Next generation biomaterials

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To:	Jason Bardell	**From:**	Doug Gaunt
Organisation:	IBS	**Subject:**	1200mm x 2.4m Wall (9.0mm Panelline/PLANKWALL V100)
Location:	Auckland	**Date:**	5 June 2019
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Jason

Please find below the P21 test results of your three 1200mm x 2.4m walls constructed as follows:

- 90x45 SG8 studs (600 centres), plates and nogs
- 9.0mm Panelline/PLANKWALL V100 cladding one side only
- Panelline/PLANKWALL V100 fixed with 50x3.0 galvanised nails at 150mm centres to perimeter and at 300 centres to middle stud
- 25x0.9mm straps around bottom plate fixed to each side of end studs with six 30x2.5 galvanised clouts
- Tested on a 'concrete' floor with M12 hold down bolts & 50x50x3 washers

P21 bracing results

1. BU wind = 149 (124 BU/m) as limited by the serviceability load capacity
2. BU Earthquake = 161 (134 BU/m) as limited by the ultimate load capacity.

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

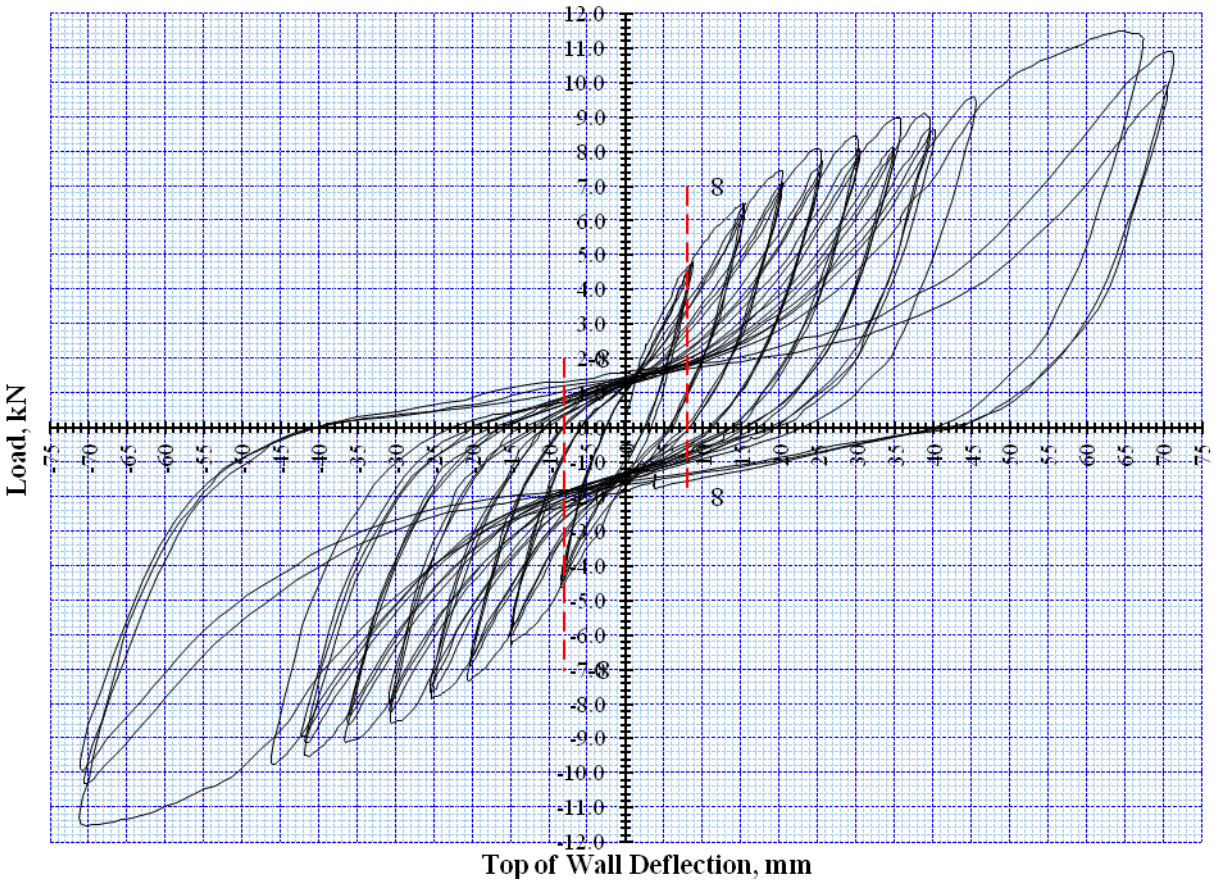

Figure 1: *Wall 260323*

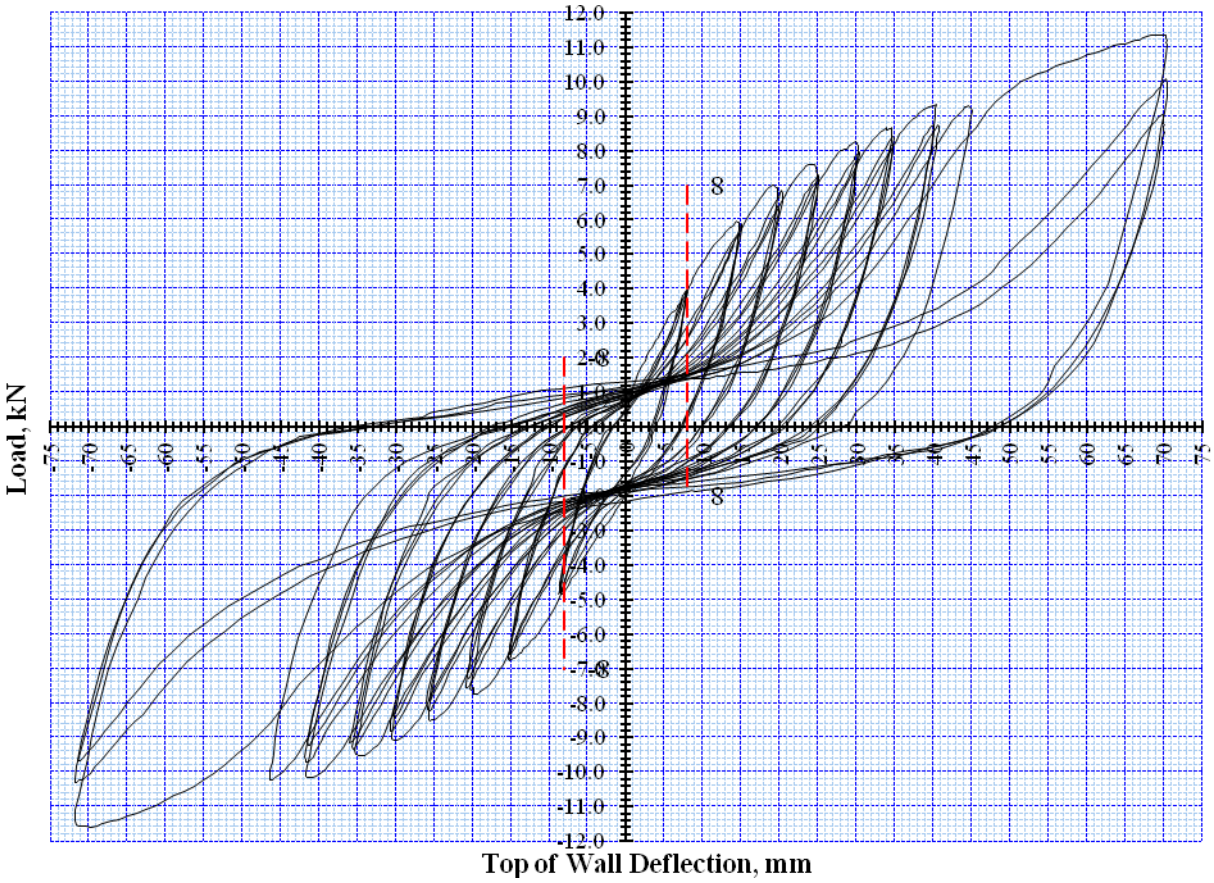

Figure 2: *Wall 260324*

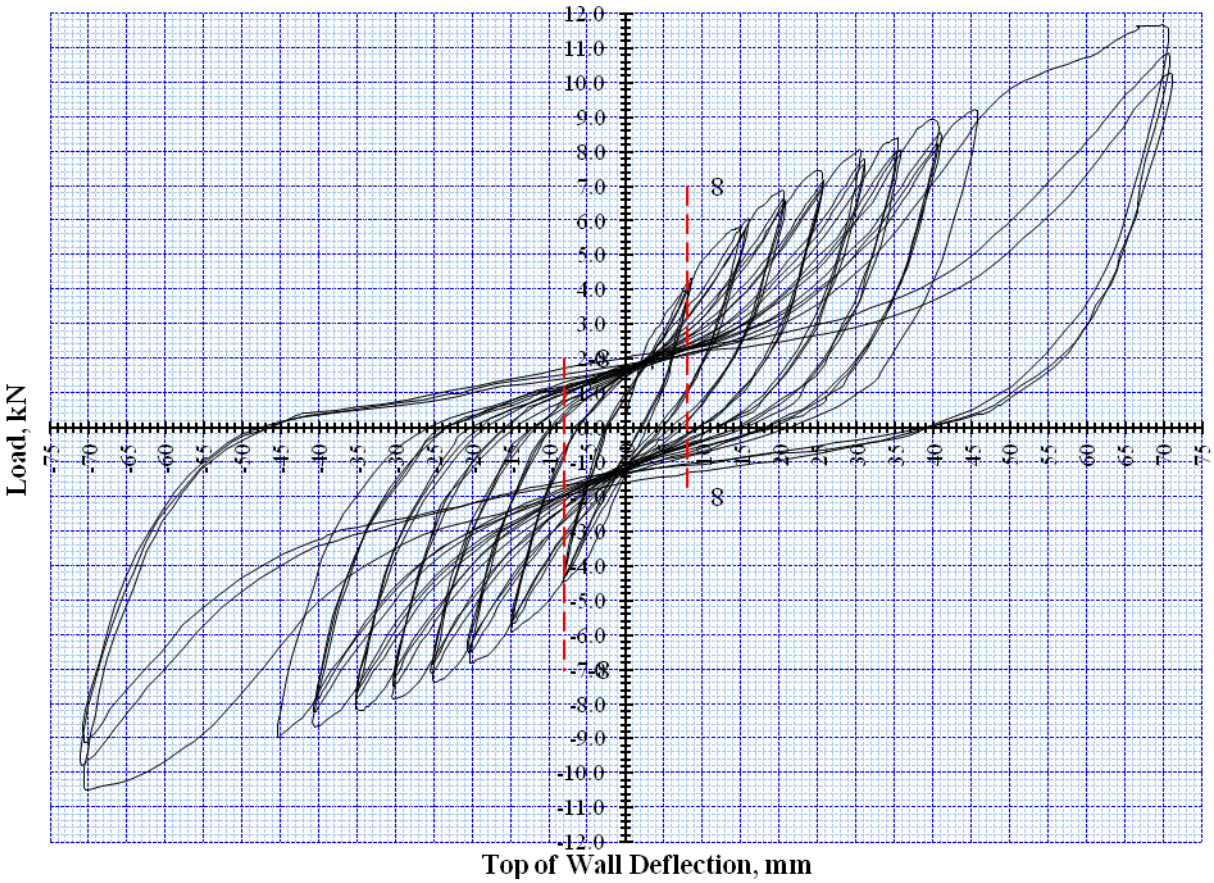

Figure 3: *Wall 260325*

