SITE INSPECTION AND STRUCTURAL ANALYSIS FOR REDESIGNING THE GARAGE AT THE RESIDENTIAL PROPERTY LOCATED AT ,

Introduction:

was contracted to inspect the existing building garage/carport area and provide a solution to widen the access to the garage/carport by removing columns in the middle of the opening. The inspection confirmed that the two existing timber posts supporting the structure are proposed for removal. The scope of work includes the replacement of the current gate system with a panel lift garage door, and the structural assessment required to determine the appropriate size and type of timber or steel beam necessary to span the new opening and ensure structural integrity.

Figure 1 Site locality

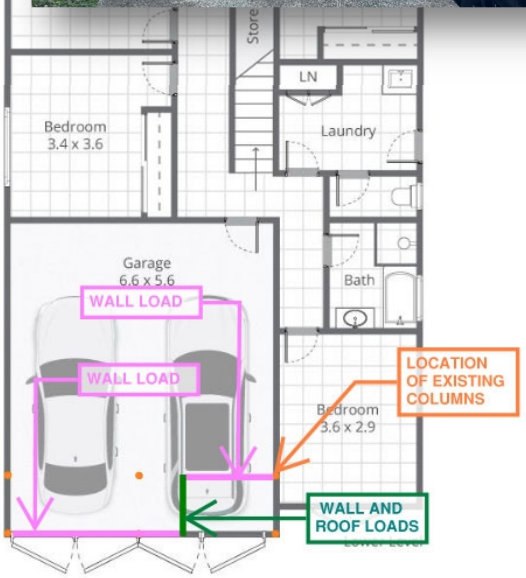
Australian standards referenced herein:

- AS 1170.0: 2002 : General Principles
- AS1170.1: 2002 : Permanent, imposed, and other actions
- AS1170.2: 2021 : Wind Load Actions
- AS 1684.4:2021 : Residential Timber Framed Construction

Observations

conducted a detailed visual inspection of the garage entrance for modification, which involves removing the centre column in the Garage Area, as depicted in Figure 2. During the inspection, measurements of the garage entrance were taken, with dimensions recorded as 5.60 meters by 1.40 meters, as illustrated in Figures 3 and 4. For proper understanding, the floor plan is depicted in Figure 5. The timber Beam between the Timber post supporting the I-Joist needs to be analyzed to determine if this beam is required or not. If the joist can support the floor load at each end, then this beam can be removed. (*See Structural Analysis Result: Floor I-joist)*. The depth of the timber bearer spanning over the posts in question was measured at approximately 300mm, as well as the joist (300mm), as shown in Figures 6 and 7. As shown in Figure 8, it was observed that the existing hold-downs on the upper floor are connected to the timber post. Upon removal of this post and the supporting timber beam beneath the I-joist, the hold-downs must be reinstated and properly reconnected directly to the timber Bridging to maintain structural integrity and load transfer.







