

Canadian Wood Council	Conseil Canadien du bois
-----------------------------	--------------------------------

WoodWorks® Shearwalls 11.4.1

Shearwalls4.wswc

Mar. 31, 2025 11:39:31

Project Information

DESIGN SETTINGS

Design Code			Wind Method	
CSA 086-19 / NBC 2015			NBC 4.1.7.5 - Other buildings	
Max Shearwall Offset [m]			Service Conditions	
Plan	Elevation		Moisture Content	
(within storey)	(between storeys)		Fabrication	Service
0.15	0.25		19% dry	10% dry
Max Height-to-length Ratio		Height Restrictions for Wind Loads	Disable Gypsum Contribution for Design	
Blocked	Unblocked		Seismic	Wind
3.5	2.0	Use mean roof height	No	No
Shearline shearwalls can have dissimilar materials				
Shearwall relative rigidity: Deflection-based stiffness of wall segments				
Design shearwall force/length: Based on wall rigidity/length				
Hold-down forces based on: Applied loads				
Drag strut forces based on: Applied loads				
Linearize deflection equation: Never				
Dead load in chord force for overturning design				
Tension end		Compression end	When completely counteracts overturning	
Wall length / 2		Wall length / 2	Wall length / 2	

SITE INFORMATION

Importance Category Normal (all other buildings)					
Wind Static Procedure NBC 4.1.7.3			Seismic Equivalent Static Force Procedure NBC 4.1.8.11		
Velocity Pressure q: 0.34 kPa	Importance Factor: 1.0		Site Class: C: Dense soil; soft rock		
Openings: Non-uniform, resistant, closed	PGA: 0.06				
Int. Gust Factor Cgi: 2.0	T = 0.2	0.5	1.0	2.0	5.0
Terrain: Rough terrain	Sa (T): 0.129	0.100	0.074	0.048	0.022
	F (T): 1.000	1.000	1.000	1.000	1.000
Topographic Information [m]			N-S		
Hill Shape	Height	Length	E-W		
-	-	-	Period Ta Calculated: 0.255s		
Site Location: -			Ta Used: 0.255s		
			Ductility Factor Rd: 3.00		
			Overstrength Factor Ro: 1.70		

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

Structural Data

STOREY INFORMATION

	Storey Elev [m]	Floor/Ceiling Depth [mm]	Wall Height [m]	Hold-down Length subject to shrinkage [mm]	Bolt length [mm]
Ceiling	10.01	0			
Level 3	7.26	254	2.75	349.3	350.0
Level 2	4.26	254	2.75	349.3	350.0
Level 1	1.25	254	2.75	349.0	350.0
Foundation	1.00				

BLOCK and ROOF INFORMATION

Block Dimensions [m]			Roof Panels			
			Face	Type	Slope	Overhang [m]
Block 1	3 Storey	E-W Ridge				
Location X,Y =	0.00	0.00	North	Side	0.0	0.00
Extent X,Y =	18.30	12.20	South	Side	0.0	0.00
Ridge Y Location, Offset	6.10	0.00	East		0.0	0.00
Ridge Elevation, Height	10.01	0.00	West		0.0	0.00

SHEATHING MATERIALS by WALL GROUP [mm]

Wall Grp	Surf	Sheathing: Material	Mark/ Ply	Thk	GU mm	Or	Bv	Dia	Fasteners Len	Pen	Spacing Edg Int	Bk	Jus	Note #
1	Ext	DF Plywood	3	7.5	–	Horz	4600	2.87	2-1/4	50	150 300	Y	1.0	1, 3
2	Ext	DF Plywood	3	7.5	–	Horz	4600	2.87	2	43	150 250	Y	1.0	
3	1	DF Plywood	3	7.5	–	Horz	4600	2.87	2	43	150 300	Y	1.0	
3	2	DF Plywood	0	7.5	–	Horz	0	0.00	0	0	? 300	N	0.4	
4	1	DF Plywood	7	18.5	–	Horz	9800	3.76	3	58	50 300	Y	1.0	
4	2	DF Plywood	0	18.5	–	Horz	0	0.00	0	0	? 300	N	0.8	
5	Ext	DF Plywood	7	18.5	–	Horz	9800	2.87	2	32	150 200	Y	1.0	
6	Ext	DF Plywood	6	15.5	–	Horz	8400	2.87	2	35	150 200	Y	1.0	

Legend:

Grp - Wall design group number, used to reference wall in other tables (created by program)

Surf - Exterior or interior surface when applied to exterior wall

Mark/Ply - No. of plywood plies (Tables 9.1-9.3) or OSB panel mark (9.3, shown in Note 4)

Thk - Sheathing thickness

GU - Gypsum underlay thickness

Or - Sheathing orientation

Bv - Shear-through-thickness rigidity of the sheathing in N/mm (Tables 9.1-9.3)

Dia - Fastener diameter (always in mm)

Len - Fastener length (always in inches)

Pen - Fastener penetration depth

Spacing - Edge and intermediate nail spacing

Bk - Sheathing is nailed to blocking at all panel edges. Y(es) or N(o)

Jus - Unblocked adjustment factor (Table 11.3)

- Number(s) of note(s) from below that apply to sheathing.

General Notes:

Blocking is defined as providing framing members at all edges of the shearwall panel. Unblocked panels must be staggered as shown in O86 Figure 11.6.

Nails shall be placed not less than 9 mm from panel edge and over-driven no more than 15% of panel thickness (O86 11.3.2.3). Framing members are at least 38 mm thick (O86 11.3.2.1), and panel edges separated by at least 2 mm (11.3.2.2).

Material-specific Notes:

1. Install minimum 64 mm or double 38 mm studs at panel edges because edge nail spacing is 50 mm (O86 11.3.2.4 a).

3. Ensure that panel edges on either side of wall fall on different studs (O86 11.3.2.4).

FRAMING MATERIALS and STANDARD WALL by WALL GROUP

Wall Grp	Species	Grade	b mm	d mm	Spcg mm	E MPa	fcp	Standard Wall
1	D.Fir-L	SS	38	140	600	12500	7.0	
2	D.Fir-L	SS	38	140	600	12500	7.0	
3	D.Fir-L	SS	38	140	600	12500	7.0	
4	D.Fir-L	SS	38	140	300	12500	7.0	
5	D.Fir-L	SS	38	140	600	12500	7.0	
6	D.Fir-L	SS	38	140	600	12500	7.0	

Legend:

Wall Grp – Wall design group number, used to reference wall in other tables

b – Stud breadth (thickness)

d – Stud depth (width)

Spcg – Maximum on-centre spacing of studs for design, actual spacing may be less

E – Modulus of elasticity

Standard Wall - Standard wall designed as group.

Notes:

Check manufacturer requirements for stud size, species and grade, for all shearwall hold-downs.

The following factors are applied to fcp for compressive design and deformation under wall segment end studs : phi = 0.8 (O86 6.5.6.2), load duration factor KD = 1.15 (5.3.2.1), size factor Kzcp = 1.15 (6.5.6.4), bearing length factor KB under window openings(6.5.6.5), wet service factor Kscp = 1.00(Table 6.10)

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

SHEARLINE, WALL and OPENING DIMENSIONS

North-south Shearlines	Hold downs	Wall Group	Location X [m]	Extent [m]		Length [m]	FHS [m]	Aspect Ratio	Height [m]	Studs S N	
Line 1											
Level 3											
Line 1	-	5	0.00	0.00	12.20	12.20	3.12	-	2.75	-	-
Wall 1-1	NSW		-	0.00	4.80	4.80	0.00	1.00	-	4	4
Wall 1-2	WR	5	-	4.80	8.00	3.20	3.12	0.86	-	4	4
Wall 1-3	NSW		-	8.00	12.20	4.20	0.00	1.00	-	4	4
Level 2											
Line 1	-	2	0.00	0.00	12.20	12.20	3.12	-	2.75	-	-
Wall 1-1	NSW		-	0.00	4.80	4.80	0.00	1.00	-	4	4
Wall 1-2	All	2	-	4.80	8.00	3.20	3.12	0.86	-	4	4
Wall 1-3	NSW		-	8.00	12.20	4.20	0.00	1.00	-	4	4
Level 1											
Line 1	-	2	0.00	0.00	12.20	12.20	3.12	-	2.75	-	-
Wall 1-1	NSW		-	0.00	4.80	4.80	0.00	1.00	-	4	4
Wall 1-2	All	2	-	4.80	8.00	3.20	3.12	0.86	-	4	4
Wall 1-3	NSW		-	8.00	12.20	4.20	0.00	1.00	-	4	4
Line 2											
Level 3											
Line 2	All	4	3.05	0.00	12.20	12.20	3.32	-	2.75	-	-
Wall 2-1	All	4	-	4.60	8.00	3.40	3.32	0.81	-	4	4
Level 2											
Line 2	All	4	3.05	0.00	12.20	12.20	3.32	-	2.75	-	-
Wall 2-1	All	4	-	4.60	8.00	3.40	3.32	0.81	-	4	4
Level 1											
Line 2	All	4	3.05	0.00	12.20	12.20	3.32	-	2.75	-	-
Wall 2-1	All	4	-	4.60	8.00	3.40	3.32	0.81	-	4	4
Line 3											
Level 3											
Line 3	All	4	9.15	0.00	12.20	12.20	7.92	-	2.75	-	-
Wall 3-1	All	4	-	0.00	8.00	8.00	7.92	0.34	-	4	4
Level 2											
Line 3	All	4	9.15	0.00	12.20	12.20	7.92	-	2.75	-	-
Wall 3-1	All	4	-	0.00	8.00	8.00	7.92	0.34	-	4	4
Level 1											
Line 3	All	4	9.15	0.00	12.20	12.20	7.92	-	2.75	-	-
Wall 3-1	All	4	-	0.00	8.00	8.00	7.92	0.34	-	4	4
Line 4											
Level 3											
Line 4	All	4	15.25	0.00	12.20	12.20	3.32	-	2.75	-	-
Wall 4-1	All	4	-	4.60	8.00	3.40	3.32	0.81	-	4	4
Level 2											
Line 4	All	4	15.25	0.00	12.20	12.20	3.32	-	2.75	-	-
Wall 4-1	All	4	-	4.60	8.00	3.40	3.32	0.81	-	4	4
Level 1											
Line 4	All	4	15.25	0.00	12.20	12.20	3.32	-	2.75	-	-
Wall 4-1	All	4	-	4.60	8.00	3.40	3.32	0.81	-	4	4
Line 5											
Level 3											
Line 5	-	6	18.30	0.00	12.20	12.20	3.22	-	2.75	-	-
Wall 5-1	NSW		-	0.00	4.70	4.70	0.00	1.00	-	4	4
Wall 5-2	WR	6	-	4.70	8.00	3.30	3.22	0.83	-	4	4
Wall 5-3	NSW		-	8.00	12.20	4.20	0.00	1.00	-	4	4
Level 2											
Line 5	-	2	18.30	0.00	12.20	12.20	3.22	-	2.75	-	-
Wall 5-1	NSW		-	0.00	4.70	4.70	0.00	1.00	-	4	4
Wall 5-2	All	2	-	4.70	8.00	3.30	3.22	0.83	-	4	4
Wall 5-3	NSW		-	8.00	12.20	4.20	0.00	1.00	-	4	4
Level 1											
Line 5	-	2	18.30	0.00	12.20	12.20	3.22	-	2.75	-	-
Wall 5-1	NSW		-	0.00	4.70	4.70	0.00	1.00	-	4	4
Wall 5-2	All	2	-	4.70	8.00	3.30	3.22	0.83	-	4	4
Wall 5-3	NSW		-	8.00	12.20	4.20	0.00	1.00	-	4	4
East-west Shearlines	Hold downs	Wall Group	Location Y [m]	Extent [m]		Length [m]	FHS [m]	Aspect Ratio	Height [m]	Studs W E	
Line A											
Level 3											
Line A	All	2	0.00	0.00	18.30	18.30	18.22	-	2.75	-	-
Wall A-1	All	2	-	0.00	18.30	18.30	18.22	0.15	-	4	4

