

# Results

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<b>To:</b>	Paul Charteris	<b>From:</b>	Doug Gaunt
<b>Organisation:</b>	Saveboard (NZ) Ltd	<b>Subject:</b>	P21:2010 1200 mm x 2.4m 10mm Saveboard without Brackets
<b>Location:</b>	New Plymouth	<b>Date:</b>	18 September 2020
<b>Mob No.:</b>	021 581046	<b>No. of</b>	5
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Please call +64 7 343 5763 if transmission incomplete

Paul

Please find below your P21 bracing results for your three 1200mm x 2.40m 10mm Saveboard walls as tested without brackets.

1. BU wind = 123 (106 BU/m) as limited by the ultimate load capacity.
2. BU Earthquake = 111 ( 93 BU/m) as limited by the ultimate load capacity.

Figures 1, 2 & 3 show the load deflection plots, Figure 4 shows the P21:2010 calculations.

## Wall Construction

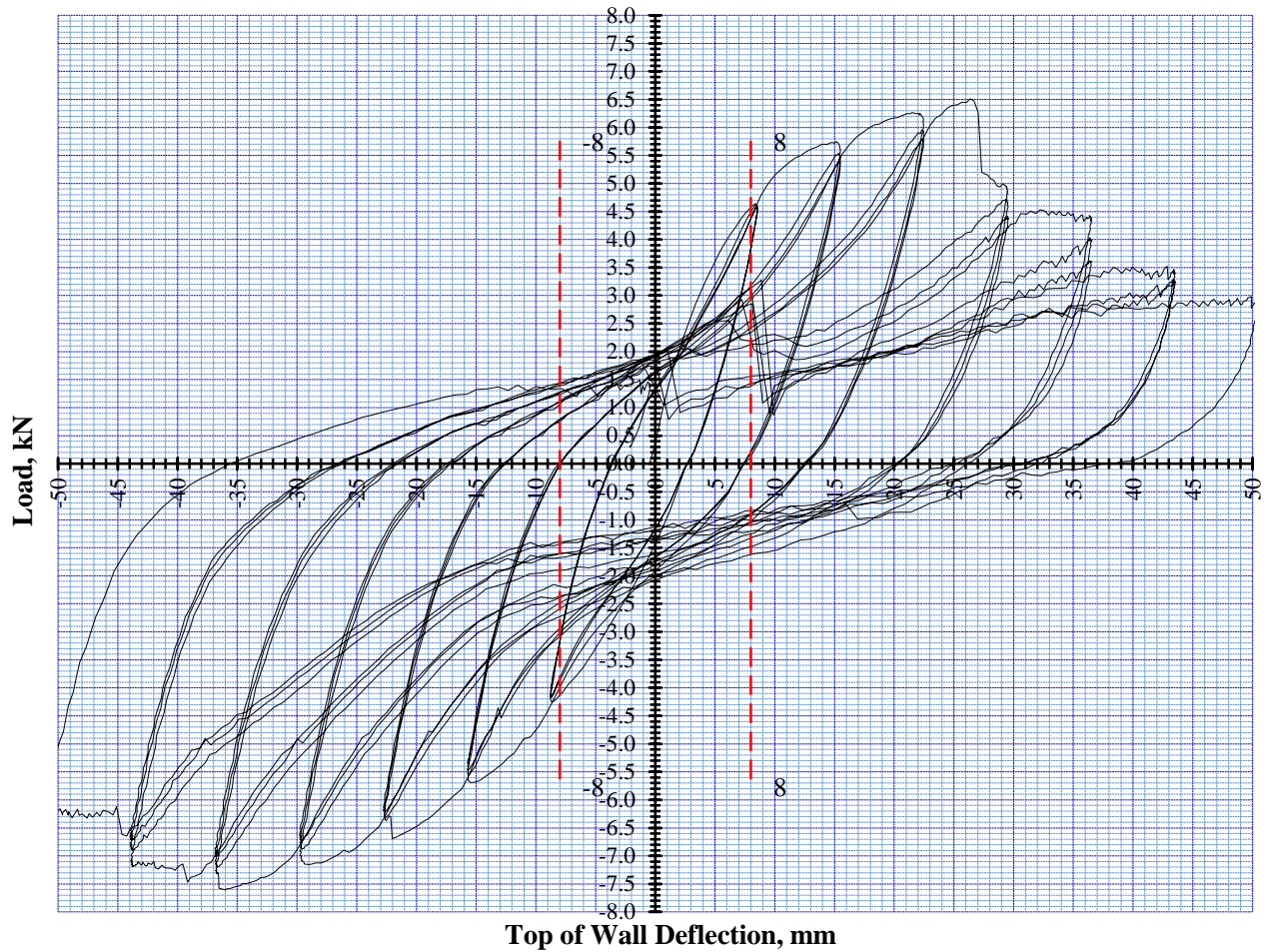
- 90x45 H1.2 SG8 framing, Studs at 600mm centres, no nogs
- 10mm Saveboard interior ceiling and wall lining one side,
- Saveboard fixed Gibgrabber 6g x 32mm plasterboard screws to Winstones pattern, 50,50,50,75,75,150mm....
- M12 hold down rods with 50x50x3mm washers to bottom plate