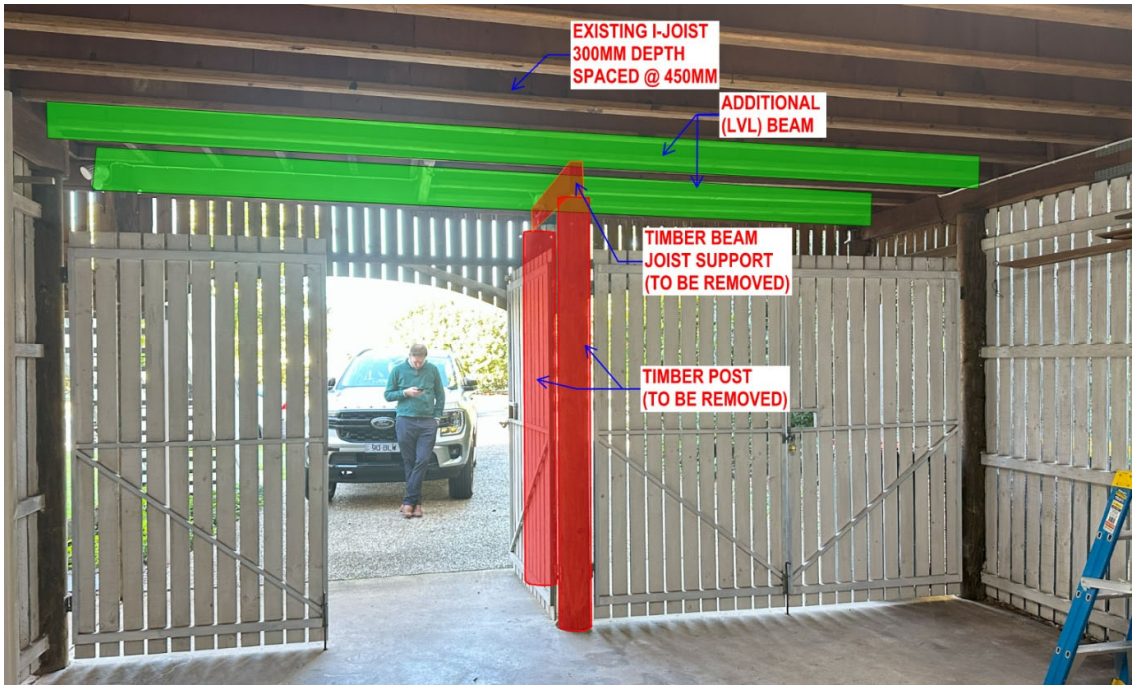


Figure 2. Scope of Work



Figure 3. Width of Opening



Figure 4. Width Deck

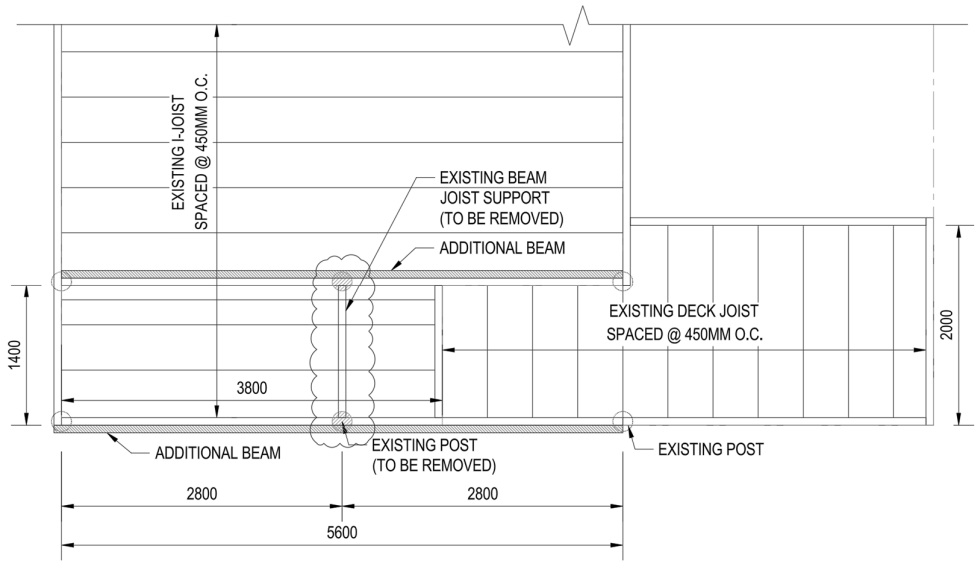


Figure 5. Floor Plan (Scope)