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

SHEARLINE, WALL and OPENING DIMENSIONS (continued)

Level 2											
Line A	All	1	0.00	0.00	18.30	18.30	18.22	-	2.75	-	-
Wall A-1	All	1	-	0.00	18.30	18.30	18.22	0.15	-	4	4
Level 1											
Line A	All	1	0.00	0.00	18.30	18.30	18.22	-	2.75	-	-
Wall A-1	All	1	-	0.00	18.30	18.30	18.22	0.15	-	4	4
Line B											
Level 3											
Line B	-	3, 4	8.00	0.00	18.30	18.30	15.90	-	2.75	-	-
Wall B-1	All	3	-	0.60	5.50	4.90	4.82	0.56	-	4	4
Wall B-2	All	4	-	6.10	12.20	6.10	6.02	0.45	-	4	4
Wall B-3	All	3	-	12.80	17.70	4.90	4.82	0.56	-	4	4
Level 2											
Line B	-	3, 4	8.00	0.00	18.30	18.30	15.90	-	2.75	-	-
Wall B-1	All	3	-	0.60	5.50	4.90	4.82	0.56	-	4	4
Wall B-2	All	4	-	6.10	12.20	6.10	6.02	0.45	-	4	4
Wall B-3	All	3	-	12.80	17.70	4.90	4.82	0.56	-	4	4
Level 1											
Line B	-	3, 4	8.00	0.00	18.30	18.30	15.90	-	2.75	-	-
Wall B-1	All	3	-	0.60	5.50	4.90	4.82	0.56	-	4	4
Wall B-2	All	4	-	6.10	12.20	6.10	6.02	0.45	-	4	4
Wall B-3	All	3	-	12.80	17.70	4.90	4.82	0.56	-	4	4
Line C											
Level 3											
Line C	All	2	12.20	0.00	18.30	18.30	18.22	-	2.75	-	-
Wall C-1	All	2	-	0.00	18.30	18.30	18.22	0.15	-	4	4
Level 2											
Line C	All	1	12.20	0.00	18.30	18.30	18.22	-	2.75	-	-
Wall C-1	All	1	-	0.00	18.30	18.30	18.22	0.15	-	4	4
Level 1											
Line C	All	1	12.20	0.00	18.30	18.30	18.22	-	2.75	-	-
Wall C-1	All	1	-	0.00	18.30	18.30	18.22	0.15	-	4	4

Legend:

Hold downs – All: All locations, WR: Where required, S&E: Start and end, NSW: Non-shearwall, NW: Non-wood/Proprietary, ND: Not designed

Location – Dimension perpendicular to wall

Length – Shear line: Distance between exterior perpendicular walls defining the shear line extent. Wall, segment, or opening: End-to-end length of the element

FHS – For shearlines and walls with multiple segments: Total shear-resisting full-height sheathing.

For individual wall segments : Distance between hold - down and compression force locations

Aspect Ratio – Ratio of wall height to segment length (Hs/Ls)

Wall Group – Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall

Studs: Number of end studs at the south and north or west and east ends of a wall segment.

Loads

WIND SHEAR LOADS (as entered or generated)

Level 3			Load Case	Wnd Dir	Surf Dir	Prof	Location [m]		Magnitude [kN,kN/m,kN/m^2]		Trib Ht [m]
Block	BF	Element					Start	End	Start	End	
Block 1	W	Wall		W->E	Wind	Line	0.00	12.20	0.45		
Block 1	E	Wall		W->E	Lee	Line	0.00	12.20	0.25		
Block 1	W	Wall		E->W	Lee	Line	0.00	12.20	0.25		
Block 1	E	Wall		E->W	Wind	Line	0.00	12.20	0.45		
Block 1	S	Wall		S->N	Wind	Line	0.00	18.30	0.50		
Block 1	N	Wall		S->N	Lee	Line	0.00	18.30	0.30		
Block 1	S	Wall		N->S	Lee	Line	0.00	18.30	0.30		
Block 1	N	Wall		N->S	Wind	Line	0.00	18.30	0.50		
Level 2			Load Case	Wnd Dir	Surf Dir	Prof	Location [m]		Magnitude [kN,kN/m,kN/m^2]		Trib Ht [m]
Block	BF	Element					Start	End	Start	End	
Block 1	W	Wall		W->E	Wind	Line	0.00	12.20	0.45		
Block 1	W	Wall		W->E	Wind	Line	0.00	12.20	0.53		
Block 1	E	Wall		W->E	Lee	Line	0.00	12.20	0.30		
Block 1	E	Wall		W->E	Lee	Line	0.00	12.20	0.25		
Block 1	W	Wall		E->W	Lee	Line	0.00	12.20	0.25		
Block 1	W	Wall		E->W	Lee	Line	0.00	12.20	0.30		
Block 1	E	Wall		E->W	Wind	Line	0.00	12.20	0.53		
Block 1	E	Wall		E->W	Wind	Line	0.00	12.20	0.45		
Block 1	S	Wall		S->N	Wind	Line	0.00	18.30	0.59		
Block 1	S	Wall		S->N	Wind	Line	0.00	18.30	0.50		
Block 1	N	Wall		S->N	Lee	Line	0.00	18.30	0.30		
Block 1	N	Wall		S->N	Lee	Line	0.00	18.30	0.36		
Block 1	S	Wall		N->S	Lee	Line	0.00	18.30	0.30		
Block 1	S	Wall		N->S	Lee	Line	0.00	18.30	0.36		
Block 1	N	Wall		N->S	Wind	Line	0.00	18.30	0.59		
Block 1	N	Wall		N->S	Wind	Line	0.00	18.30	0.50		
Level 1			Load Case	Wnd Dir	Surf Dir	Prof	Location [m]		Magnitude [kN,kN/m,kN/m^2]		Trib Ht [m]
Block	BF	Element					Start	End	Start	End	
Block 1	W	Wall		W->E	Wind	Line	0.00	12.20	0.53		
Block 1	W	Wall		W->E	Wind	Line	0.00	12.20	0.45		
Block 1	E	Wall		W->E	Lee	Line	0.00	12.20	0.25		
Block 1	E	Wall		W->E	Lee	Line	0.00	12.20	0.30		
Block 1	W	Wall		E->W	Lee	Line	0.00	12.20	0.25		
Block 1	W	Wall		E->W	Lee	Line	0.00	12.20	0.30		
Block 1	E	Wall		E->W	Wind	Line	0.00	12.20	0.53		
Block 1	E	Wall		E->W	Wind	Line	0.00	12.20	0.45		
Block 1	S	Wall		S->N	Wind	Line	0.00	18.30	0.59		
Block 1	S	Wall		S->N	Wind	Line	0.00	18.30	0.50		
Block 1	N	Wall		S->N	Lee	Line	0.00	18.30	0.30		
Block 1	N	Wall		S->N	Lee	Line	0.00	18.30	0.36		
Block 1	S	Wall		N->S	Lee	Line	0.00	18.30	0.36		
Block 1	S	Wall		N->S	Lee	Line	0.00	18.30	0.30		
Block 1	N	Wall		N->S	Wind	Line	0.00	18.30	0.59		
Block 1	N	Wall		N->S	Wind	Line	0.00	18.30	0.50		

Legend:

Block - Block used in load generation, Accum: loads from one block combined with another, Manual: user-entered loads (no block)

BF - Building face (north, south, east, west)

Element - Building surface on which loads generated or entered

Load Case: From NBC Figure 4.1.7.6.-A, low building windward corner and load case A or B

Surf Dir - Windward or leeward side of the building

Prof - Profile (distribution)

Location - Start and end points on building element

Magnitude - Start: Intensity of uniform and point loads or leftmost intensity of trapezoidal load, End: Right intensity of trapezoidal load; Trib Ht - Tributary height of user-applied area loads only

Notes:

All loads entered by user or generated by program are specified (unfactored) loads, except they include ULS importance factor.

The program applies a load factor of 1.4 to wind loads before distributing them to the shearlines.

WIND C&C LOADS

Block	Building Face	Wind Direction	Level	Magnitude [kN/m ²]	
				Interior	End Zone
Block 1	West	Windward	3	0.75	0.75
Block 1	East	Leeward	3	0.68	0.86
Block 1	West	Leeward	3	0.68	0.86
Block 1	East	Windward	3	0.75	0.75
Block 1	South	Windward	3	0.75	0.75
Block 1	North	Leeward	3	0.68	0.86
Block 1	South	Leeward	3	0.68	0.86
Block 1	North	Windward	3	0.75	0.75
Block 1	West	Windward	2	0.75	0.75
Block 1	East	Leeward	2	0.68	0.86
Block 1	West	Leeward	2	0.68	0.86
Block 1	East	Windward	2	0.75	0.75
Block 1	South	Windward	2	0.75	0.75
Block 1	North	Leeward	2	0.68	0.86
Block 1	South	Leeward	2	0.68	0.86
Block 1	North	Windward	2	0.75	0.75
Block 1	West	Windward	1	0.75	0.75
Block 1	East	Leeward	1	0.68	0.86
Block 1	West	Leeward	1	0.68	0.86
Block 1	East	Windward	1	0.75	0.75
Block 1	South	Windward	1	0.75	0.75
Block 1	North	Leeward	1	0.68	0.86
Block 1	South	Leeward	1	0.68	0.86
Block 1	North	Windward	1	0.75	0.75

Mag - Load magnitude, unfactored except that it includes ULS importance factor.