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## CAUTION

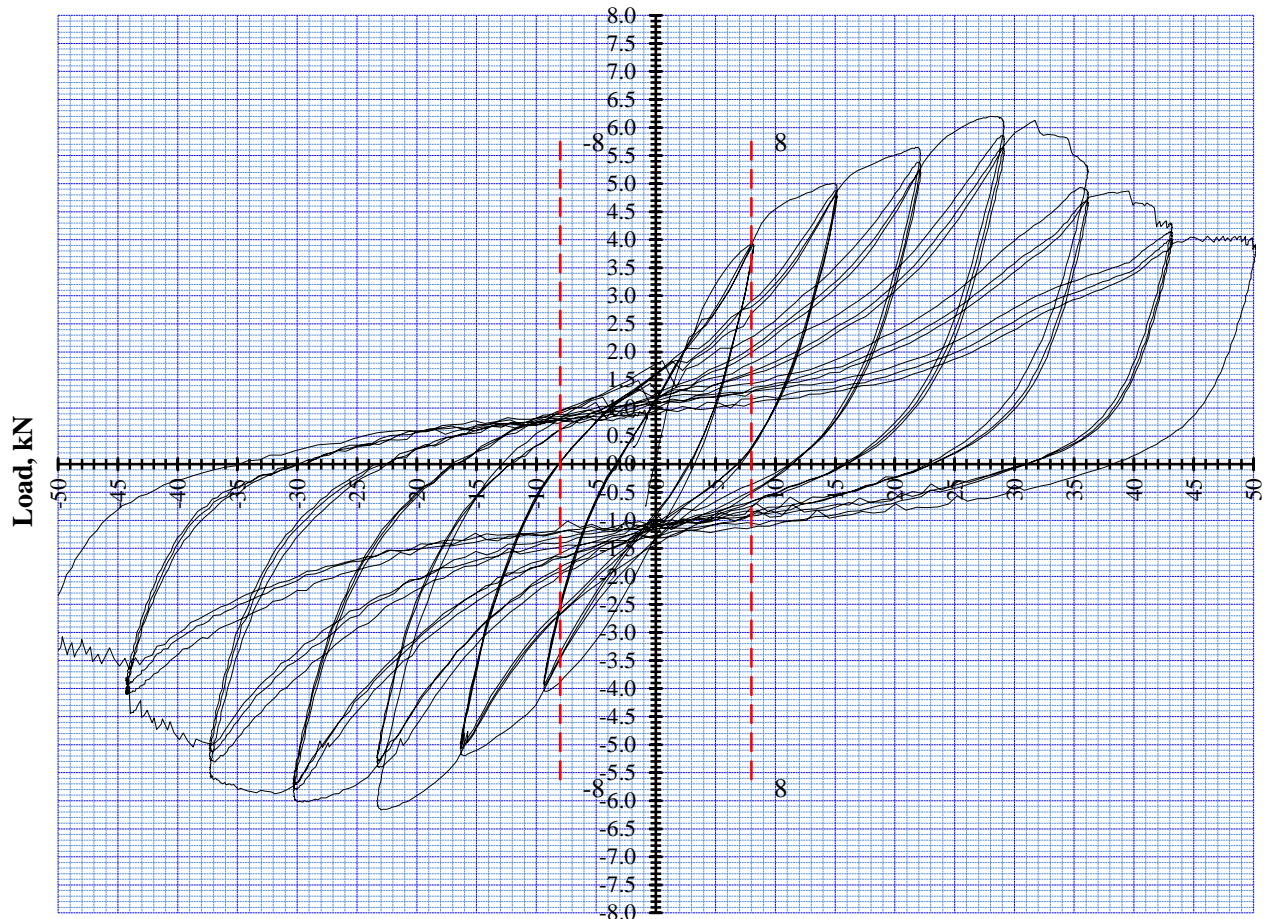
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**Figure 1:** Wall 282363