Figure 6. Depth of Bearer



Figure 7. Depth of Joist

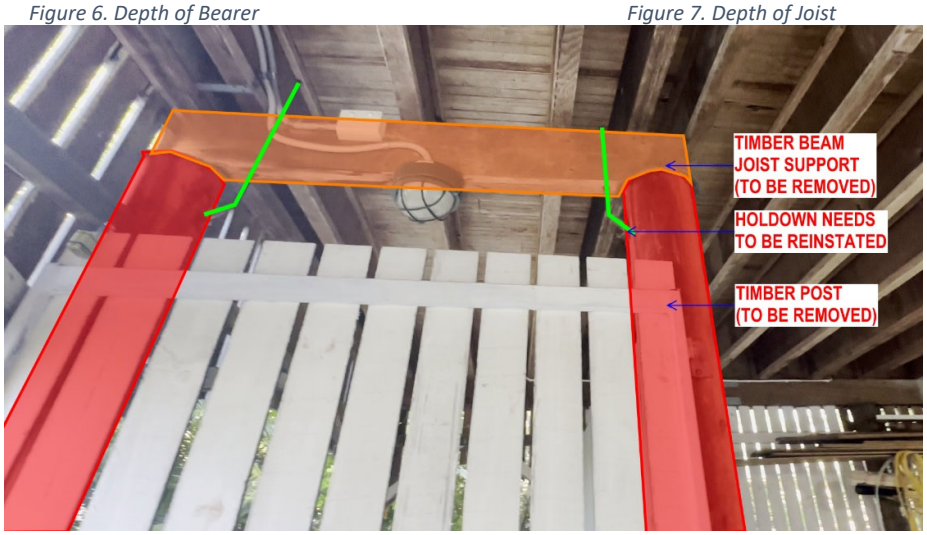


Figure 8. Existing Hold-down attached t

Structural Analysis and Design

We performed structural analysis and design for the floor bearer spanning 5.60 meters without central support. The assessment specifically addresses the outer Beam, which is subjected to a greater tributary width compared to adjacent bearers. This is due to the alignment of the internal bearer with the joists, causing the I-joists to transfer floor loads directly to the edge bearer. For structural design, a tributary load width (L.W.) of 0.70 meters was adopted, as shown in the figure below. Additionally, a structural assessment was performed on the I-joist spanning 3.80 meters without intermediate timber beam support, with the nearest support located 2.80 meters from the left end. The analysis confirmed that the I-joist is structurally adequate to carry the applied floor loads across the span without requiring additional intermediate support.

