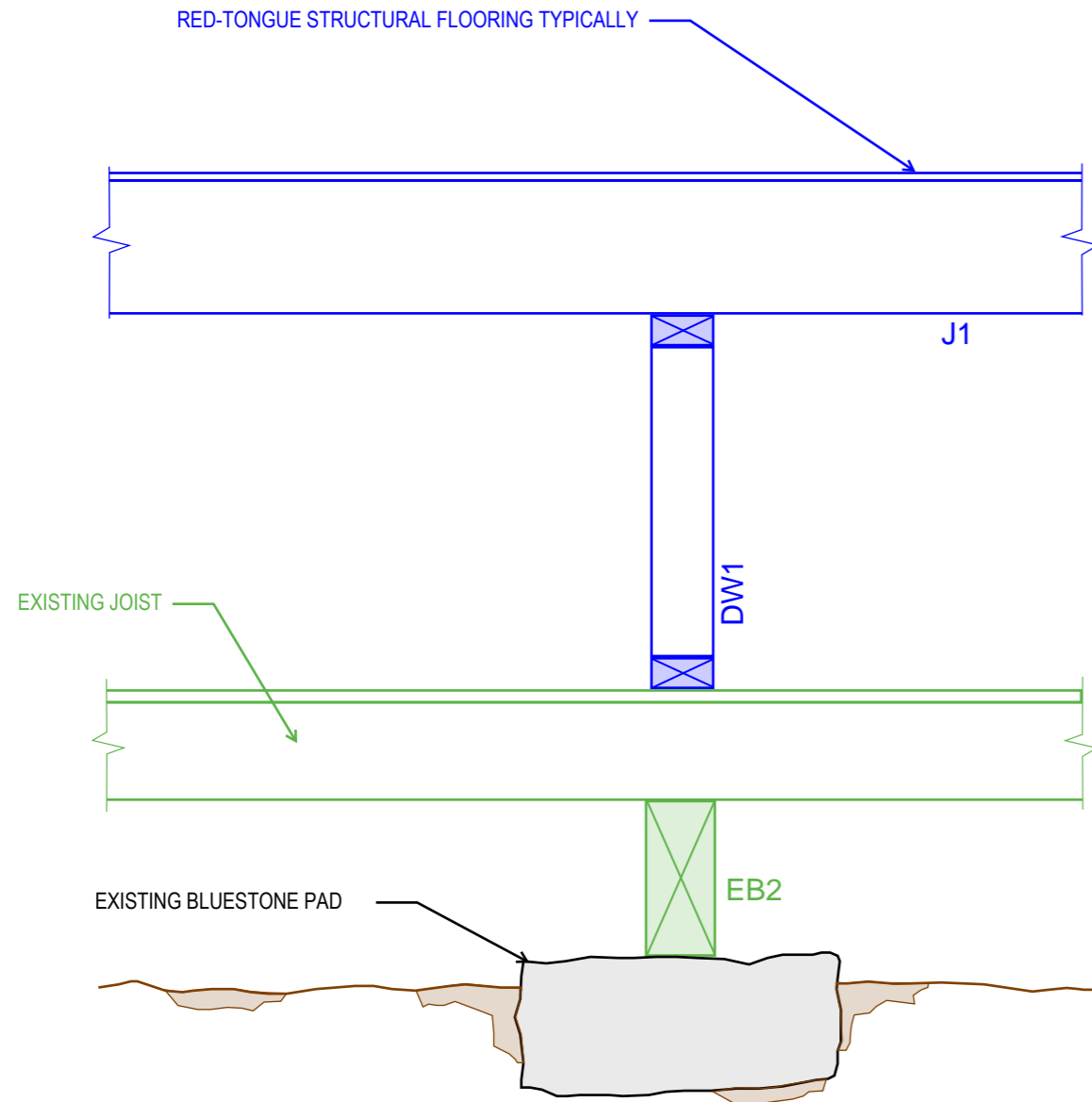
**LEGEND:**

■ DENOTES EXISTING 520 x 520 BLUESTONE SUPPORT PAD

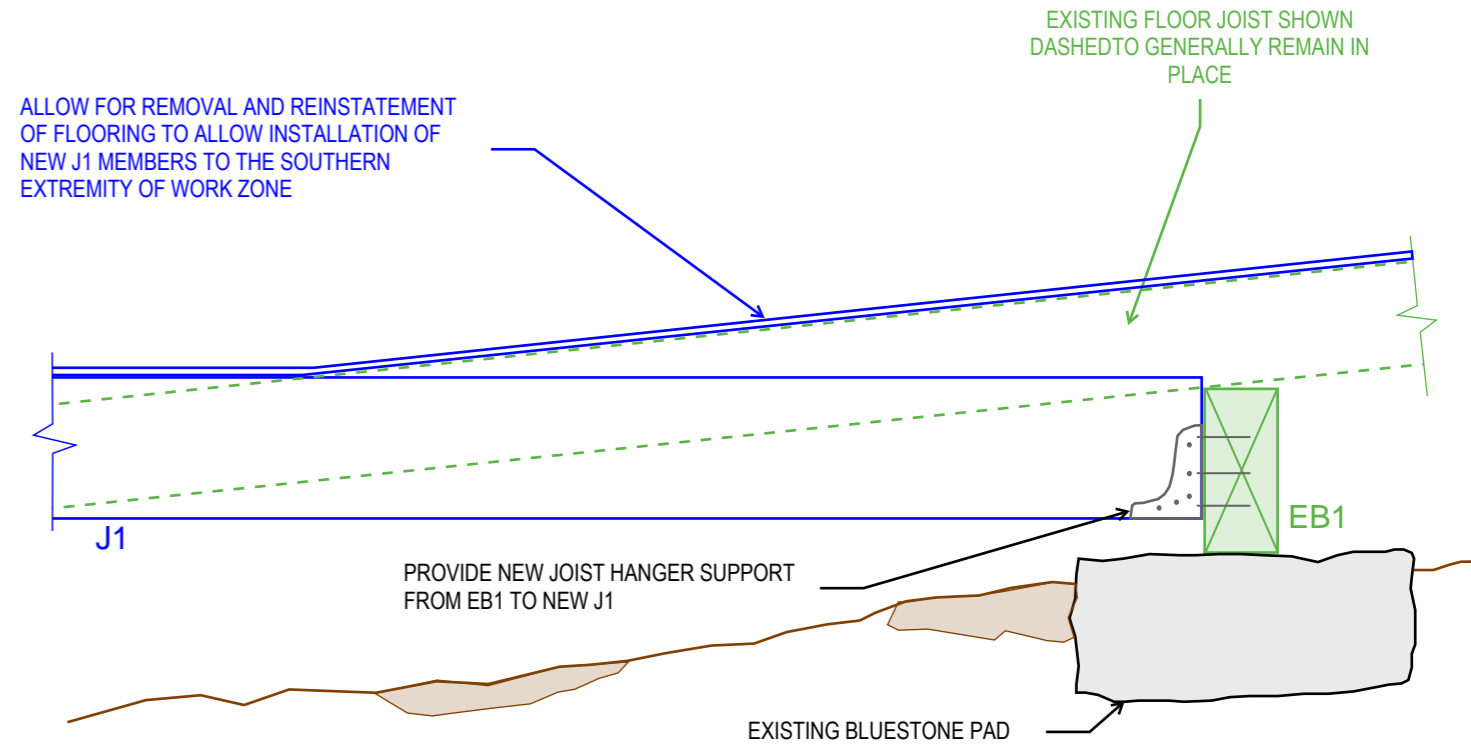
**NOTES:**

- DW1 STUD LOCATIONS TO MATCH EXISTING JOIST LOCATION TO ENSURE FULL LOAD TRANSFER TO EXISTING BEARER
- ALL EXISTING STRUCTURE LOCATIONS AND SIZES ARE INDICATIVE AND BASED UPON VISUAL INSPECTION AT SELECT LOCATIONS SUPPLEMENTED WITH INFORMATION PROVIDED WITHIN THE EXISTING DOCUMENTATION. TO BE FURTHER VERIFIED PRIOR OR DURING CONSTRUCTION.
- J1 ASSUMED TO BE DOUBLE CONTINUOUS SPAN
- STRUCTURAL DESIGN AND FRAMING IS AT CONCEPT LEVEL. SIZES AND ORIENTATION MAY BE SUBJECT TO MODIFICATION FOLLOWING COMPLETION OF DETAILED DESIGN. APPROPRIATE DESIGN CONTINGENCY TO BE INCLUDED IN ANY COSTING ASSUMPTIONS
- THE PROPOSED FLOOR LEVEL SOLUTION RELIES UPON SUPPORT BY THE EXISTING BEARERS WITHIN THE SUB-FLOOR. ASSUMED GRADE OF BEARERS ARE EQUIVALENT TO F17. TIMBER GRADING TO BE UNDERTAKEN IN ORDER TO CONFIRM THIS ASSUMPTION