BUILDING MASSES

Level 3				Profile	Location [m]		Magnitude		Trib Width [m]
Force Dir	Building Element	Block	Wall Line		Start	End	[kN,kN/m,kN/m^2]	Start End	
E-W	Snow	n/a	1	Line	0.00	12.20	1.14	1.14	
E-W	Snow	n/a	5	Line	0.00	12.20	1.14	1.14	
E-W	Roof F1	n/a	1	Line	0.00	12.20	11.90	11.90	
E-W	Roof F1	n/a	5	Line	0.00	12.20	11.90	11.90	
N-S	Snow	n/a	A	Line	0.00	18.30	0.76	0.76	
N-S	Snow	n/a	C	Line	0.00	18.30	0.76	0.76	
N-S	Roof F1	n/a	A	Line	0.00	18.30	7.93	7.93	
N-S	Roof F1	n/a	C	Line	0.00	18.30	7.93	7.93	
Level 2				Profile	Location [m]		Magnitude		Trib Width [m]
Force Dir	Building Element	Block	Wall Line		Start	End	[kN,kN/m,kN/m^2]	Start End	
E-W	Floor F1	n/a	1	Line	0.00	12.20	18.30	18.30	
E-W	Floor F1	n/a	5	Line	0.00	12.20	18.30	18.30	
N-S	Floor F1	n/a	A	Line	0.00	18.30	12.20	12.20	
N-S	Floor F1	n/a	C	Line	0.00	18.30	12.20	12.20	
Level 1				Profile	Location [m]		Magnitude		Trib Width [m]
Force Dir	Building Element	Block	Wall Line		Start	End	[kN,kN/m,kN/m^2]	Start End	
E-W	Floor F1	n/a	1	Line	0.00	12.20	18.30	18.30	
E-W	Floor F1	n/a	5	Line	0.00	12.20	18.30	18.30	
N-S	Floor F1	n/a	A	Line	0.00	18.30	12.20	12.20	
N-S	Floor F1	n/a	C	Line	0.00	18.30	12.20	12.20	

Legend:

Force Dir - Direction in which the mass is used for seismic load generation, E-W, N-S, or Both

Building element - Roof, gable end, wall or floor area used to generate mass, wall line for user-applied masses, Floor F# - refer to Plan View for floor area number

Wall line - Shearline that equivalent line load is assigned to

Location - Start and end points of equivalent line load on wall line

Trib Width. - Tributary width; for user applied area loads only

SEISMIC LOADS

Level 3					
Force Dir	Profile	Location [m]		Mag [kN,kN/m,kN/m^2]	
		Start	End	Start	End
E-W	Line	0.00	12.20	0.80	0.80
N-S	Line	0.00	18.30	0.53	0.53
Level 2					
Force Dir	Profile	Location [m]		Mag [kN,kN/m,kN/m^2]	
		Start	End	Start	End
E-W	Line	0.00	12.20	0.77	0.77
N-S	Line	0.00	18.30	0.51	0.51
Level 1					
Force Dir	Profile	Location [m]		Mag [kN,kN/m,kN/m^2]	
		Start	End	Start	End
E-W	Line	0.00	12.20	0.38	0.38
N-S	Line	0.00	18.30	0.26	0.26

Legend:

Loads in table can be accumulation of loads from several building masses, so they do not correspond with a particular building element.

Location - Start and end of load in direction perpendicular to seismic force direction

Design Summary

SHEARWALL DESIGN

Wind Shear Loads, Flexible Diaphragm

All shearwalls have sufficient design capacity.

Storey drift (NBC 4.1.3.5.(3)): Limit exceeded on at least one level. Refer to Storey Drift table.

Wind Shear Loads, Rigid Diaphragm

All shearwalls have sufficient design capacity.

Storey drift (NBC 4.1.3.5.(3)): Limit exceeded on at least one level. Refer to Storey Drift table.

Components and Cladding Wind Loads, Out-of-plane Sheathing

All shearwalls have sufficient design capacity.

Components and Cladding Wind Loads, Nail Withdrawal

All shearwalls have sufficient design capacity.

Seismic Loads, Flexible Diaphragm

All shearwalls have sufficient design capacity.

The following walls fail because panel buckling or a non-ductile nail strength mode governs for design:

Level 1: B-1, B-2, B-3, 2-1, 3-1, 4-1

Level 2: B-1, B-2, B-3, 2-1, 3-1, 4-1

Level 3: B-1, B-2, B-3, 2-1, 3-1, 4-1

Storey drift (NBC 4.1.8.13.(3)): Within limits. Refer to Storey Drift table.

Over-capacity ratio (O86 11.8.3.2): Outside of allowable range. Refer to Seismic Information table.

Irregularities (NBC 4.1.8.6): No violations of design code provisions due to irregularities. Refer to Seismic Irregularities table.

Seismic Loads, Rigid Diaphragm

All shearwalls have sufficient design capacity.

The following walls fail because panel buckling or a non-ductile nail strength mode governs for design:

Level 1: B-1, B-2, B-3, 2-1, 3-1, 4-1

Level 2: B-1, B-2, B-3, 2-1, 3-1, 4-1

Level 3: B-1, B-2, B-3, 2-1, 3-1, 4-1

Storey drift (NBC 4.1.8.13.(3)): Within limits. Refer to Storey Drift table.

Over-capacity ratio (O86 11.8.3.2): Outside of allowable range. Refer to Seismic Information table.

Irregularities (NBC 4.1.8.6): No violations of design code provisions due to irregularities. Refer to Seismic Irregularities table.

HOLD-DOWN DESIGN

Wind Loads, Flexible Diaphragm

All hold-downs have sufficient design capacity.

Wind Loads, Rigid Diaphragm

All hold-downs have sufficient design capacity.

Seismic Loads, Flexible Diaphragm

All hold-downs have sufficient design capacity.

Seismic Loads, Rigid Diaphragm

All hold-downs have sufficient design capacity.

COMPRESSION FORCE DESIGN

Wind Loads, Flexible Diaphragm

Bottom plate has sufficient perpendicular-to-grain compressive capacity under all wall end studs.

Wind Loads, Rigid Diaphragm

Bottom plate has sufficient perpendicular-to-grain compressive capacity under all wall end studs.

Seismic Loads, Flexible Diaphragm

Bottom plate has sufficient perpendicular-to-grain compressive capacity under all wall end studs.

Seismic Loads, Rigid Diaphragm

Bottom plate has sufficient perpendicular-to-grain compressive capacity under all wall end studs.

Flexible Diaphragm Wind Design

SHEAR RESULTS

North-south Shearlines	W Gp	For Dir	Wind Case	Shear Force		Capacities [kN/m]					Ratio Fv/V
				FHS [m]	Fv/L [kN/m]	Vhd (vd) / L Int	Jhd Ext	Vrs (vpb) / L Int	Vrs/L Ext	Vrs/L	
Line 1											
Level 3											
Ln1, Lev3	-	Both		3.20	0.14	-	-	-	-	-	0.21S
Wall 1-2	5	Both		3.20	0.53	-	5.55	0.46	-	77.68	0.21S
Level 2											
Ln1, Lev2	-	Both		3.20	0.45	-	-	-	-	-	0.42
Wall 1-2	2	Both		3.20	1.70	-	4.03	1.00	-	5.36	0.42
Level 1											
Ln1, Lev1	-	Both		3.20	0.75	-	-	-	-	-	0.71
Wall 1-2	2^	Both		3.20	2.86	-	4.03	1.00	-	5.36	0.71
Line 2											
Level 3											
Ln2, Lev3	-	Both		3.40	0.42	-	-	-	-	-	0.08
Wall 2-1	4	Both		3.40	1.51	0.00	19.57	1.00	-	77.68	0.08
Level 2											
Ln2, Lev2	-	Both		3.40	1.34	-	-	-	-	-	0.24
Wall 2-1	4	Both		3.40	4.79	0.00	19.57	1.00	-	77.68	0.24
Level 1											
Ln2, Lev1	-	Both		3.40	2.25	-	-	-	-	-	0.41
Wall 2-1	4	Both		3.40	8.08	0.00	19.57	1.00	-	77.68	0.41
Line 3											
Level 3											
Ln3, Lev3	-	Both		8.00	0.56	-	-	-	-	-	0.04
Wall 3-1	4	Both		8.00	0.85	0.00	19.57	1.00	-	77.68	0.04
Level 2											
Ln3, Lev2	-	Both		8.00	1.78	-	-	-	-	-	0.14
Wall 3-1	4	Both		8.00	2.72	0.00	19.57	1.00	-	77.68	0.14
Level 1											
Ln3, Lev1	-	Both		8.00	3.00	-	-	-	-	-	0.23
Wall 3-1	4	Both		8.00	4.58	0.00	19.57	1.00	-	77.68	0.23
Line 4											
Level 3											
Ln4, Lev3	-	Both		3.40	0.42	-	-	-	-	-	0.08
Wall 4-1	4	Both		3.40	1.51	0.00	19.57	1.00	-	77.68	0.08
Level 2											
Ln4, Lev2	-	Both		3.40	1.34	-	-	-	-	-	0.24
Wall 4-1	4	Both		3.40	4.79	0.00	19.57	1.00	-	77.68	0.24
Level 1											
Ln4, Lev1	-	Both		3.40	2.25	-	-	-	-	-	0.41
Wall 4-1	4	Both		3.40	8.08	0.00	19.57	1.00	-	77.68	0.41
Line 5											
Level 3											
Ln5, Lev3	-	Both		3.30	0.14	-	-	-	-	-	0.21S
Wall 5-2	6	Both		3.30	0.52	-	5.35	0.47	-	39.33	0.21S
Level 2											
Ln5, Lev2	-	Both		3.30	0.45	-	-	-	-	-	0.41
Wall 5-2	2	Both		3.30	1.65	-	4.03	1.00	-	5.36	0.41
Level 1											
Ln5, Lev1	-	Both		3.30	0.75	-	-	-	-	-	0.69
Wall 5-2	2	Both		3.30	2.78	-	4.03	1.00	-	5.36	0.69
East-west Shearlines	W Gp	For Dir	Wind Case	Shear Force		Capacities [kN/m]					Ratio Fv/V
				FHS [m]	Fv/L [kN/m]	Vhd (vd) / L Int	Jhd Ext	Vrs (vpb) / L Int	Vrs/L Ext	Vrs/L	
Line A											
Level 3											
LnA, Lev3	2	Both		18.30	0.21	-	4.03	1.00	-	5.36	0.05
Level 2											
LnA, Lev2	1	Both		18.30	0.68	-	4.03	1.00	-	5.36	0.17
Level 1											
LnA, Lev1	1	Both		18.30	1.15	-	4.03	1.00	-	5.36	0.29
Line B											
Level 3											
LnB, Lev3	-	Both		15.90	0.33	-	-	-	-	-	-
Wall B-1	3	Both		4.90	0.00	0.00	4.03	1.00	-	5.36	0.00S
Wall B-2	4	Both		6.10	0.98	0.00	19.57	1.00	-	77.68	0.05