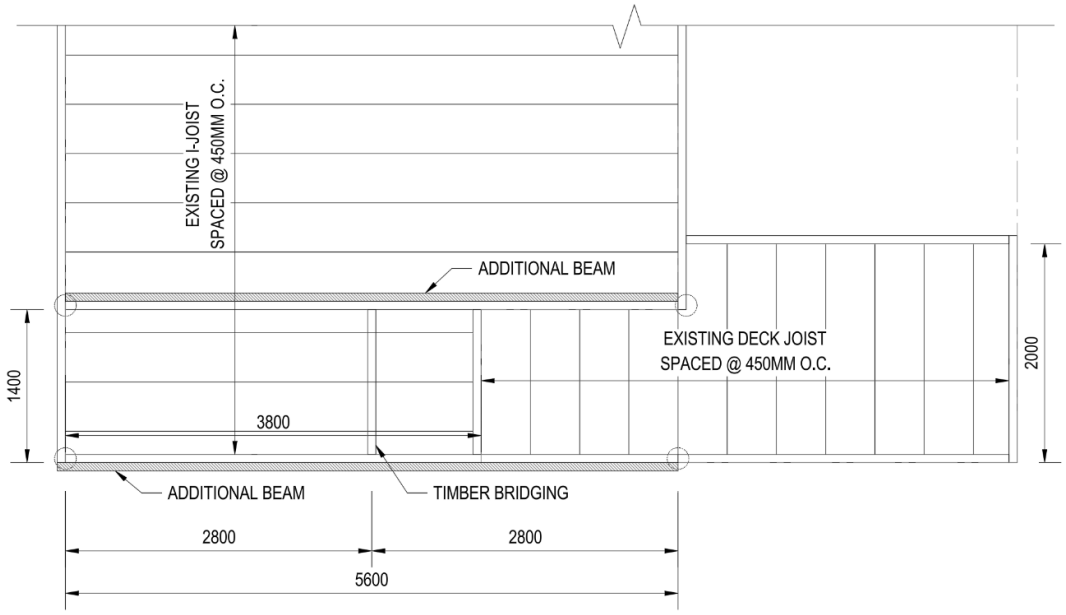


Figure 9. Proposed Floor Plan

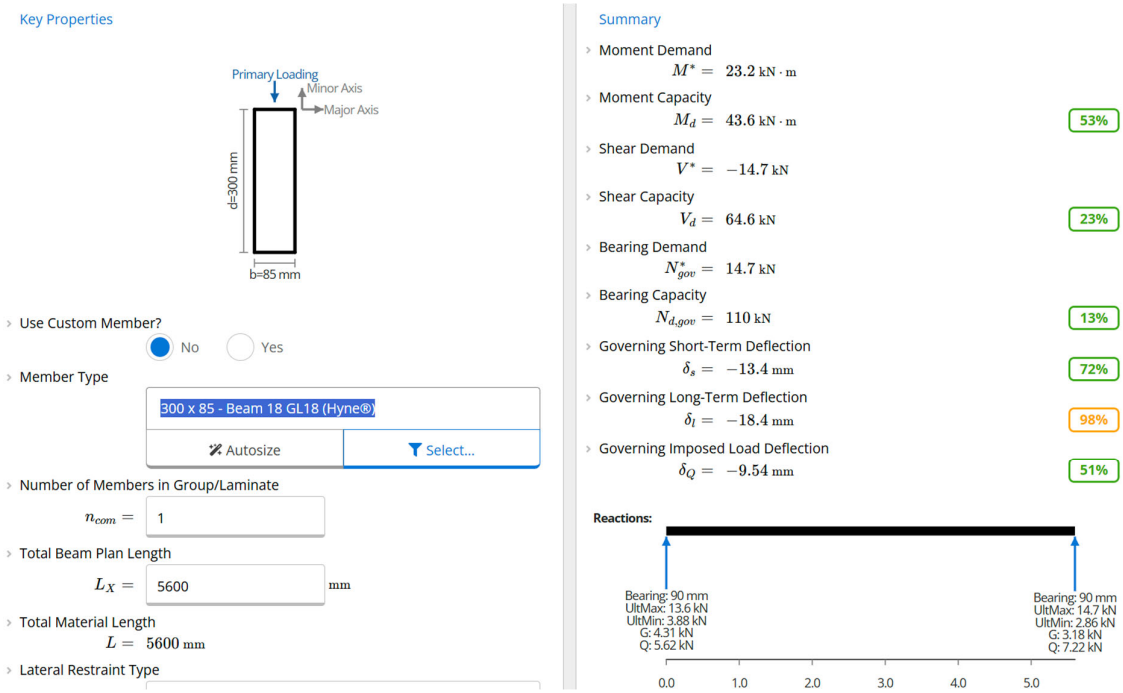
LOADING

The loading applied to the floor bearer has been determined in accordance with AS 1170.1:2002 – Permanent, Imposed, and Other Actions. The assumed deadload for the deck is 0.40 kPa, the imposed live load is 2.0 kPa, as specified in Table 3.1 of AS 1170.1:2002. These values have been factored into the design to ensure compliance with the standard, and the relevant loading conditions are illustrated in the figure below.

Results

ADDITIONAL BEAM (300x85 Beam 18 GL18: Hyne)

The result shown is based on the use of 300 x 85 - Beam 18 GL18 (Hyne®).



Calculations demonstrate that the long term deflection is expected to be at 18.4mm as specified in AS1170.0:2002 Table C1 (L/300), leading to a serviceability D/C ratio of 0.98.

If lesser deflection is desired, consider using wider beam such as 2-300x65 Beam 18 GL18 (Hyne®), which will make it 135mm in total.

Construction Methodology: Beam Reinforcement & Integration Method

1. Site Preparation

- Remove obstructions, debris, and materials from the work area.
- Install barriers, signs, and required safety measures according to relevant safety standards.

2. Disassembly

- Remove blocking and hold-downs between joists to allow access for beam installation.

4. Beam Installation

- Lift and place the new LVL beam alongside the existing timber beam.
    - If two beams are used, position one on each side of the existing beam.
- Hold beams in position using clamps or temporary fixings.

5. Temporary shoring

- If installation of the new beam(s) is unfeasible without further disassembly, install temporary scaffolding to support the building and remove the posts first.

6. Fixing

- Install M12-4.6/S bolts through pre-drilled holes in the 300x85 Beam 18 GL18 (Hyne) and timber elements.
- Ensure all fixings follow the provided drawings and specifications.

7. Support Connections

- Install connections at supports as per the structural design.
- Fix the new timber beam to the existing support members.

8. Reinstallation

- Reinstall blocking and hold-downs to re-establish the load path from roof to foundation.
- Reinstate all dismantled components, including deck joists and others, as per original or updated specifications.

9. Compliance Check and Completion

- Inspect work to verify compliance with this method and the provided drawings.
- Remove posts and supports no longer required.
- Clear the site and confirm all tasks are complete.

PUBLIC PORTFOLIO SAMPLE ? CLIENT, SITE AND PROJECT IDENTIFIERS REDACTED

Recommendations

Our recommendations are the following:

1. It is recommended to install a **300 x 85 GL18 (Hyne®)** member alongside the existing main floor bearer to enhance its load-carrying capacity. The new beam shall be fixed in a manner that ensures composite action with the existing bearer. Refer to the details below for the proposed connection method.