P21:2010 BRACING RACKING TEST RESULT EVALUATION								
Wall Construction								
9mm grooved Panelline/PLANKWALL V100 board one side , Concrete floor								
50x3.0dia galv clouts at 150mm centres, 300 centres to middle stud						**Summary**		
25x0.9mm + 30x2.5 clouts as 12kN straps + P21 restraints						**Earthquake**	**134 (U)**	**BU/m**
90x45 SG8 H1.2 framing 600mm c/c's						**Wind**	**124 (S)**	**BU/m**
Calculated to BRANZ P21:2010, AS/NZS1170.2&5, NZS3604:2010								
Scion, Private Bag 3020 Rotorua. Timber Engineering Lab								
Date of test:-		**13-Oct-11**	Ship No.	**2592**		Tested by	Doug Gaunt	
Date of calc's:-		**13-Oct-11**	Job No.	**TE11-028**		Analysed by	Doug Gaunt	
		Serviceability Cycles		Ultimate Cycles				
		Cycle to H/300 or DLQ or D		Cycle to Displacement			Wall dimensions	
		8.0	X mm	y=(mm)			L(mm)	H(mm)
Lab Number	Direction	Loads	Residual	Maximum			1200	2400
		(P_8)	Defln, C	Load	def @ P		d at P/2	4th,R
		kN	mm	P(kN)	y (mm)	P/2 (kN)	d mm	kN
260323	**+**	**4.60**	**2.70**	**9.10**	**40.0**	4.55	**7.4**	**8.22**
	-	**4.55**	**2.70**	**9.32**	**40.0**			**7.95**
260324	**+**	**3.92**	**3.50**	**9.30**	**40.0**	4.65	**9.6**	**8.00**
	-	**4.70**	**2.00**	**10.10**	**40.0**			**8.50**