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

SHEAR RESULTS (flexible wind design, continued)

Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00S
Level 2											
LnB, Lev2	-	Both	15.90	1.04	-	-	-	-	-	-	-
Wall B-1	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00S
Wall B-2	4	Both	6.10	3.13	0.00	19.57	1.00	-	77.68	19.57	0.16
Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00S
Level 1											
LnB, Lev1	-	Both	15.90	1.76	-	-	-	-	-	-	-
Wall B-1	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00S
Wall B-2	4	Both	6.10	5.28	0.00	19.57	1.00	-	77.68	19.57	0.27
Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00S
Line C											
Level 3											
LnC, Lev3	2	Both	18.30	0.11	-	4.03	1.00	-	5.36	4.03	0.03
Level 2											
LnC, Lev2	1	Both	18.30	0.36	-	4.03	1.00	-	5.36	4.03	0.09
Level 1											
LnC, Lev1	1	Both	18.30	0.61	-	4.03	1.00	-	5.36	4.03	0.15

Legend:

Results can have different meaning for shearlines, walls, and wall segments. Results for walls with no openings are the same as those for segments.
W Gp - Wall design group as listed in Sheathing and Framing Materials tables. "A" means that this wall is critical for all walls in the Standard Wall group.

Dir - Direction of wind force along shearline. "Both" appears if results are identical for both directions.

Wind case - Critical low-rise windward corner and load case A or B when using NBC 4.1.7.6; all other results are for this load case. Nothing shown when using 4.1.7.5.

FHS - Length of full height sheathing along shearline, wall, or segment.

Fv/L - For shearlines = diaphragm shear force = factored shearline force divided by length of shearline; for wall segments = design shear force = factored shear force divided by length of full height sheathing.

Vhd(vd)/L - Factored unit sheathing connection resistance = Vrs from O86 11.6.2 without Jhd

For wood panels (11.6.2.2(a)) = $0.80 \times vd \times JD \times Jus \times Js$; $vd = Nu$ (from 12.9.3) / nail spacing

JD - diaphragm and shearwall factor (12.9.3.1) = 1.3; Js - fastener spacing factor (11.5.1)

Jus - unblocked factor (11.5.4), shown in the Sheathing Materials table.

For gypsum wallboard (11.6.2.3) = $0.70 \times vd$; vd from Table 11.4

Jhd - Hold-down effect factor from 11.5.5

Vrs(vpb)/L - Factored unit panel buckling resistance (11.6.2.2(b)) = $0.80 \times vpb \times KD \times KS \times KT$.

KD - load-duration factor (5.3.2.1) = 1.15; KS - service-condition factor (9.4.2); KT - treatment factor = 1.0

Vrs/L - Factored unit shear resistance of wall segment = $\min(Vhd(vd)/L \times Jhd, Vrs(vpb)/L)$.

Refer to Detailed Shear Wall design output for strengths, factors and other intermediate values for Vrs, Vhd and Jhd.

"S" indicates that the seismic design criterion was critical in selecting wall.

Notes:

According to O86 11.3.3.1 Note (1), there should be a balanced spatial distribution of gypsum wallboard and wood-based panels on every level in each direction.

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

Hold-Down and Compression Design (flexible wind design)

Level 1					Tensile Hold-down or Compressive Stud Force [kN]				Hold-down	Cap [kN]	Crit Resp.
Line- Wall	Posit'n	Location [m]		Note	Shear	Dead	Uplift	Cmb'd			
		X	Y								
Line 1											
1-2	L End	0.00	4.84		15.6		0.0	15.65	HDU8	60.3	0.26
1-2	L End	0.00	4.84		15.6		0.0	15.7	Compression	157.6	0.10
1-2	R End	0.00	7.96		15.6		0.0	15.65	HDU8	60.3	0.26
1-2	R End	0.00	7.96		15.6		0.0	15.65	Compression	157.6	0.10
Line 2											
2-1	L End	3.05	4.64		43.8		0.0	43.80	HDU8	60.3	0.73
2-1	L End	3.05	4.64		43.8		0.0	43.8	Compression	157.6	0.28
2-1	R End	3.05	7.96		43.8		0.0	43.80	HDU8	60.3	0.73
2-1	R End	3.05	7.96		43.8		0.0	43.80	Compression	157.6	0.28
Line 3											
3-1	L End	9.15	0.04		24.5		0.0	24.50	HDU8	60.3	0.41
3-1	L End	9.15	0.04		24.5		0.0	24.5	Compression	157.6	0.16
3-1	R End	9.15	7.96		24.5		0.0	24.50	HDU8	60.3	0.41
3-1	R End	9.15	7.96		24.5		0.0	24.49	Compression	157.6	0.16
Line 4											
4-1	L End	15.25	4.64		43.8		0.0	43.80	HDU8	60.3	0.73
4-1	L End	15.25	4.64		43.8		0.0	43.8	Compression	157.6	0.28
4-1	R End	15.25	7.96		43.8		0.0	43.80	HDU8	60.3	0.73
4-1	R End	15.25	7.96		43.8		0.0	43.80	Compression	157.6	0.28
Line 5											
5-2	L End	18.30	4.74		15.2		0.0	15.16	HDU8	60.3	0.25
5-2	L End	18.30	4.74		15.2		0.0	15.2	Compression	157.6	0.10
5-2	R End	18.30	7.96		15.2		0.0	15.16	HDU8	60.3	0.25
5-2	R End	18.30	7.96		15.2		0.0	15.16	Compression	157.6	0.10
Line A											
A-1	L End	0.04	0.00		6.1		0.0	6.14	HDU8	60.3	0.10
A-1	L End	0.04	0.00		6.1		0.0	6.14	Compression	157.6	0.04
A-1	R End	18.26	0.00		6.1		0.0	6.14	HDU8	60.3	0.10
A-1	R End	18.26	0.00		6.1		0.0	6.14	Compression	157.6	0.04
Line B											
B-2	L End	6.14	8.00		28.3		0.0	28.32	HDU8	60.3	0.47
B-2	L End	6.14	8.00		28.3		0.0	28.32	Compression	157.6	0.18
B-2	R End	12.16	8.00		28.3		0.0	28.32	HDU8	60.3	0.47
B-2	R End	12.16	8.00		28.3		0.0	28.3	Compression	157.6	0.18
Line C											
C-1	L End	0.04	12.20		3.2		0.0	3.22	HDU8	60.3	0.05
C-1	L End	0.04	12.20		3.2		0.0	3.22	Compression	157.6	0.02
C-1	R End	18.26	12.20		3.2		0.0	3.22	HDU8	60.3	0.05
C-1	R End	18.26	12.20		3.2		0.0	3.22	Compression	157.6	0.02
Level 2					Tensile Hold-down or Compressive Stud Force [kN]				Hold-down	Cap [kN]	Crit Resp.
Line- Wall	Posit'n	Location [m]		Note	Shear	Dead	Uplift	Cmb'd			
		X	Y								
Line 1											
1-2	L End	0.00	4.84		6.8		0.0	6.84	HDU8	60.3	0.11
1-2	L End	0.00	4.84		6.8		0.0	6.8	Compression	157.6	0.04
1-2	R End	0.00	7.96		6.8		0.0	6.84	HDU8	60.3	0.11
1-2	R End	0.00	7.96		6.8		0.0	6.84	Compression	157.6	0.04
Line 2											
2-1	L End	3.05	4.64		19.0		0.0	18.96	HDU8	60.3	0.31
2-1	L End	3.05	4.64		19.0		0.0	19.0	Compression	157.6	0.12
2-1	R End	3.05	7.96		19.0		0.0	18.96	HDU8	60.3	0.31
2-1	R End	3.05	7.96		19.0		0.0	18.96	Compression	157.6	0.12
Line 3											
3-1	L End	9.15	0.04		10.6		0.0	10.61	HDU8	60.3	0.18
3-1	L End	9.15	0.04		10.6		0.0	10.6	Compression	157.6	0.07
3-1	R End	9.15	7.96		10.6		0.0	10.61	HDU8	60.3	0.18
3-1	R End	9.15	7.96		10.6		0.0	10.61	Compression	157.6	0.07
Line 4											
4-1	L End	15.25	4.64		19.0		0.0	18.96	HDU8	60.3	0.31
4-1	L End	15.25	4.64		19.0		0.0	19.0	Compression	157.6	0.12
4-1	R End	15.25	7.96		19.0		0.0	18.96	HDU8	60.3	0.31
4-1	R End	15.25	7.96		19.0		0.0	18.96	Compression	157.6	0.12
Line 5											
5-2	L End	18.30	4.74		6.6		0.0	6.63	HDU8	60.3	0.11
5-2	L End	18.30	4.74		6.6		0.0	6.6	Compression	157.6	0.04
5-2	R End	18.30	7.96		6.6		0.0	6.63	HDU8	60.3	0.11
5-2	R End	18.30	7.96		6.6		0.0	6.62	Compression	157.6	0.04

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

Hold-Down and Compression Design (flexible wind design, continued)