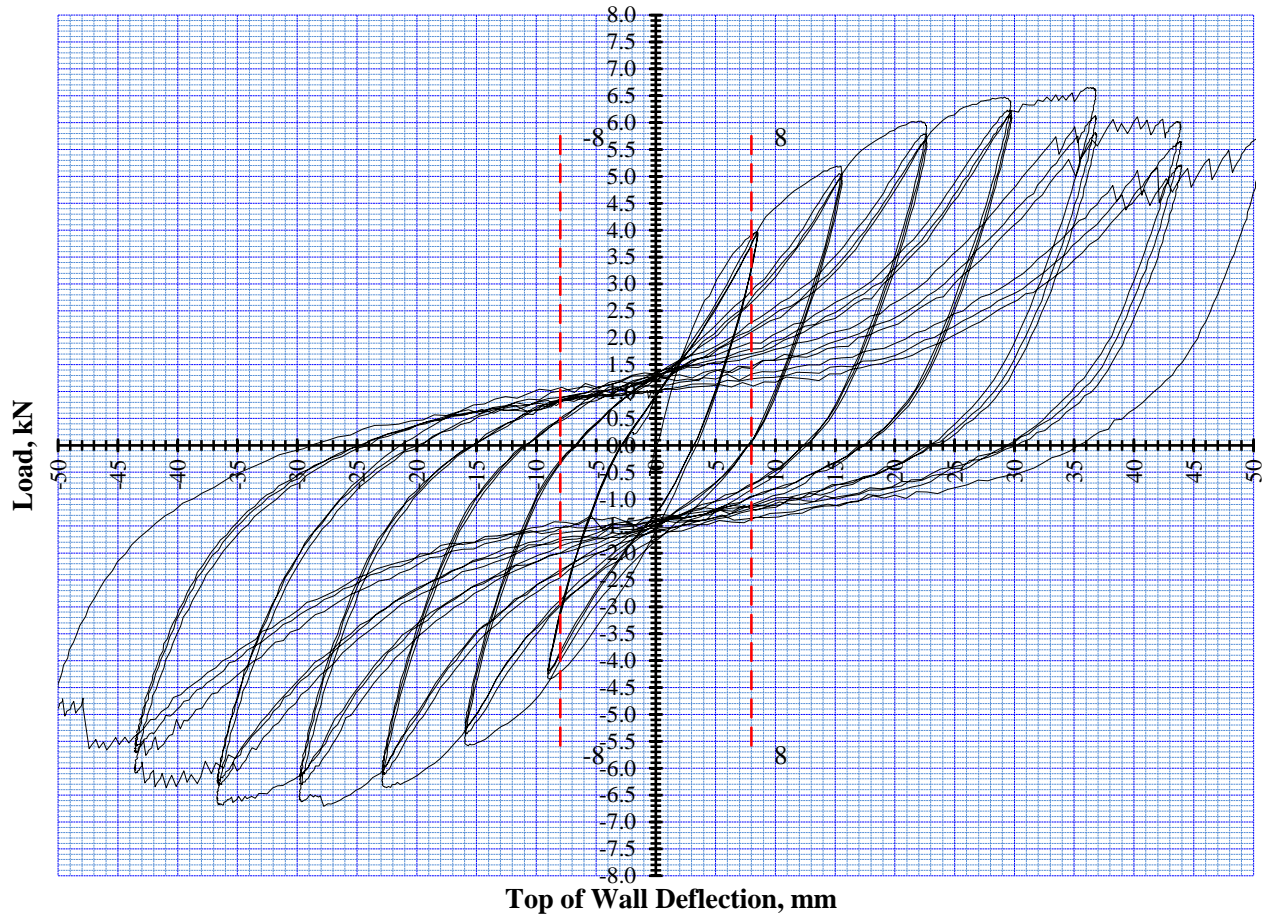
**Observations**

- Board moving on screws on bottom plate, plate splitting on wall 282363



Top of Wall Deflection, mm

Figure 2: Wall 282364



**Figure 3: Wall 282366**

P21:2010 BRACING RACKING TEST RESULT EVALUATION									
Wall Construction									
1200mm, 10mm Saveboard Interior Wall and Ceiling lining one side									
90x45 H1.2 SG8 framing, studs at 600mm centres, no nogs									
Saveboard fixed 32mm x 6g plasterboard screws							Summary		
to Winstone pattern, 50,50,50,75,75,150mm....							Earthquake	93 (U)	BU/m
No end brackets used							Wind	103 (U)	BU/m
M12 hold down bolts with 50x50x3mm washer to bottom plate									
P21 Supplementary restraints used									
Date of test:-	18-Sep-20	Ship No.	3124				Tested by	Jamie Agnew	
Date of calc's:-	18-Sep-20	Job No.	TE20-023				Analysed by	Doug Gaunt	
Calculated to BRANZ P21:2010, AS/NZS1170.2&5, NZS3604:2011 Scion, Private Bag 3020 Rotorua.									
Serviceability Cycles					Ultimate Cycles				
Lab Number	Direction	Cycle to H/300 or DLQ or DLW		Cycle to Displacement		Wall dimensions			
		Loads (P <sub>8</sub> )	Residual Defln, C	Maximum Load	y=(mm) def @ P	L(mm)	H(mm)	d at P/2	4th,R
		kN	mm	P(kN)	y (mm)	P/2 (kN)	d mm	kN	
282363	+	4.57	2.60	6.24	22.0	3.12	4.9	5.70	
	-	4.14	3.60	6.69	22.0			6.05	
282364	+	3.90	2.80	5.63	22.0	2.82	4.1	5.20	
	-	3.88	3.20	6.15	22.0			5.10	
282366	+	3.90	3.10	6.02	22.0	3.01	5.0	5.53	
	-	4.18	2.80	6.30	22.0			5.75	
		(P <sub>8</sub> )	(C)	(P)	(y)	P/2 (kN)	(d)	(R <sub>y</sub> )	
Averages		4.10	3.02	6.17	22.00	2.98	4.67	5.56	
Coefficient of Variation %		5.96	10.90	5.15	0.00	4.23	8.63	5.87	
y = average failure deflection or peak deflection of the three tests.									
