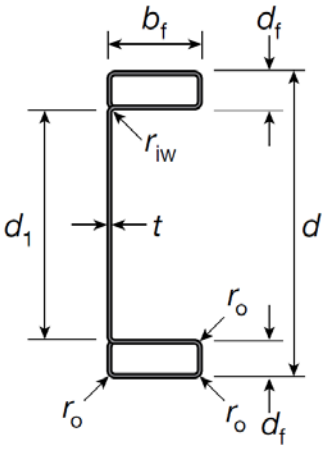
Table 1: Nominal Dimensions of LSB Sections

LSB Section	Depth	Flange		Thick-ness	Corner Radius	
		Width	Depth			
	d	b_f	d_f	t	r_o	r_{iw}
300x75x3.0LSB	300	75	25.0	3.00	4.50	3.00
300x75x2.5LSB	300	75	25.0	2.50	3.75	3.00
300x60x2.0LSB	300	60	20.0	2.00	3.00	3.00
250x75x3.0LSB	250	75	25.0	3.00	4.50	3.00
250x75x2.5LSB	250	75	25.0	2.50	3.75	3.00
250x60x2.0LSB	250	60	20.0	2.00	3.00	3.00
200x60x2.5LSB	200	60	20.0	2.50	3.75	3.00
200x60x2.0LSB	200	60	20.0	2.00	3.00	3.00
200x45x1.6LSB	200	45	15.0	1.60	2.40	3.00
150x45x2.0LSB	150	45	15.0	2.00	3.00	3.00
150x45x1.6LSB	150	45	15.0	1.60	2.40	3.00
125x45x2.0LSB	125	45	15.0	2.00	3.00	3.00
125x45x1.6LSB	125	45	15.0	1.60	2.40	3.00



***** d, b_f, d_f = External dimensions

Table 2: Boundary Conditions Used in the Finite Element Model

Edges	u	v	w	θ_x	θ_y	θ_z
Left and Right (Supports)	0	1	1	1	0	0
Middle (Loading Point)	1	0	1	1	0	0

Note: u, v and w are translations and θ_x, θ_y and θ_z are rotations in the x, y and z directions, respectively. 0 denotes free and 1 denotes restrained.

Table 3: Comparison of Ultimate Shear Capacities from FEA and Experiments [6]

No.	LSB Section	Aspect Ratio	Ultimate Shear Capacities (kN)		Test/FEA
			Test	FEA	
1	150x45x2.0	1.0	68.5	70.0	0.98
2	200x45x1.6	1.0	63.6	63.5	1.00
3	200x60x2.0	1.0	88.2	88.5	1.00
4	200x60x2.5	1.0	119.3	118.0	1.01
5	250x60x2.0	1.0	90.1	93.0	0.97
6	250x75x2.5	1.0	139.6	136.5	1.02
7	300x60x2.0	1.0	93.0	96.0	0.97
8	300x75x2.5	1.0	143.7	151.5	0.95
9	125x45x2.0	1.5	56.9	56.0	1.02
10	150x45x1.6	1.5	45.8	47.8	0.96
11	150x45x1.6	1.5	47.1	47.8	0.99
12	150x45x1.6	1.5	47.0	47.8	0.98
13	150x45x2.0	1.5	61.1	61.0	1.00
14	150x45x2.0	1.5	58.8	61.0	0.96
15	150x45x2.0	1.5	59.5	61.0	0.98
16	200x60x1.6	1.5	56.8	55.0	1.03
17	200x45x1.6	1.5	54.2	55.0	0.99
18	200x60x2.0	1.5	74.0	76.0	0.97
19	200x60x2.5	1.5	110.0	109.0	1.01
20	250x60x2.0	1.5	>75.0	83.0	NA
21	250x75x2.5	1.5	118.9	121.0	0.98
22	300x60x2.0	1.5	> 75.0	82.0	NA
23	300x75x2.5	1.5	125.1	131.0	0.95
24	200x60x2.0	1.6	79.4	75.0	1.06
25	200x60x2.5	1.6	107.9	106.0	1.02

Table 4: Post-Buckling Capacity of LiteSteel Beams in Shear

LSB Section	a/d_1	V_u (kN)	V_y (kN)	V_b (kN)	V_{pb} (kN)	$\frac{V_{pb} x100}{\left(V_y - V_b\right)}\%$
200x45x1.6	1.00	63.6	74.1	51.6	12.0	53.3
250x60x2.0	1.00	90.1	111.4	76.5	13.6	39.0
300x60x2.0	1.00	93.0	142.5	64.3	28.7	36.7
300x75x2.5	1.00	143.7	169.1	125.1	18.6	42.3
150x45x1.6	1.50	47.0	51.8	46.0	1.0	17.2
150x45x1.6	1.50	47.1	51.8	46.0	1.1	19.0
200x45x1.6	1.50	56.8	74.1	46.3	10.5	37.8
200x45x1.6	1.50	54.2	74.1	46.3	7.9	28.4
200x60x2.0	1.50	74.0	83.3	70.4	3.6	27.9
250x60x2.0	1.50	>75.0	111.4	67.6	>7.4	>16.9
250x75x2.5	1.50	118.9	135.0	115.1	3.8	19.1
300x60x2.0	1.50	>75.0	142.5	54.8	>20.2	>23.0
300x75x2.5	1.50	125.1	169.1	115.5	9.6	17.9
200x60x2.0	1.60	79.4	83.3	69.8	9.6	71.1