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Rev.	Amendment	Date				Level 4/178 Collins Street, Melbourne Victoria ABN: 92 665 743 251E: admin@SheerForceEng.com		Client	Sheet Size	Scale	Drawn	Checked	Project No.	Drawing No.	Revision
								THE UNITING CHURCH IN AUSTRALIA	A3	1:200	QS	QS	324001	S-02	A

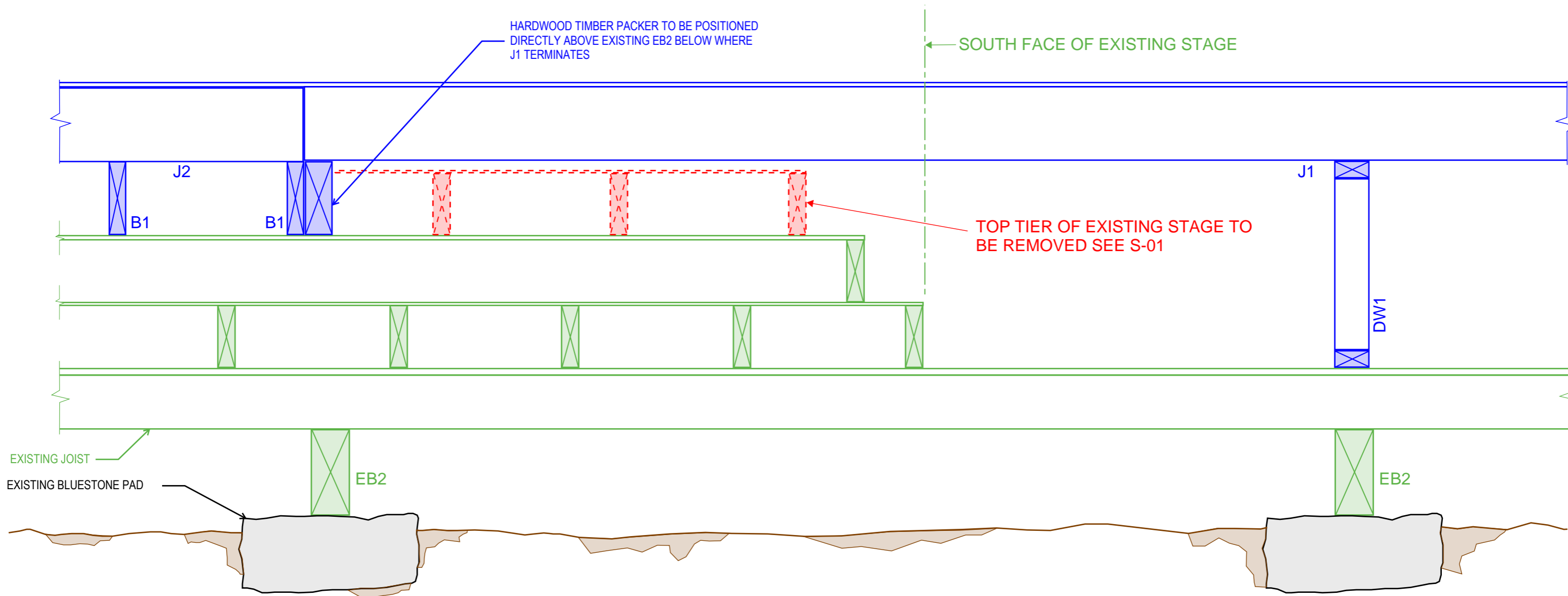


**SECTION A**  
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**SECTION B**  
1:10 S-02

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				 Level 4/178 Collins Street, Melbourne Victoria ABN: 92 665 743 251E: admin@SheerForceEng.com				<b>ST MICHAEL'S UNITING CHURCH 120 COLLINS STREET</b>				<b>SECTIONS AND DETAILS SHEET 1</b>							
<b>A PRELIMINARY</b>		22/04/24						Client: THE UNITING CHURCH IN AUSTRALIA		Sheet Size: A3		Scale: 1:10		Drawn: QS		Checked: QS		Project No.: 324001	
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**SECTION C**  
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Rev.	Amendment	Date	22/04/24	Sheet Size	Scale	Drawn	Checked	Project No.	Drawing No.	Revision					
A	PRELIMINARY			A3	1:10	QS	QS	324001	S-04	A					