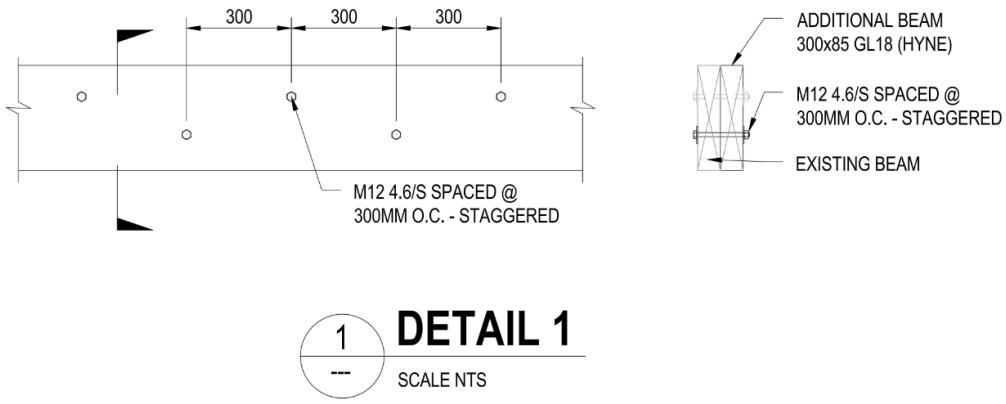


Figure 10. Existing Beam to New Beam

2. We provided a connection detail for the support here the following:

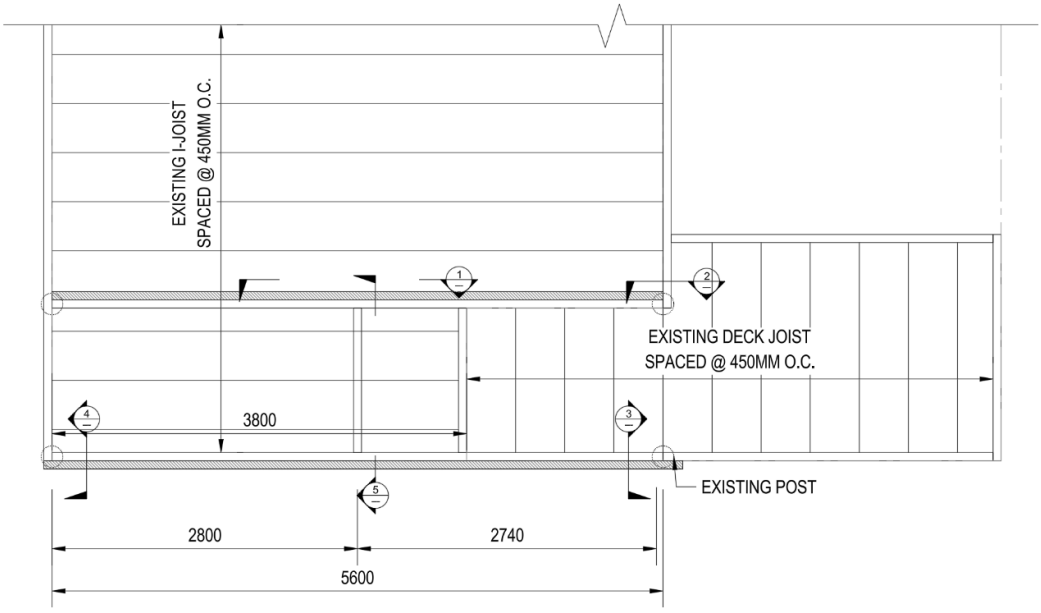


Figure 11. Proposed Floor Plan

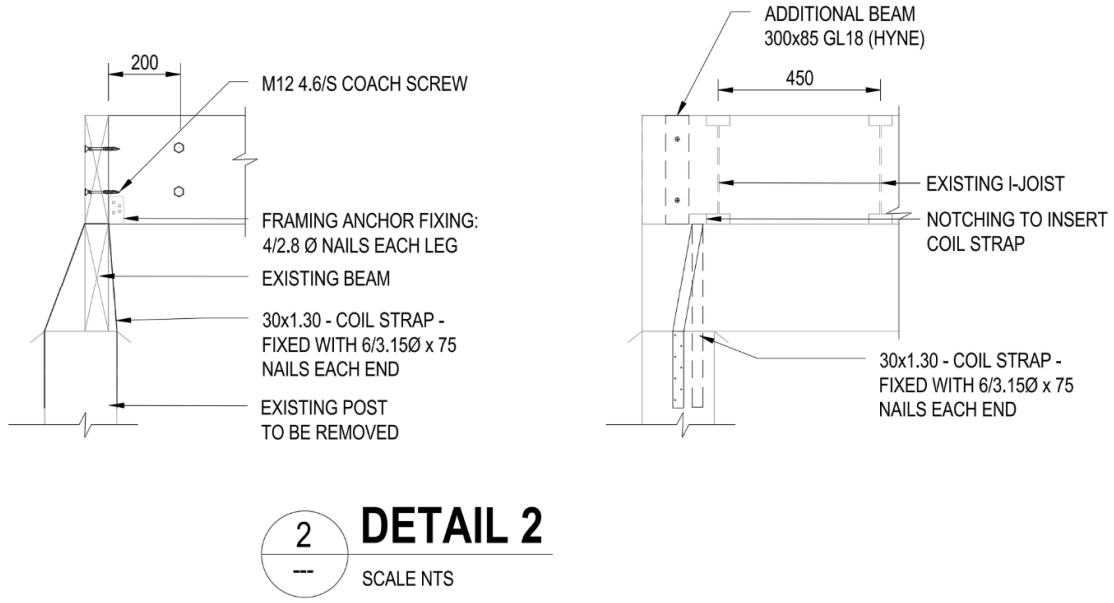


Figure 12. Details at Support 1

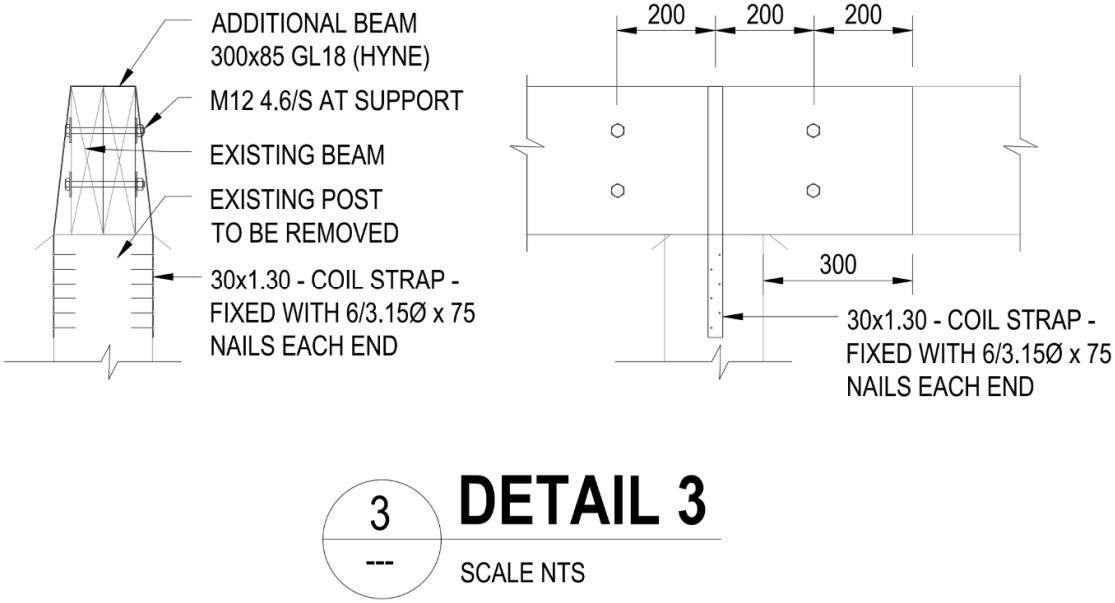


Figure 13. Details at Support 2

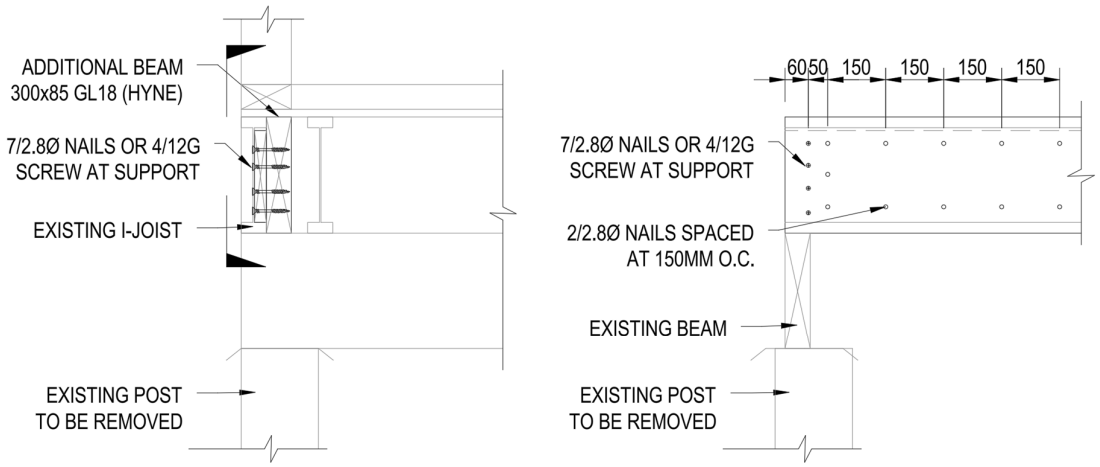


