

Date: 27 August 2020

Novare Project No. 3048

**Mark Roach**  
**Horner Art Limited**  
8A Horner Street  
Newtown  
Wellington

Dear Mark Roach

### **8A HORNER STREET – REAR WALL ASSESSMENT**

This memo is to be appended to the Initial Seismic Assessment (ISA) for 8A Horner Street undertaken by Novare Design Limited on 21 July 2020 and is to be read in conjunction with the Coffey Geotechnical memo dated 24 August 2020.

The ISA identified additional built up earth to the rear wall of the building. However, this was not quantifiable within the ISA procedure and additional investigation was recommended to determine the effects on the rear wall out-of-plane capacity.

We have completed a seismic assessment of the out-of-plane capacity of the rear wall of 8A Horner street in order to determine a more reliable percentage of new building standard (%NBS) for this element. This has been undertaken by completing a Finite Element (FE) analysis of the wall.

The loading that has been considered for the out-of-plane capacity of the wall are:

- Loading from 1.5m of retained soil at the rear of the property (Refer to Coffey Geotechnical memo 773-WLGGE278035 - 8A Horner, Newton, Wellington dated 24 August 2020)
  - o Static earth force ( $P_o$ ) of  $9.51\text{kN/m}^2/\text{m}$
  - o ULS earthquake earth force ( $\Delta P_{E,ULS}$ ) from 0 to  $12.68\text{kN/m}^2/\text{m}$  (triangular distribution)
- Seismic actions due to self-mass of the wall of  $1.55\text{kPa}$  based on:
  - o Soil Class C (based on GNS science subsoil class map of Wellington)
  - o Importance level 2 structure with a 50-year design working life
  - o  $18.5\text{kN/m}^3$  masonry density (Typical for North Island concrete masonry units)
  - o horizontal seismic coefficient ( $C_d(t)$ ) of 0.42
- Self-weight of reinforced concrete masonry wall acting as the only axial load.

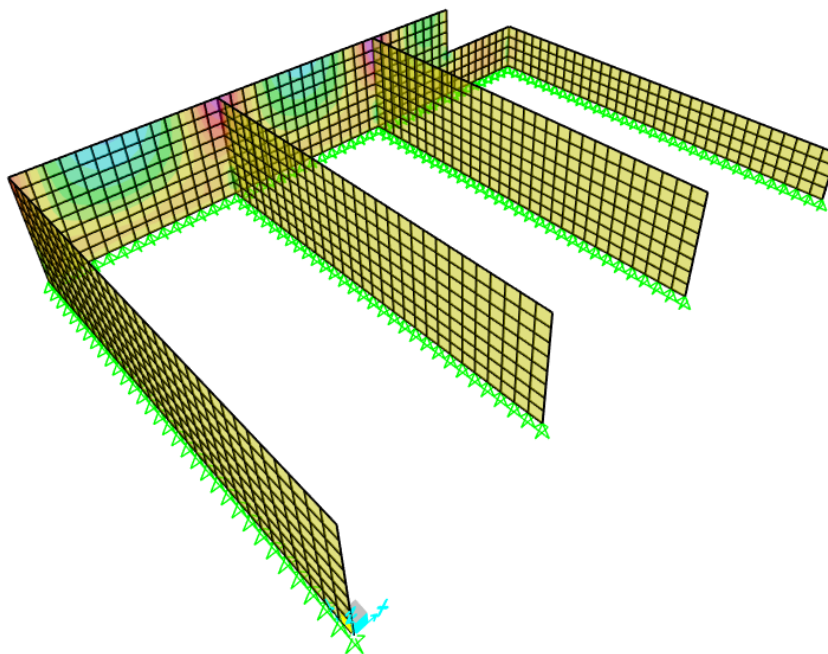
A model of 8 Horner Street (See figure 1) has been constructed for analysis of out-of-plane wall loadings only, and actions applied from transverse walls was not considered.

Based on the original structural drawings provided, the wall has been identified as having H12-600 vertical reinforcement and H12-400 horizontal shear reinforcement and is constructed with 200 series concrete masonry blocks. The top trimmer bar is an H16.

Below is a summary of the output results of our analysis:

*Table 1: Analysis results for out-of-plane capacity of rear wall of 8A Horner Street*

| Direction of reinforcement          | Maximum Capacity | Reactions From Model | Rating        |
|-------------------------------------|------------------|----------------------|---------------|
| Horizontal – H12@400mm centers      | 13.4 kNm/m       | 19 kNm/m             | ~70%NBS(IL2)  |
| Vertical – H12@600mm centers        | 9.2 kNm/m        | 16 kNm/m             | ~60%NBS(IL2)  |
| Shear capacity at base              | 0.93 MPa         | 0.49 MPa             | >100%NBS(IL2) |
| Shear capacity - Connection to wall | 0.73 MPa         | 0.26 MPa             | >100%NBS(IL2) |



*Figure 1: Example of Finite Element model*

Based on our analysis, we estimate 60%NBS(IL2) for the out-of-plane capacity of the rear wall of 8A Horner street. Therefore, the building is now considered to be **Grade C** and is below the threshold for earthquake-risk (67%NBS), but above the threshold for earthquake-prone buildings (34%NBS).

Based on these results, minor structural works would be required to achieve a seismic performance of greater than 67%NBS(IL2).

The structural system currently has 3 sides supported because the top of the wall has no restraint strut members within its span. By converting the structural system to 4 sides (supported by a structural steel support member at roof level) it will possible to achieve the 70%NBS(IL2) criteria.

Although the entire 8 Horner Street complex has been constructed for modeling purposes, we have only carried out the assessment for the 8A Horner Street rear wall out-of-plane capacity.

If you have any further questions, please do not hesitate to contact us.

**Assessment By:**

**Signed:** Alistair Collow  
Intermediate Structural Engineer

**Date:** 27 August 2020



**Reviewed By:**

**Signed:** Ian MacDonald  
Senior Structural Engineer

**Date:** 27 August 2020





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