

22nd Sep 2023

MProp Limited

c/o Engenium Structures Limited
PO Box 3911
Christchurch
Attn: Thomas Ryan

Dear Thomas,

RE: Structural Peer Review Report – Detailed Seismic Assessment at 37 Washbourne Road Wigram, Christchurch

HFC: Civil & Structural (South) Ltd has been commissioned MProp Limited to carry out structural peer review of the Detailed Seismic Assessment for the above-mentioned building.

This review report has been issued following resolution of the queries raised in our peer review process. We have attached completed peer review log for the record. During the peer review process, HFC & Engenium Structures had a discussion on methodology and assumptions adopted. Key items we discussed and agreed are summarised in this report.

HFC Scope:

Our Peer review comprised as follows:

- Review of calculations for this DSA and the existing structural drawings by Alan Reay Consultants Ltd (17 Dec 2008).
- Review of SpaceGass models for one & two unit and Wall-slab connection.
- General review of Geotechnical reports by Geotech Consulting Ltd dated 21 June 2023.
- Review of Quality Assessment report IEP by Engenium Structures Ltd dated 2nd of March 2023.
- Review of Final Detailed Seismic Assessment Report by Engenium Structures Ltd.

Key Assumptions & Findings:

In the discussion held between HFC and Engenium, we discussed strength hierarchy of the structural elements when assessing local scores.

- The moment curvature in the slab connector although appears single curvature in the model but in reality, it is a double curvature as shown in the calculations.
- The portion of the slab weight contributes to the uplift resistance of the wall and support the wall panel to act like a cantilever.
- The in-plane assessment of the wall used seismic building coefficients and the out of plane assessment of the wall used the parts coefficient.
- Roof mass was included in the beam element at the top of the wall by modifying the element area.

We appreciate assessment for an existing building and designing a new building involves two different processes and some inherent strength redundancy may be built into the assessment methodology.

Summary:

Based on our review, we believe the seismic assessment carried out by Engenium generally comply with the MBIE guidance document & subsequent proposed amendments, and industry good practice that are known to us at the time of review.

Yours sincerely

Per: HFC Civil and Structural (South) Ltd

**Tom Watanabe**

Associate

B.E, M.E, CPEng(No.1010912), IntPE, CMEngNZ

Auckland Producer Statement Author No.2818

Disclaimer

Please note the main purpose of this assessment is to determine the point at which a life safety hazard is present and/or at which there is potential for the building, or building element, to damage adjacent property and it is not an assessment of the risk or damage to the building or buildings elements, or the effects of building operation. Some of the building elements may be severely damaged in future earthquakes beyond repair. The assessment has been carried out in accordance with MBIE guidance document, "The Seismic Assessment of Existing Buildings (July 2017) and associated proposed amendments.



JOB NAME	37 Washbournes Road	REVISION RECORD	ISSUE DESCRIPTION	ISSUE BY : TOM WATANABE (CPENG 1010912) AUCKLAND PS AUTHOR NO. 2818
JOB NUMBER	23-185	25/08/2023	ISSUED TO ENGENIUM FOR INITIAL QUERIES	
STRUCTURE ID	Warehouse Building	6/09/2023	RESPONSES PROVIDED	
DESIGN ENGINEER	Engenium	19/09/2023	ISSUED FOR FUTHER QUERIES	
DATE	22/09/2023	20/09/2023	RESPONSES PROVIDED	
		21/09/2023	QUERIES CLOSED	