Table 5: Ratio of Applied Moment to Section Moment Capacity of LSBs

LSB Section	a/d_1	V_u (kN) Exp.	M* (kNm)	M_s (kNm)	$\frac{M^*}{M_s}$
150x45x2.0	1.0	68.5	8.2	20.20	0.41
200x45x1.6	1.0	63.6	10.8	20.88	0.52
200x60x2.0	1.0	88.2	14.1	31.78	0.44
200x60x2.5	1.0	119.3	19.2	52.44	0.37
250x60x2.0	1.0	90.1	18.9	42.12	0.45
250x75x2.5	1.0	139.6	28.1	70.68	0.40
300x60x2.0	1.0	93.0	24.4	53.36	0.46
300x75x2.5	1.0	143.7	35.9	85.78	0.42
125x45x2.0	1.5	56.9	8.1	14.33	0.57
150x45x1.6	1.5	45.8	8.2	16.18	0.51
150x45x1.6	1.5	47.0	8.5	16.18	0.53
150x45x1.6	1.5	47.1	8.5	16.18	0.53
150x45x2.0	1.5	58.8	10.6	20.20	0.52
150x45x2.0	1.5	59.5	10.7	20.20	0.53
150x45x2.0	1.5	61.1	11.0	20.20	0.54
200x45x1.6	1.5	54.2	13.8	20.88	0.66
200x45x1.6	1.5	56.8	14.5	20.88	0.69
200x60x2.0	1.5	74.0	17.8	31.78	0.56
200x60x2.5	1.5	110.0	26.4	52.44	0.50
250x60x2.0	1.5	>75.00	>23.6	42.12	>0.56
250x75x2.5	1.5	118.9	35.8	70.68	0.51
300x60x2.0	1.5	>75.00	>29.5	53.36	>0.55
300x75x2.5	1.5	125.1	46.9	85.78	0.55
200x60x2.0	1.6	79.4	20.3	31.78	0.64
200x60x2.5	1.6	107.9	27.8	52.44	0.53

Note: M_s was obtained from [3]

Table 6: Selected Ultimate Shear Strength Results from the Parametric Study (250x60x2.0 LSB and 250x60x2.1 LSB with an Aspect Ratio of 1.0)

LSB Section	f_{yw}	τ_{yw}	V_u(kN) FEA	M_s	M^*	$\frac{M^*}{M_s}$	τ_u	$\frac{\tau_u}{\tau_{yw}}$	λ
250x60x2.0 (d_1/t_w=105)	250	150	61.0	34.9	12.8	0.37	145.2	0.97	0.87
	275	165	66.0	34.9	13.9	0.40	157.1	0.95	0.91
	300	180	70.5	34.9	14.8	0.42	167.9	0.93	0.95
	325	195	75.0	34.9	15.8	0.45	178.6	0.92	0.99
	350	210	79.5	34.9	16.7	0.48	189.3	0.90	1.03
	375	225	83.5	34.9	17.5	0.50	198.8	0.88	1.06
	400	240	87.5	34.9	18.4	0.53	208.3	0.87	1.10
	425	255	91.5	34.9	19.2	0.55	217.9	0.85	1.13
	450	270	95.5	34.9	20.1	0.58	227.4	0.84	1.16
250x60x2.1 (d_1/t_w=100)	250	150	65.0	36.7	13.7	0.37	147.4	0.98	0.83
	275	165	70.0	36.7	14.7	0.40	158.7	0.96	0.87
	300	180	75.5	36.7	15.9	0.43	171.2	0.95	0.90
	325	195	80.0	36.7	16.8	0.46	181.4	0.93	0.94
	350	210	85.0	36.7	17.9	0.49	192.7	0.92	0.98
	375	225	89.5	36.7	18.8	0.51	202.9	0.90	1.01
	400	240	93.5	36.7	19.6	0.53	212.0	0.88	1.04
	425	255	98.0	36.7	20.6	0.56	222.2	0.87	1.08
	450	270	102.0	36.7	21.4	0.58	231.3	0.86	1.11

Table 7: Selected Ultimate Shear Strength Results from the Parametric Study (200x45x1.6 LSB, 200x45x1.5 LSB, 300x75x2.0 LSB and 300x75x2.1 LSB with an Aspect Ratio of 1.5)