Line A											
A-1	L End	0.04	0.00		2.7	0.0	2.66	HDU8	60.3	0.04	
A-1	L End	0.04	0.00		2.7	0.0	2.66	Compression	157.6	0.02	
A-1	R End	18.26	0.00		2.7	0.0	2.66	HDU8	60.3	0.04	
A-1	R End	18.26	0.00		2.7	0.0	2.66	Compression	157.6	0.02	
Line B											
B-2	L End	6.14	8.00		12.3	0.0	12.26	HDU8	60.3	0.20	
B-2	L End	6.14	8.00		12.3	0.0	12.3	Compression	157.6	0.08	
B-2	R End	12.16	8.00		12.3	0.0	12.26	HDU8	60.3	0.20	
B-2	R End	12.16	8.00		12.3	0.0	12.3	Compression	157.6	0.08	
Line C											
C-1	L End	0.04	12.20		1.4	0.0	1.40	HDU8	60.3	0.02	
C-1	L End	0.04	12.20		1.4	0.0	1.39	Compression	157.6	0.01	
C-1	R End	18.26	12.20		1.4	0.0	1.40	HDU8	60.3	0.02	
C-1	R End	18.26	12.20		1.4	0.0	1.39	Compression	157.6	0.01	
Level 3					Tensile Hold-down or Compressive Stud Force [kN]						
Line-Wall	Posit'n	Location [m]		Note	Shear	Dead	Uplift	Cmb'd	Hold-down	Cap [kN]	Crit Resp.
		X	Y								
Line 1											
1-2	L End	0.00	4.84		1.6	0.0	1.62	Anchorage			
1-2	L End	0.00	4.84		1.6	0.0	1.6	Compression	157.6	0.01	
1-2	R End	0.00	7.96		1.6	0.0	1.62	Anchorage			
1-2	R End	0.00	7.96		1.6	0.0	1.62	Compression	157.6	0.01	
Line 2											
2-1	L End	3.05	4.64		4.2	0.0	4.23	HDU8	60.3	0.07	
2-1	L End	3.05	4.64		4.2	0.0	4.2	Compression	157.6	0.03	
2-1	R End	3.05	7.96		4.2	0.0	4.23	HDU8	60.3	0.07	
2-1	R End	3.05	7.96		4.2	0.0	4.23	Compression	157.6	0.03	
Line 3											
3-1	L End	9.15	0.04		2.4	0.0	2.37	HDU8	60.3	0.04	
3-1	L End	9.15	0.04		2.4	0.0	2.4	Compression	157.6	0.02	
3-1	R End	9.15	7.96		2.4	0.0	2.37	HDU8	60.3	0.04	
3-1	R End	9.15	7.96		2.4	0.0	2.37	Compression	157.6	0.02	
Line 4											
4-1	L End	15.25	4.64		4.2	0.0	4.23	HDU8	60.3	0.07	
4-1	L End	15.25	4.64		4.2	0.0	4.2	Compression	157.6	0.03	
4-1	R End	15.25	7.96		4.2	0.0	4.23	HDU8	60.3	0.07	
4-1	R End	15.25	7.96		4.2	0.0	4.23	Compression	157.6	0.03	
Line 5											
5-2	L End	18.30	4.74		1.6	0.0	1.56	Anchorage			
5-2	L End	18.30	4.74		1.6	0.0	1.6	Compression	157.6	0.01	
5-2	R End	18.30	7.96		1.6	0.0	1.56	Anchorage			
5-2	R End	18.30	7.96		1.6	0.0	1.56	Compression	157.6	0.01	
Line A											
A-1	L End	0.04	0.00		0.6	0.0	0.59	HDU8	60.3	0.01	
A-1	L End	0.04	0.00		0.6	0.0	0.59	Compression	157.6	0.00	
A-1	R End	18.26	0.00		0.6	0.0	0.59	HDU8	60.3	0.01	
A-1	R End	18.26	0.00		0.6	0.0	0.59	Compression	157.6	0.00	
Line B											
B-2	L End	6.14	8.00		2.7	0.0	2.74	HDU8	60.3	0.05	
B-2	L End	6.14	8.00		2.7	0.0	2.7	Compression	157.6	0.02	
B-2	R End	12.16	8.00		2.7	0.0	2.74	HDU8	60.3	0.05	
B-2	R End	12.16	8.00		2.7	0.0	2.7	Compression	157.6	0.02	
Line C											
C-1	L End	0.04	12.20		0.3	0.0	0.31	HDU8	60.3	0.01	
C-1	L End	0.04	12.20		0.3	0.0	0.31	Compression	157.6	0.00	
C-1	R End	18.26	12.20		0.3	0.0	0.31	HDU8	60.3	0.01	
C-1	R End	18.26	12.20		0.3	0.0	0.31	Compression	157.6	0.00	

Legend:

Line-Wall:

At wall or opening - Shearline and wall number

At vertical element - Shearline

Posit'n - Stud that hold-down is attached to:

V Elem - Vertical element: column or strengthened studs required where not at wall end or opening

L or R End - At left or right wall end

L or R Op n - At left or right side of opening n

Location - Co-ordinates in Plan View

Note - Number(s) of note(s) below to apply

Tensile Hold-down or Compressive Stud Force: Upwards force on hold-down at one end of the wall or downward force on bottom plate under studs

at the other end, for each force direction. Includes forces transferred from upper levels.

Shear – Overturning component = $V \times h / L$; V = force on segment factored by 1.4; h = wall height + joist depth (O86 Fig. 11.7); L = wall segment length – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width). When anchorages used L = segment length – 300 mm (O86 11.6.4.1).

Dead - Dead load resisting component, factored by 0.9 when resisting overturning and 1.25 for compression

Uplift - Uplift wind load component, factored by 1.4

Cmb'd - Sum of factored overturning, dead and uplift forces

Hold-down - Device used from hold-down database or "Anchorage" if no hold-down required.

Cap - Allowable tension load

Crit. Resp. - Critical Response = Combined hold-down force / Allowable tension load

Notes:

Moment arm L used in hold-down force calculations is wall length minus the user-input hold-down offset at each end of wall. For anchorages, maximum moment arm is wall length minus 300 mm. Refer to O86 11.6.4.1.

HDU8-SDS2.5 for studs with thickness > 0.11 m and depth > 0.09 m : Uses 20 1/4" x 2 1/2" SDS heavy-duty screws; 7/8" anchor bolt.

Factored for load combination 4 from NBC Table 4.1.3.2A, without companion loads for maximum effect. Worst case of low-rise wind loads used.

COLLECTOR FORCES (flexible wind design)

Level 1				Drag Strut Force [kN]		Strap/Blocking Force [kN]	
Line-Wall	Position on Wall or Opening	Location [m]					
		X	Y	--->	<---	--->	<---
Line 1							
1-2	Left Wall End	0.00	4.80	-3.6	3.6		
1-2	Right Wall End	0.00	8.00	3.2	-3.1		
Line 2							
2-1	Left Wall End	3.05	4.60	-10.4	10.4		
2-1	Right Wall End	3.05	8.00	9.5	-9.5		
Line 3							
3-1	Right Wall End	9.15	8.00	12.6	-12.6		
Line 4							
4-1	Left Wall End	15.25	4.60	-10.4	10.4		
4-1	Right Wall End	15.25	8.00	9.5	-9.5		
Line 5							
5-2	Left Wall End	18.30	4.70	-3.5	3.5		
5-2	Right Wall End	18.30	8.00	3.2	-3.1		
Line B							
B-1	Left Wall End	0.60	8.00	-1.0	1.1		
B-1	Right Wall End	5.50	8.00	-9.7	9.7		
B-2	Left Wall End	6.10	8.00	-10.7	10.7		
B-2	Right Wall End	12.20	8.00	10.7	-10.7		
B-3	Left Wall End	12.80	8.00	9.7	-9.7		
B-3	Right Wall End	17.70	8.00	1.1	-1.0		

Level 2				Drag Strut Force [kN]		Strap/Blocking Force [kN]	
Line-Wall	Position on Wall or Opening	Location [m]					
		X	Y	--->	<---	--->	<---
Line 1							
1-2	Left Wall End	0.00	4.80	-2.1	2.1		
1-2	Right Wall End	0.00	8.00	1.9	-1.9		
Line 2							
2-1	Left Wall End	3.05	4.60	-6.1	6.1		
2-1	Right Wall End	3.05	8.00	5.6	-5.6		
Line 3							
3-1	Right Wall End	9.15	8.00	7.5	-7.5		
Line 4							
4-1	Left Wall End	15.25	4.60	-6.1	6.1		
4-1	Right Wall End	15.25	8.00	5.6	-5.6		
Line 5							
5-2	Left Wall End	18.30	4.70	-2.1	2.1		
5-2	Right Wall End	18.30	8.00	1.9	-1.9		
Line B							
B-1	Left Wall End	0.60	8.00	-0.6	0.6		
B-1	Right Wall End	5.50	8.00	-5.7	5.7		
B-2	Left Wall End	6.10	8.00	-6.4	6.4		
B-2	Right Wall End	12.20	8.00	6.4	-6.4		
B-3	Left Wall End	12.80	8.00	5.7	-5.7		
B-3	Right Wall End	17.70	8.00	0.6	-0.6		

Level 3				Drag Strut Force [kN]		Strap/Blocking Force [kN]	
Line-Wall	Position on Wall or Opening	Location [m]					
		X	Y	--->	<---	--->	<---
Line 1							
1-2	Left Wall End	0.00	4.80	-0.7	0.7		
1-2	Right Wall End	0.00	8.00	0.6	-0.6		
Line 2							
2-1	Left Wall End	3.05	4.60	-1.9	1.9		
2-1	Right Wall End	3.05	8.00	1.8	-1.8		
Line 3							
3-1	Right Wall End	9.15	8.00	2.3	-2.3		
Line 4							
4-1	Left Wall End	15.25	4.60	-1.9	1.9		
4-1	Right Wall End	15.25	8.00	1.8	-1.8		
Line 5							
5-2	Left Wall End	18.30	4.70	-0.6	0.7		
5-2	Right Wall End	18.30	8.00	0.6	-0.6		
Line B							
B-1	Left Wall End	0.60	8.00	-0.2	0.2		
B-1	Right Wall End	5.50	8.00	-1.8	1.8		
B-2	Left Wall End	6.10	8.00	-2.0	2.0		

COLLECTOR FORCES (flexible wind design, continued)

B-2	Right Wall End	12.20	8.00	2.0	-2.0	
B-3	Left Wall End	12.80	8.00	1.8	-1.8	
B-3	Right Wall End	17.70	8.00	0.2	-0.2	

Legend:

Line-Wall - Shearline and wall number

Position... - Side of opening or wall end that drag strut is attached to

Location - Co-ordinates in Plan View

Drag Strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression. Based on factored shearline force.