206325	**+**	**4.20**	**2.00**	**8.90**	**40.0**	4.45	**9.0**	**7.95**
	-	**4.45**	**2.50**	**8.65**	**40.0**			**7.75**
		(P_8)	(C)	(P)	(y)	P/2 (kN)	(d)	(Ry)
Averages		4.40	2.57	9.23	40.00	4.55	8.67	8.06
Coefficient of Variation %		6.05	19.82	4.91	0.00	1.79	10.71	2.97
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	4.62	
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	**(= 1.4 - C/X)**	**BU's**	**BU's**	**BU's**	**BU's**
260323	1.00	161.7	199.6	184.2	154.6
260324	1.00	165.0	188.1	194.0	145.7
206325	1.00	157.0	188.7	175.5	146.2
	260323	*0% Ok result*	*6% Ok result*	*0% Ok result*	*6% Ok result*
<20% Result Check	*260324*	*3% Ok result*	*-3% Ok result*	*7% Ok result*	*-3% Ok result*
	206325	*-4% Ok result*	*-3% Ok result*	*-8% Ok result*	*-3% 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 =	**161**	(P8 x K1) x (K2/0.55) =		**192**
	134	**BU/m**		**Limited by**	**Ultimate limit state**
Average Wind BR		**Ultimate**			**Serviceability**
Wind (BU's)	20 * P =	**185**	(P8 x K1) x (K2/0.71) =		**149**
	124	**BU/m**		**Limited by**	**Serviceability limit state**

Figure 4: *P21 calculations for 1200mmx2.4m 9mm Panelline/PLANKWALL V100 walls on a concrete floor.*

Please feel free to contact me to discuss this information as necessary.

Doug Gaunt