NO.	ITEM / ELEMENT	HFC INTERPRETATION OF ENGENIUM DESIGN	HFC QUERIES / COMMENTS	ENGENIUM RESPONSE	AGREED RESOLUTION	STATUS
1.0	GENERAL/SPECIFICATION COMMENTS					
2.0	MODELLING COMMENTS					
	For ETABS model, references have been made to the tab names in the attached excel spreadsheet called Etabs Table Tom.xlsm.	Unless noted otherwise, modelling intent/philosophy is understood as per the input.	Please note some of the items in this columns are just records of what HFC checked/verified. For those items, simply state "noted " would be appreciated.			
3.0	DESIGN COMMENTS					
	Calculation references have been made to the pdf page number of the returned mark up rather than actual page numbers of the pdf document.	Unless noted otherwise, we understood the design intent/philosophy as per the relevant calculation sheets.	Please note some of the items in this columns are just records of what HFC checked/verified. For those items, simply state "noted " would be appreciated.			
3.1	79, refer to attached calculation mark up	HFC Advice/Notes	0.728, Hence OK	No response required	HFC Noted [19.09.2023]	Closed
3.2	82	HFC Query	Is the Ag is 0.15m x 1m ?	Ag is the gross area of the wall (Ag=0.1m*7m=0.7m2)	HFC Noted [19.09.2023]	Closed
3.3	82	HFC Query	Is the thickness of the wall used 100mm? internal wall ?	We confirm that the wall considered in this calculation is 100mm thick.	HFC Noted [19.09.2023]	Closed
3.4	83	HFC Advice/Notes	weight of the panel 0.1x7.5x3.2x24=57.6kN OK	No response required	HFC Noted [19.09.2023]	Closed
3.5	85	HFC Query	Obtained from the model ?	Yes, these moments are obtained from an ETABS model	HFC Noted [19.09.2023]	Closed
3.6	85	HFC Query	2.0.73 is the building coefficient, we would think parts coefficient should be used, confirm.	We disagree with this. Parts coefficients are intended for 'parts' of a structure only. As this wall acts as the primary lateral structure the structural 'building' coefficient is more relevant.	Agreed for the in-plane assessment. But is it preferable to use parts coeff for OOP as the panels are working individually.	We confirm that we have assessed panels in-plane using a building coefficient and panels out-of-plane using a parts coefficient. HFC Noted [21.09.2023]
3.7	85	HFC Query	Clarify the source of these values, spaceass provides the values in per m ?	These moments are obtained from an ETABS model	HFC Noted [19.09.2023]	Closed
3.8	86	HFC Query	considered vertical ??	verticality is irrelevant, this calculation is for a concrete element with distributed reinforcement. Spandrels can behave in this way with relatively small 'axial' loads.	As above HFC Noted [21.09.2023]	Closed
3.9	86	HFC Query	Clarify	3101 clause 11.4 relates to the additional requirements for walls designed for ductility. These walls	HFC Noted [19.09.2023]	Closed
3.10	87	HFC Query	Are these from the model ? in plane moments in wall ?	Etabs model	HFC Noted [19.09.2023]	Closed
3.11	87	HFC Advice/Notes	4 fixing in 1.2 long panel	Correct	HFC Noted [19.09.2023]	Closed
3.12	88	HFC Query	3.0.75 x anchor capacity is the shear friction. 20.6/1 x 0.06 x 0.85 = 1.05 kN/m connection flexural capacity is insignificant, hence this should be treated as pin edge for OOP check. M restoring = 2.88 x 3.5^2/2 = 17.64kNm.	this calculation considers how much slab mass is 'picked up' by the wall to resist overturning or uplift note that M20 EF anchors are restrained against shear failure into the bottom edge of the panel by D10 Ubars	The lever arm from the slab bars to tension side to support the slab to resist or lift with the wall is small producing large moments. The calculation shown by HFC indicates that connection between the panel and the slab has no flexural capacity which means slab cannot be lifted due to overturning of the walls.	The purpose of this calculation is to demonstrate that there is enough capacity in the wall to slab connection to hold the piers of the front panel down when subject to in-plane overturning. The deflected shape of the wall panel & slab is shown on page 5-8, where the forces on a single M10 EF anchor is up to 10.1kN in shear friction. We agree that the wall-to-slab connection has negligible out-of-plane flexural strength, and have revised our calculations to show the slab weight is sufficient when considering that it will act more like a propped cantilever. HFC Noted [21.09.2023]
3.13	88	HFC Query	Single curvature in the model, clarify	The model is a representation only and is not able to accurately represent some behaviour. We consider that the weight of slab contributing to uplift resistance of the wall is limited by the slab's flexural capacity, calculated in the table on page 6-9, where it is expected that the floor slab would yield before a failure in the panel anchor / hair pin would occur.	Refer to respons eabove	As above HFC Noted [21.09.2023]
3.14	88	HFC Query	Is it obtained from the slab capacity table, for 120mm thk, 663 mesh centrally placed ?	Correct.	HFC Noted [19.09.2023]	Closed
3.15	89	HFC Query	Roof weight not considered in the model in x-dir, clarify	The roof mass is 'fudged' in the definition of the beam element at the top of the wall by modifying the element's area. actual purlin area = 555mm2, roof mass = 0.142kPa or 0.53kN/m per side	HFC Noted [19.09.2023]	Closed
3.16	89	HFC Query	Where are these forces, is it from the single unit model, where the 2 unit model is used ?	single unit model. This is considered as the 'worst case' and the 2 unit model was made to	HFC Noted [19.09.2023]	Closed
3.17	90	HFC Query	Clarify the calculations of moment ?	This is the moment capacity of the singly reinforced 100mm thick 663 mesh reinforced section, see page 6-9	HFC Noted [19.09.2023]	Closed
3.18	91	HFC Query	are these panels considered as parts ?	yes, panels are considered as 'parts' of the structure out of plane	HFC Noted [19.09.2023]	Closed
3.19	92	HFC Query	Is this a support here ?	yes	HFC Noted [19.09.2023]	Closed
3.20	93	HFC Query	Clarify the fixed assumption based on Galv D	standard notation for yieldline calculations: single stroke lines = pinned double stroke lines = fixed	HFC Noted [19.09.2023]	Closed
3.21	93	HFC Query	is this panel assumed supported from the side panel at these support ?	yes	HFC Noted [19.09.2023]	Closed
3.22	93	HFC Query	support is for mu=1 ?	yes	HFC Noted [19.09.2023]	Closed
3.23	95	HFC Query	any cracks in the panel noted during visit ?	no	HFC Noted [19.09.2023]	Closed
3.24	101	HFC Query	Moment curvature in the slab connector is appears to be single curvature in the model, clarify ?	Note that the model is 'elastic' only and cannot consider more complex behaviour. In reality double curvature will occur as the slab mesh yields.	HFC Noted [19.09.2023]	Closed
3.25	101	HFC Query	connection checked for mu=1 ? clarify	yes	HFC Noted [19.09.2023]	Closed
3.26	102	HFC Advice/Notes	Cmin = 50	No response required	HFC Noted [19.09.2023]	Closed
3.27	102	HFC Query	Assumed uncracked ??	Panels are not cracked.	HFC Noted [19.09.2023]	Closed
3.28	103	HFC Query	1. please confirm if there is no existing crackin aerougn t he connectigonl	No cracking has been observed in this location.	HFC Noted [19.09.2023]	Closed
3.29	111	HFC Query	Is there a sufficient development of the bar for the action ??	bars relied upon in 'dowel action' only, round bars are not considered to develop	HFC Noted [19.09.2023]	Closed
3.30	119	HFC Query	only in-plane considered in the model, clarify ?	The roof mass is 'fudged' in the definition of the beam element at the top of the wall by modifying the element's area.	HFC Noted [19.09.2023]	Closed