----> Force in the west-to-east or south-to-north direction

<---- Force in the east-to-west or north-to-south direction

DEFLECTION (flexible wind design)

Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	Nail slip vs N	en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 1														
Line 1 1-2	2	Both	Ext	1.53	3.20	2.75	21280	.02	.92	230	.13	.91	6.8	8.6
Line 2 2-1	4	Both	1	0.00	3.40	2.75	21280	.07	.00	0	.00	.00	8.4	10.6
		Both	2	4.33					.00	0	.00	.00		
Line 3 3-1	4	Both	1	0.00	8.00	2.75	21280	.02	-	-	-	-	2.9	3.7
		Both	2	2.45					.00	0	.00	.00		
Line 4 4-1	4	Both	1	0.00	3.40	2.75	21280	.07	.00	0	.00	.00	8.4	10.6
		Both	2	4.33					.00	0	.00	.00		
Line 5 5-2	2	Both	Ext	1.49	3.30	2.75	21280	.02	.89	223	.12	.85	6.5	8.3
Line A A-1	1	Both	Ext	0.62	18.30	2.75	21280	.00	.37	93	.02	.15	1.0	1.5
Line B B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	5.1
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.02	-	-	-	-	4.0	5.1
		Both	2	2.83					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	5.1
		Both	2	0.00					-	-	-	-		
Line C C-1	1	Both	Ext	0.32	18.30	2.75	21280	.00	.19	49	.01	.04	1.0	1.2
Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	Nail slip vs N	en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 2														
Line 1 1-2	2	Both	Ext	0.91	3.20	2.75	21280	.01	.54	136	.05	.32	6.1	7.0
Line 2 2-1	4	Both	1	0.00	3.40	2.75	21280	.04	-	-	-	-	6.6	8.3
		Both	2	2.57					.00	0	.00	.00		
Line 3 3-1	4	Both	1	0.00	8.00	2.75	21280	.01	-	-	-	-	2.5	3.2
		Both	2	1.46					.00	0	.00	.00		
Line 4 4-1	4	Both	1	0.00	3.40	2.75	21280	.04	-	-	-	-	6.6	8.3
		Both	2	2.57					.00	0	.00	.00		
Line 5 5-2	2	Both	Ext	0.88	3.30	2.75	21280	.01	.53	132	.04	.30	5.9	6.7
Line A A-1	1	Both	Ext	0.37	18.30	2.75	21280	.00	.22	55	.01	.05	1.0	1.3
Line B B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	4.2
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.01	-	-	-	-	3.4	4.2
		Both	2	1.68					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	4.2
		Both	2	0.00					-	-	-	-		
Line C C-1	1	Both	Ext	0.19	18.30	2.75	21280	.00	.12	29	.00	.01	1.0	1.1
Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	Nail slip vs N	en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 3														
Line 1 1-2	5	Both	Ext	0.29	3.20	2.75	21280	.00	.08	43	.00	.03	0.0	0.2
Line 2 2-1	4	Both	1	0.00	3.40	2.75	21280	.01	.00	0	.00	.00	5.5	6.9
		Both	2	0.81					.00	0	.00	.00		
Line 3 3-1	4	Both	1	0.00	8.00	2.75	21280	.00	-	-	-	-	2.3	2.8
		Both	2	0.46					.00	0	.00	.00		
Line 4 4-1	4	Both	1	0.00	3.40	2.75	21280	.01	.00	0	.00	.00	5.5	6.9

DEFLECTION (flexible wind design, continued)

Line 5	Both	2	0.81						.00	0	.00	.00		
5-2	6	Both	Ext	0.28	3.30	2.75	21280	.00	.09	42	.00	.03	0.0	0.2
Line A														
A-1	2	Both	Ext	0.12	18.30	2.75	21280	.00	.07	17	.00	.01	1.0	1.0
Line B														
B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.7
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.00	-	-	-	-	3.0	3.7
		Both	2	0.53					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.7
		Both	2	0.00					-	-	-	-		
Line C														
C-1	2	Both	Ext	0.06	18.30	2.75	21280	.00	.04	9	.00	.00	1.0	1.0

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B

W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall.

Dir – Force direction

Srf – Wall surface, interior or exterior for perimeter walls, 1 or 2 for interior partitions

v - SLS-factored shear force on wall segment = Design shear force / 1.4 wind factor x 0.75 SLS importance factor / 1.0 ULS importance factor

L - Width of wall segment between openings

H - Wall height

Defl - Horizontal shearwall deflection due to given term:

Bending = $2vHs^3 / 3EALs \times 10^6$; A - Cross sectional area of segment end stud(s); E - Stud mod. of elasticity from Framing Materials table

Shear = $1000 vHs / Bv$; Bv - Shear-through-thickness rigidity from Tables 9.1-9.3, value is in Sheathing Materials table

Nail slip = $2.5 Hs \times en$; en – From O86 A.11.7 = $(0.013 vs / d^2)^{1/2}$ wood, 0.76 v / vcap GWB

vs - shear force per nail along panel edge, d - nail diameter.

Hold - Restraint system (hold-down) = $da \times h / L$;

da - Vertical hold-down displacement; refer to Hold-down Displacement table for components.

L = $Ls - (tension\ stud\ pack\ width + hold-down\ anchor\ bolt\ offset) - (1/2\ compression\ stud\ pack\ width)$

Total Defl – Deflection from bending + shear + nail slip + hold-down / unblocked factor Jus, as per O86 11.7.1.2,3

HOLD-DOWN DISPLACEMENT (flexible wind design)

Wall, segment	Dir	Hold- down	Tens. force kN	Vert. Manuf mm	Displacement Add mm	da mm	Slippage Vf kN	da mm	Shrink +Extra mm	Comp. force kN	Crush da mm	Total da mm	Horz Defl mm
Level 1													
Line 1													
1-2	Both	HDU8	15.65	1.3	.04	1.37	-	-	6.3	8.38	0.04	7.7	6.8
Line 2													
2-1	Both	HDU8	43.80	3.7	.11	3.82	-	-	6.3	23.46	0.10	10.2	8.4
Line 3													
3-1	Both	HDU8	24.50	2.1	.06	2.14	-	-	6.3	13.12	0.06	8.5	2.9
Line 4													
4-1	Both	HDU8	43.80	3.7	.11	3.82	-	-	6.3	23.46	0.10	10.2	8.4
Line 5													
5-2	Both	HDU8	15.16	1.3	.04	1.32	-	-	6.3	8.12	0.04	7.6	6.5
Line A													
A-1	Both	HDU8	6.14	.52	.02	0.54	-	-	6.3	3.29	0.01	6.8	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	28.32	2.4	.07	2.47	-	-	6.3	15.17	0.07	8.8	4.0
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	3.22	.27	.01	0.28	-	-	6.3	1.73	0.01	6.6	1.0
Wall, segment	Dir	Hold- down	Tens. force kN	Vert. Manuf mm	Displacement Add mm	da mm	Slippage Vf kN	da mm	Shrink +Extra mm	Comp. force kN	Crush da mm	Total da mm	Horz Defl mm
Level 2													
Line 1													
1-2	Both	HDU8	6.84	.58	.02	0.60	-	-	6.3	3.67	0.02	6.9	6.1
Line 2													
2-1	Both	HDU8	18.96	1.6	.05	1.66	-	-	6.3	10.16	0.04	8.0	6.6
Line 3													
3-1	Both	HDU8	10.61	.90	.03	0.93	-	-	6.3	5.68	0.02	7.2	2.5
Line 4													
4-1	Both	HDU8	18.96	1.6	.05	1.66	-	-	6.3	10.16	0.04	8.0	6.6
Line 5													
5-2	Both	HDU8	6.63	.56	.02	0.58	-	-	6.3	3.55	0.02	6.9	5.9
Line A													
A-1	Both	HDU8	2.66	.23	.01	0.23	-	-	6.3	1.42	0.01	6.5	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	12.26	1.0	.03	1.07	-	-	6.3	6.57	0.03	7.4	3.4
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	1.40	.12	.00	0.12	-	-	6.3	0.75	0.00	6.4	1.0
Wall, segment	Dir	Hold- down	Tens. force kN	Vert. Manuf mm	Displacement Add mm	da mm	Slippage Vf kN	da mm	Shrink +Extra mm	Comp. force kN	Crush da mm	Total da mm	Horz Defl mm
Level 3													
Line 1													
1-2	Both	Anchor	-	(nu = 696 N)						-		0.0	0.0
Line 2													
2-1	Both	HDU8	4.23	.36	.01	0.37	-	-	6.3	2.27	0.01	6.7	5.5
Line 3													
3-1	Both	HDU8	2.37	.20	.01	0.21	-	-	6.3	1.27	0.01	6.5	2.3
Line 4													
4-1	Both	HDU8	4.23	.36	.01	0.37	-	-	6.3	2.27	0.01	6.7	5.5
Line 5													
5-2	Both	Anchor	-	(nu = 672 N)						-		0.0	0.0
Line A													
A-1	Both	HDU8	0.59	.05	.00	0.05	-	-	6.3	0.32	0.00	6.3	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	2.74	.23	.01	0.24	-	-	6.3	1.47	0.01	6.5	3.0
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	0.31	.03	.00	0.03	-	-	6.3	0.17	0.00	6.3	1.0

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B

Dir – Force direction

Tens., Comp. – Accumulated ULS hold-down tension force *T* and SLS compression force *C* from overturning, dead, and wind uplift loads.

Tens. – ULS-factored force, used for proportion of manufacturer's maximum elongation

Comp. – Factored for serviceability

da – Vertical displacements due to the following components:

Vert. Displacement - Vertical displacement of hold-down

Manuf – Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation

Unless marked with * = (ULS-factored tension force / hold-down capacity) x max displacement

* - Maximum displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.

Add – Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = $TL / (Ab \times Es)$

T – Serviceability-factored tension force (not shown)

Ab = bolt cross-sectional area

Es = steel modulus = 200 GPa

L = *Lb* – *Lh*

Lb = Total bolt length shown in Storey Information table

Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database

Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation

Nails = en from O86 A.11.7 = $(0.013 Pf / d^2)^2$, *d* = nail diameter

Shrink + Extra – Wood shrinkage plus extra displacement due to mis-cuts, gaps, etc.

Shrinkage = $0.002 \times (19\% \text{ fabrication} - 10\% \text{ in-service moisture contents}) \times Ls$

Ls = Length between anchor bolt fasteners subject to perp-to-grain shrinkage; see Storey Information table

Crush – Deformation of bottom plate at compression end of wall segment

= $0.5\text{mm} \times [r / 0.73, r < 0.73; (1 + (r - 0.73) / 0.27), 0.73 < r < 1; 2r^3, r > 1]$

$r = C / Qr$; $Qr = KD Ks Kz f_{cp} A$; *A* = cross sectional area of end studs

Total da – *Vert. Displacement* + *Slippage* + *Shrink* + *Crush* + *Extra*

Horz Defl – Restraint system term in deflection equation in O86 11.7.1.2 = $Hs / L \times da$

Hs = wall height; *L* = wall segment length *Ls* – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width)

Hs and *Ls* are shown in Deflection table

STOREY DRIFT (flexible wind design)

Level	Dir	Actual Storey Drift (mm)		Allowable Storey Drift		
		Max defl	Line	hs m	Drift mm	Ratio
1	N<->S	10.6	2	3.00	6.0	1.77*
	E<->W	5.1	B		6.0	0.84
2	N<->S	8.3	2	3.00	6.0	1.38*
	E<->W	4.2	B		6.0	0.70
3	N<->S	6.9	2	2.75	5.5	1.26*
	E<->W	3.7	B		5.5	0.68

Legend:

Max defl – Largest deflection for any shearline on level in this direction; refer to Deflections table

Line – Shearline with largest deflection on level in this direction

hs – Storey height in 4.1.3.5.(3) = Height of walls plus joist depth between this level and the one above.