LSB Section	f_{yw}	τ_{yw}	V_u(kN) FEA	M_s	M^*	$\frac{M^*}{M_s}$	τ_u	$\frac{\tau_u}{\tau_{yw}}$	λ
200x45x1.6 (d_1/t_w=106)	250	150	35.5	17.2	9.0	0.52	130.3	0.87	0.95
	275	165	38.3	17.2	9.8	0.57	140.8	0.85	1.00
	300	180	41.1	17.2	10.5	0.61	150.9	0.84	1.04
	325	195	43.7	17.2	11.1	0.65	160.5	0.82	1.08
200x45x1.5 (d_1/t_w=113)	250	150	32.6	16.1	8.3	0.52	127.8	0.85	1.01
	275	165	35.2	16.1	9.0	0.56	138.0	0.84	1.06
	300	180	37.7	16.1	9.6	0.60	147.6	0.82	1.11
	325	195	40.1	16.1	10.2	0.63	157.3	0.81	1.16
300x75x2.0 (d_1/t =125)	250	150	59.5	51.1	22.3	0.44	119.0	0.79	1.12
	275	165	64.5	51.1	24.2	0.47	129.0	0.78	1.17
	300	180	69.0	51.1	25.9	0.51	138.0	0.77	1.22
	350	210	78.0	51.1	29.3	0.57	156.0	0.74	1.32
	375	225	82.5	51.1	30.9	0.60	165.0	0.73	1.37
300x75x2.1 (d_1/t_w=119)	250	150	64.5	53.8	24.2	0.45	122.9	0.82	1.06
	275	165	69.5	53.8	26.1	0.49	132.4	0.80	1.12
	300	180	74.0	53.8	27.8	0.52	141.0	0.78	1.17
	325	195	79.5	53.8	29.8	0.55	151.4	0.78	1.21
	350	210	83.5	53.8	31.3	0.58	159.0	0.76	1.26

Table 8: Comparison of FEA Ultimate Shear Capacities with Equations 8 to 10 and AS/NZS 4600 for 250x60x2.0 LSB and 250x60x2.1 LSB with an Aspect Ratio of 1.0

LSB Section	f_{yw} (MPa)	Ult. Shear Capacity V_u (kN)			FEA Predicted Capacity / AS/NZS 4600	FEA / AS/NZS 4600
		FEA	Eqs.8-10	AS/NZS 4600		
250x60x2.0	250	61.0	60.0	55.3	1.01	1.10
	275	66.0	63.6	58.0	1.03	1.14
	300	70.5	67.0	60.6	1.04	1.16
	325	75.0	70.4	63.1	1.05	1.19
	350	79.5	73.7	64.4	1.07	1.23
	375	83.5	77.0	64.4	1.07	1.30
	400	87.5	80.1	64.4	1.07	1.36
	425	91.5	83.2	64.4	1.08	1.42
	450	95.5	86.3	64.4	1.09	1.48
250x60x2.1	250	65.0	65.5	61.0	0.99	1.07
	275	70.0	69.4	64.0	1.01	1.09
	300	75.5	73.1	66.8	1.03	1.13
	325	80.0	76.8	69.5	1.03	1.15
	350	85.0	80.4	72.2	1.05	1.18
	375	89.5	83.8	74.6	1.06	1.20
	400	93.5	87.3	74.6	1.06	1.25
	425	98.0	90.6	74.6	1.07	1.31
	450	102.0	93.9	74.6	1.07	1.37

Table 9: Comparison of FEA Ultimate Shear Capacities with Equations 8 to 10 and AS/NZS 4600 for 200x45x1.6 LSB, 200x45x1.5 LSB, 300x75x2.0 LSB and 300x75x2.1 LSB with an Aspect Ratio of 1.5

LSB Section	f_{yw} (MPa)	Ultimate Shear Capacity V_u (kN)			FEA / AS/NZS 4600 Predicted Capacity	FEA / AS/NZS 4600
		FEA	Eqs.8-10	AS/NZS 4600		
200x45x1.6	250	35.5	36.2	30.9	0.97	1.15
	275	38.3	38.4	31.1	0.99	1.23
	300	41.1	40.5	31.1	1.00	1.32
	325	43.7	42.5	31.1	1.01	1.41
200x45x1.5	250	32.6	32.3	25.6	1.00	1.27
	275	35.2	34.2	25.6	1.01	1.38
	300	37.7	36.2	25.6	1.02	1.47
	325	40.1	38.0	25.6	1.04	1.57
300x75x2.0	250	59.5	58.8	41.2	1.00	1.44
	275	64.5	62.4	41.2	1.01	1.56
	300	69.0	65.9	41.2	1.02	1.67
	350	78.0	69.1	41.2	1.09	1.89
	375	82.5	70.6	41.2	1.13	2.00
300x75x2.1	250	64.5	64.0	47.7	0.99	1.35
	275	69.5	67.9	47.7	1.01	1.46
	300	74.0	71.8	47.7	1.01	1.55
	325	79.5	75.5	47.7	1.03	1.67
	350	83.5	77.8	47.7	1.05	1.75