d= average first cycle displacement at half peak, (the very first cycle wall reaches the load)									
R = Residual load, P = Peak Load, S = Serviceability load									
Displacement Recovery Factor (K1), (0.8 <= K1 <= 1.0)					Systems factor K2 = 1.2				
Average Structural Displacement Ductility factor					u = y/d 4.71				
Ductility Modification factor					K4 = 1.00				
DLW = Selected deflection limit for wind forces					DLQ = Selected deflection limit for earthquake forces				
P21:2010 BR Calc's		K1	EQ ultimate	EQ service	Wind Ultimate	Wind Service			
Lab Number	(BU)	(= 1.4 - C/X)	BU's	BU's	BU's	BU's			
282363	(BU)	1.00	117.5	190.0	129.3	147.2			
	(BU/m)		98	158	108	123			
282364	(BU)	1.00	103.0	169.7	117.8	131.5			
	(BU/m)		86	141	98	110			
282366	(BU)	1.00	112.8	176.3	123.2	136.6			
	(BU/m)		94	147	103	114			
		282363	8% Ok result	9% Ok result	7% Ok result	9% Ok result			
<20% Result Check		282364	-12% Ok result	-8% Ok result	-7% Ok result	-8% Ok result			
		282366	2% Ok result	-2% Ok result	0% Ok result	-2% Ok result			
Note: Where the value of BR Wind or BR EQ for any specimen is more than 20% greater than either of the other two specimens, assign it a value of 1.2 times the lower value before averaging.									
Average Earthquake BR			Ultimate			Serviceability			
EQ (BU's)	20 x K4 x Ry =		111	(P8 x K1) x (K2/0.55) =		179			
			93 BU/m			Limited by	Ultimate limit state		
Average Wind BR			Ultimate			Serviceability			
Wind (BU's)	20 * P =		123	(P8 x K1) x (K2/0.71) =		138			
			103 BU/m			Limited by	Ultimate limit state		

Figure 4: P21:2010 calculations for the 1200mm x 2.4m, 10mm Saveboard without brackets  
Please feel free to contact me to discuss this information.

Doug Gaunt 