Figure 14. Details at Support 3

3. The proposed Details of the reinstatement of hold-down connections are shown below:

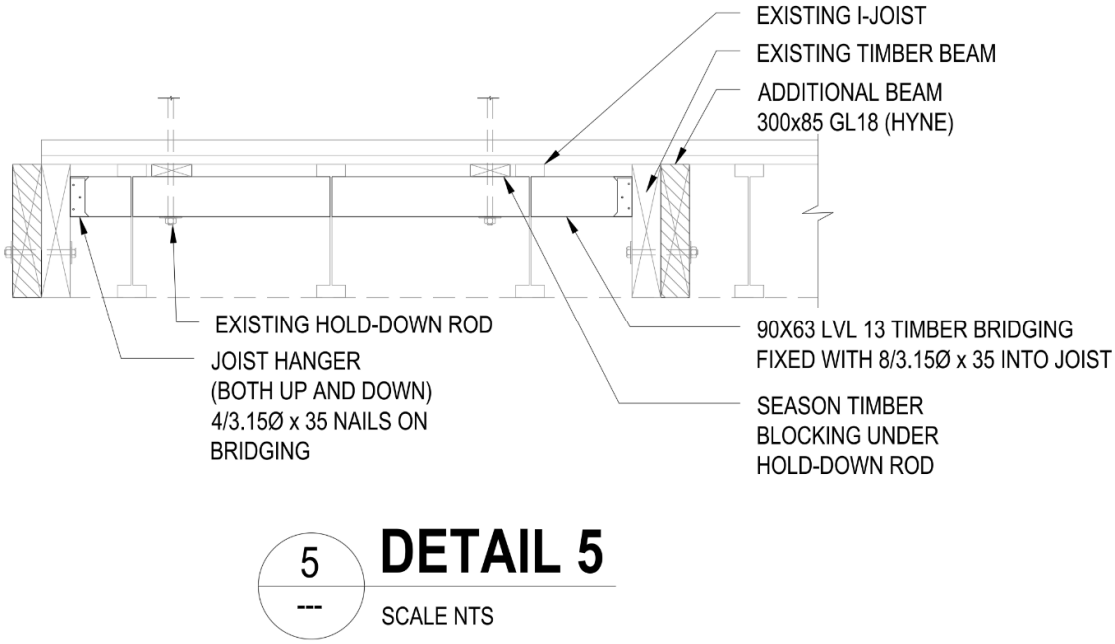


Figure 15. Hold-down Connection

Conclusion

The proposed recommendations, once employed, will ensure the expected performance of the structure components assessed herein and extend their life cycle.

The proposed recommendations are economically designed, generally in accordance with industry regulations and best engineering practices.

Once all proposed solutions are implemented, (upon request) may come to inspect installed structural members. If the inspection is deemed successful, Form 12 will be issued.

We would like to thank you for your business, and please do not hesitate to contact us to discuss, if required.

Kind regards,