Drift = Allowable storey drift on this level from NBC 4.1.3.5.(3)

Ratio - Proportion of allowable storey drift experienced, on this level in this direction.

Notes:

*FAILURE – Story drift on this level is greater than maximum allowed according to NBC 4.1.3.5.(3).

Rigid Diaphragm Wind Design

SHEAR RESULTS

North-south Shearlines	W Gp	For Dir	Wind Case	Shear Force		Capacities [kN/m]					Ratio Fv/V
				FHS [m]	Fv/L [kN/m]	Vhd (vd) / L Int	Jhd Ext	Vrs (vpb) / L Int	Vrs/L Ext	Vrs/L	
Line 1											
Level 3											
Ln1, Lev3	-	Both		3.20	0.71	-	-	-	-	-	0.49S
Wall 1-2	5	Both		3.20	2.70	-	5.55	1.00	-	77.68	0.49S
Level 2											
Ln1, Lev2	-	Both		3.20	0.18	-	-	-	-	-	0.17
Wall 1-2	2	Both		3.20	0.69	-	4.03	1.00	-	5.36	0.17
Level 1											
Ln1, Lev1	-	Both		3.20	0.33	-	-	-	-	-	0.31
Wall 1-2	2	Both		3.20	1.25	-	4.03	1.00	-	5.36	0.31
Line 2											
Level 3											
Ln2, Lev3	-	Both		3.40	0.02	-	-	-	-	-	0.00
Wall 2-1	4	Both		3.40	0.06	0.00	19.57	1.00	-	77.68	0.00
Level 2											
Ln2, Lev2	-	Both		3.40	0.36	-	-	-	-	-	0.07
Wall 2-1	4	Both		3.40	1.31	0.00	19.57	1.00	-	77.68	0.07
Level 1											
Ln2, Lev1	-	Both		3.40	0.80	-	-	-	-	-	0.15
Wall 2-1	4	Both		3.40	2.87	0.00	19.57	1.00	-	77.68	0.15
Line 3											
Level 3											
Ln3, Lev3	-	Both		8.00	0.22	-	-	-	-	-	0.02
Wall 3-1	4	Both		8.00	0.34	0.00	19.57	1.00	-	77.68	0.02
Level 2											
Ln3, Lev2	-	Both		8.00	4.24	-	-	-	-	-	0.33
Wall 3-1	4	Both		8.00	6.47	0.00	19.57	1.00	-	77.68	0.33
Level 1											
Ln3, Lev1	-	Both		8.00	6.74	-	-	-	-	-	0.53
Wall 3-1	4^	Both		8.00	10.28	0.00	19.57	1.00	-	77.68	0.53
Line 4											
Level 3											
Ln4, Lev3	-	Both		3.40	0.02	-	-	-	-	-	0.00
Wall 4-1	4	Both		3.40	0.06	0.00	19.57	1.00	-	77.68	0.00
Level 2											
Ln4, Lev2	-	Both		3.40	0.36	-	-	-	-	-	0.07
Wall 4-1	4	Both		3.40	1.29	0.00	19.57	1.00	-	77.68	0.07
Level 1											
Ln4, Lev1	-	Both		3.40	0.79	-	-	-	-	-	0.15
Wall 4-1	4	Both		3.40	2.84	0.00	19.57	1.00	-	77.68	0.15
Line 5											
Level 3											
Ln5, Lev3	-	Both		3.30	0.71	-	-	-	-	-	0.49S
Wall 5-2	6	Both		3.30	2.64	-	5.35	1.00	-	39.33	0.49S
Level 2											
Ln5, Lev2	-	Both		3.30	0.19	-	-	-	-	-	0.18
Wall 5-2	2	Both		3.30	0.72	-	4.03	1.00	-	5.36	0.18
Level 1											
Ln5, Lev1	-	Both		3.30	0.35	-	-	-	-	-	0.32
Wall 5-2	2	Both		3.30	1.29	-	4.03	1.00	-	5.36	0.32
East-west Shearlines	W Gp	For Dir	Wind Case	Shear Force		Capacities [kN/m]					Ratio Fv/V
				FHS [m]	Fv/L [kN/m]	Vhd (vd) / L Int	Jhd Ext	Vrs (vpb) / L Int	Vrs/L Ext	Vrs/L	
Line A											
Level 3											
LnA, Lev3	2	Both		18.30	0.33	-	4.03	1.00	-	5.36	0.08
Level 2											
LnA, Lev2	1	Both		18.30	0.99	-	4.03	1.00	-	5.36	0.25
Level 1											
LnA, Lev1	1^	Both		18.30	1.63	-	4.03	1.00	-	5.36	0.41
Line B											
Level 3											
LnB, Lev3	-	Both		15.90	0.03	-	-	-	-	-	-
Wall B-1	3	Both		4.90	0.00	0.00	4.03	1.00	-	5.36	0.00S
Wall B-2	4	Both		6.10	0.10	0.00	19.57	1.00	-	77.68	0.01

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

SHEAR RESULTS (rigid wind design, continued)

Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00S
Level 2											
LnB, Lev2	-	Both	15.90	0.15	-	-	-	-	-	-	-
Wall B-1	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00S
Wall B-2	4	Both	6.10	0.46	0.00	19.57	1.00	-	77.68	19.57	0.02
Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00S
Level 1											
LnB, Lev1	-	Both	15.90	0.36	-	-	-	-	-	-	-
Wall B-1	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00S
Wall B-2	4	Both	6.10	1.07	0.00	19.57	1.00	-	77.68	19.57	0.05
Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00S
Line C											
Level 3											
LnC, Lev3	2	Both	18.30	0.30	-	4.03	1.00	-	5.36	4.03	0.07
Level 2											
LnC, Lev2	1	Both	18.30	0.94	-	4.03	1.00	-	5.36	4.03	0.23
Level 1											
LnC, Lev1	1	Both	18.30	1.53	-	4.03	1.00	-	5.36	4.03	0.38

Legend:

Results can have different meaning for shearlines, walls, and wall segments. Results for walls with no openings are the same as those for segments.
W Gp - Wall design group as listed in Sheathing and Framing Materials tables. "A" means that this wall is critical for all walls in the Standard Wall group.

Dir - Direction of wind force along shearline. "Both" appears if results are identical for both directions.

Wind case - Critical low-rise windward corner and load case A or B when using NBC 4.1.7.6; all other results are for this load case. Nothing shown when using 4.1.7.5.

FHS - Length of full height sheathing along shearline, wall, or segment.

Fv/L - For shearlines = diaphragm shear force = factored shearline force divided by length of shearline; for wall segments = design shear force = factored shear force divided by length of full height sheathing.

Vhd(vd)/L - Factored unit sheathing connection resistance = Vrs from O86 11.6.2 without Jhd

For wood panels (11.6.2.2(a)) = $0.80 \times vd \times JD \times Jus \times Js$; $vd = Nu$ (from 12.9.3) / nail spacing

JD - diaphragm and shearwall factor (12.9.3.1) = 1.3; Js - fastener spacing factor (11.5.1)

Jus - unblocked factor (11.5.4), shown in the Sheathing Materials table.

For gypsum wallboard (11.6.2.3) = $0.70 \times vd$; vd from Table 11.4

Jhd - Hold-down effect factor from 11.5.5

Vrs(vpb)/L - Factored unit panel buckling resistance (11.6.2.2(b)) = $0.80 \times vpb \times KD \times KS \times KT$.

KD - load-duration factor (5.3.2.1) = 1.15; KS - service-condition factor (9.4.2); KT - treatment factor = 1.0

Vrs/L - Factored unit shear resistance of wall segment = $\min(Vhd(vd)/L \times Jhd, Vrs(vpb)/L)$.

Refer to Detailed Shear Wall design output for strengths, factors and other intermediate values for Vrs, Vhd and Jhd.

"S" indicates that the seismic design criterion was critical in selecting wall.

Notes:

According to O86 11.3.3.1 Note (1), there should be a balanced spatial distribution of gypsum wallboard and wood-based panels on every level in each direction.

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

Hold-Down and Compression Design (rigid wind design)

Level 1					Tensile Hold-down or Compressive Stud Force [kN]				Hold-down	Cap [kN]	Crit Resp.
Line- Wall	Posit'n	Location [m]		Note	Shear	Dead	Uplift	Cmb'd			
Line 1											
1-2	L End	0.00	4.84		13.6		0.0	13.61	HDU8	60.3	0.23
1-2	L End	0.00	4.84		13.6		0.0	13.6	Compression	157.6	0.09
1-2	R End	0.00	7.96		13.6		0.0	13.61	HDU8	60.3	0.23
1-2	R End	0.00	7.96		13.6		0.0	13.6	Compression	157.6	0.09
Line 2											
2-1	L End	3.05	4.64		13.0		0.0	12.99	HDU8	60.3	0.22
2-1	L End	3.05	4.64		13.0		0.0	13.0	Compression	157.6	0.08
2-1	R End	3.05	7.96		13.0		0.0	12.99	HDU8	60.3	0.22
2-1	R End	3.05	7.96		13.0		0.0	13.0	Compression	157.6	0.08
Line 3											
3-1	L End	9.15	0.04		51.7		0.0	51.74	HDU8	60.3	0.86
3-1	L End	9.15	0.04		51.7		0.0	51.74	Compression	157.6	0.33
3-1	R End	9.15	7.96		51.7		0.0	51.74	HDU8	60.3	0.86
3-1	R End	9.15	7.96		51.7		0.0	51.7	Compression	157.6	0.33
Line 4											
4-1	L End	15.25	4.64		12.8		0.0	12.85	HDU8	60.3	0.21
4-1	L End	15.25	4.64		12.8		0.0	12.8	Compression	157.6	0.08
4-1	R End	15.25	7.96		12.8		0.0	12.85	HDU8	60.3	0.21
4-1	R End	15.25	7.96		12.8		0.0	12.8	Compression	157.6	0.08
Line 5											
5-2	L End	18.30	4.74		13.6		0.0	13.62	HDU8	60.3	0.23
5-2	L End	18.30	4.74		13.6		0.0	13.6	Compression	157.6	0.09
5-2	R End	18.30	7.96		13.6		0.0	13.62	HDU8	60.3	0.23
5-2	R End	18.30	7.96		13.6		0.0	13.6	Compression	157.6	0.09
Line A											
A-1	L End	0.04	0.00		8.8		0.0	8.82	HDU8	60.3	0.15
A-1	L End	0.04	0.00		8.8		0.0	8.8	Compression	157.6	0.06
A-1	R End	18.26	0.00		8.8		0.0	8.82	HDU8	60.3	0.15
A-1	R End	18.26	0.00		8.8		0.0	8.8	Compression	157.6	0.06
Line B											
B-2	L End	6.14	8.00		4.9		0.0	4.95	HDU8	60.3	0.08
B-2	L End	6.14	8.00		4.9		0.0	4.95	Compression	157.6	0.03
B-2	R End	12.16	8.00		4.9		0.0	4.95	HDU8	60.3	0.08
B-2	R End	12.16	8.00		4.9		0.0	5.0	Compression	157.6	0.03
Line C											
C-1	L End	0.04	12.20		8.3		0.0	8.27	HDU8	60.3	0.14
C-1	L End	0.04	12.20		8.3		0.0	8.3	Compression	157.6	0.05
C-1	R End	18.26	12.20		8.3		0.0	8.27	HDU8	60.3	0.14
C-1	R End	18.26	12.20		8.3		0.0	8.3	Compression	157.6	0.05
Level 2					Tensile Hold-down or Compressive Stud Force [kN]				Hold-down	Cap [kN]	Crit Resp.
Line- Wall	Posit'n	Location [m]		Note	Shear	Dead	Uplift	Cmb'd			
Line 1											
1-2	L End	0.00	4.84		9.8		0.0	9.75	HDU8	60.3	0.16
1-2	L End	0.00	4.84		9.8		0.0	9.8	Compression	157.6	0.06
1-2	R End	0.00	7.96		9.8		0.0	9.75	HDU8	60.3	0.16
1-2	R End	0.00	7.96		9.8		0.0	9.8	Compression	157.6	0.06
Line 2											
2-1	L End	3.05	4.64		4.2		0.0	4.18	HDU8	60.3	0.07
2-1	L End	3.05	4.64		4.2		0.0	4.2	Compression	157.6	0.03
2-1	R End	3.05	7.96		4.2		0.0	4.18	HDU8	60.3	0.07
2-1	R End	3.05	7.96		4.2		0.0	4.2	Compression	157.6	0.03
Line 3											
3-1	L End	9.15	0.04		20.6		0.0	20.57	HDU8	60.3	0.34
3-1	L End	9.15	0.04		20.6		0.0	20.57	Compression	157.6	0.13
3-1	R End	9.15	7.96		20.6		0.0	20.57	HDU8	60.3	0.34
3-1	R End	9.15	7.96		20.6		0.0	20.6	Compression	157.6	0.13
Line 4											
4-1	L End	15.25	4.64		4.1		0.0	4.13	HDU8	60.3	0.07
4-1	L End	15.25	4.64		4.1		0.0	4.1	Compression	157.6	0.03
4-1	R End	15.25	7.96		4.1		0.0	4.13	HDU8	60.3	0.07
4-1	R End	15.25	7.96		4.1		0.0	4.1	Compression	157.6	0.03
Line 5											
5-2	L End	18.30	4.74		9.6		0.0	9.65	HDU8	60.3	0.16
5-2	L End	18.30	4.74		9.6		0.0	9.6	Compression	157.6	0.06
5-2	R End	18.30	7.96		9.6		0.0	9.65	HDU8	60.3	0.16
5-2	R End	18.30	7.96		9.6		0.0	9.6	Compression	157.6	0.06

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

Hold-Down and Compression Design (rigid wind design, continued)

Line A											
A-1	L End	0.04	0.00		3.9	0.0	3.89	HDU8	60.3	0.06	
A-1	L End	0.04	0.00		3.9	0.0	3.9	Compression	157.6	0.02	
A-1	R End	18.26	0.00		3.9	0.0	3.89	HDU8	60.3	0.06	
A-1	R End	18.26	0.00		3.9	0.0	3.9	Compression	157.6	0.02	
Line B											
B-2	L End	6.14	8.00		1.7	0.0	1.69	HDU8	60.3	0.03	
B-2	L End	6.14	8.00		1.7	0.0	1.7	Compression	157.6	0.01	
B-2	R End	12.16	8.00		1.7	0.0	1.69	HDU8	60.3	0.03	
B-2	R End	12.16	8.00		1.7	0.0	1.68	Compression	157.6	0.01	
Line C											
C-1	L End	0.04	12.20		3.7	0.0	3.66	HDU8	60.3	0.06	
C-1	L End	0.04	12.20		3.7	0.0	3.6	Compression	157.6	0.02	
C-1	R End	18.26	12.20		3.7	0.0	3.66	HDU8	60.3	0.06	
C-1	R End	18.26	12.20		3.7	0.0	3.6	Compression	157.6	0.02	
Level 3					Tensile Hold-down or Compressive Stud Force [kN]						
Line-Wall	Posit'n	Location [m]		Note	Shear	Dead	Uplift	Cmb'd	Hold-down	Cap [kN]	Crit Resp.
		X	Y								
Line 1											
1-2	L End	0.00	4.84	5	7.6		0.0	7.62	HDU8	60.3	0.13
1-2	L End	0.00	4.84	5	7.6		0.0	7.6	Compression	157.6	0.05
1-2	R End	0.00	7.96	5	7.6		0.0	7.62	HDU8	60.3	0.13
1-2	R End	0.00	7.96	5	7.6		0.0	7.6	Compression	157.6	0.05
Line 2											
2-1	L End	3.05	4.64		0.2		0.0	0.17	HDU8	60.3	0.00
2-1	L End	3.05	4.64		0.2		0.0	0.2	Compression	157.6	0.00
2-1	R End	3.05	7.96		0.2		0.0	0.17	HDU8	60.3	0.00
2-1	R End	3.05	7.96		0.2		0.0	0.2	Compression	157.6	0.00
Line 3											
3-1	L End	9.15	0.04		0.9		0.0	0.93	HDU8	60.3	0.02
3-1	L End	9.15	0.04		0.9		0.0	0.93	Compression	157.6	0.01
3-1	R End	9.15	7.96		0.9		0.0	0.93	HDU8	60.3	0.02
3-1	R End	9.15	7.96		0.9		0.0	0.9	Compression	157.6	0.01
Line 4											
4-1	L End	15.25	4.64		0.2		0.0	0.17	HDU8	60.3	0.00
4-1	L End	15.25	4.64		0.2		0.0	0.2	Compression	157.6	0.00
4-1	R End	15.25	7.96		0.2		0.0	0.17	HDU8	60.3	0.00
4-1	R End	15.25	7.96		0.2		0.0	0.2	Compression	157.6	0.00
Line 5											
5-2	L End	18.30	4.74	5	7.4		0.0	7.44	HDU8	60.3	0.12
5-2	L End	18.30	4.74	5	7.4		0.0	7.4	Compression	157.6	0.05
5-2	R End	18.30	7.96	5	7.4		0.0	7.44	HDU8	60.3	0.12
5-2	R End	18.30	7.96	5	7.4		0.0	7.4	Compression	157.6	0.05
Line A											
A-1	L End	0.04	0.00		0.9		0.0	0.90	HDU8	60.3	0.01
A-1	L End	0.04	0.00		0.9		0.0	0.9	Compression	157.6	0.01
A-1	R End	18.26	0.00		0.9		0.0	0.90	HDU8	60.3	0.01
A-1	R End	18.26	0.00		0.9		0.0	0.9	Compression	157.6	0.01
Line B											
B-2	L End	6.14	8.00		0.3		0.0	0.28	HDU8	60.3	0.00
B-2	L End	6.14	8.00		0.3		0.0	0.3	Compression	157.6	0.00
B-2	R End	12.16	8.00		0.3		0.0	0.28	HDU8	60.3	0.00
B-2	R End	12.16	8.00		0.3		0.0	0.28	Compression	157.6	0.00
Line C											
C-1	L End	0.04	12.20		0.8		0.0	0.82	HDU8	60.3	0.01
C-1	L End	0.04	12.20		0.8		0.0	0.8	Compression	157.6	0.01
C-1	R End	18.26	12.20		0.8		0.0	0.82	HDU8	60.3	0.01
C-1	R End	18.26	12.20		0.8		0.0	0.8	Compression	157.6	0.01

Legend:

Line-Wall:

At wall or opening - Shearline and wall number

At vertical element - Shearline

Posit'n - Stud that hold-down is attached to:

V Elem - Vertical element: column or strengthened studs required where not at wall end or opening

L or R End - At left or right wall end

L or R Op n - At left or right side of opening n

Location - Co-ordinates in Plan View

Note - Number(s) of note(s) below to apply

Tensile Hold-down or Compressive Stud Force: Upwards force on hold-down at one end of the wall or downward force on bottom plate under studs

at the other end, for each force direction. Includes forces transferred from upper levels.

Shear – Overturning component = $V \times h / L$; V = force on segment factored by 1.4; h = wall height + joist depth (O86 Fig. 11.7); L = wall segment length – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width). When anchorages used L = segment length – 300 mm (O86 11.6.4.1).

Dead - Dead load resisting component, factored by 0.9 when resisting overturning and 1.25 for compression

Uplift - Uplift wind load component, factored by 1.4

Cmb'd - Sum of factored overturning, dead and uplift forces

Hold-down - Device used from hold-down database or "Anchorage" if no hold-down required.

Cap - Allowable tension load

Crit. Resp. - Critical Response = Combined hold-down force / Allowable tension load

Notes:

Moment arm L used in hold-down force calculations is wall length minus the user-input hold-down offset at each end of wall. For anchorages, maximum moment arm is wall length minus 300 mm. Refer to O86 11.6.4.1.

HDU8-SDS2.5 for studs with thickness > 0.11 m and depth > 0.09 m : Uses 20 1/4" x 2 1/2" SDS heavy-duty screws; 7/8" anchor bolt.

Factored for load combination 4 from NBC Table 4.1.3.2A, without companion loads for maximum effect. Worst case of low-rise wind loads used.

Note 5. Hold-down placed at this location because $J_{hd} = 1$ needed to achieve successful design.

COLLECTOR FORCES (rigid wind design)

Level 1				Drag Strut Force [kN]		Strap/Blocking Force [kN]	
Line-Wall	Position on Wall or Opening	Location [m]					
		X	Y	--->	<---	--->	<---
Line 1							
1-2	Left Wall End	0.00	4.80	-1.6	1.6		
1-2	Right Wall End	0.00	8.00	1.4	-1.4		
Line 2							
2-1	Left Wall End	3.05	4.60	-3.7	3.7		
2-1	Right Wall End	3.05	8.00	3.4	-3.3		
Line 3							
3-1	Right Wall End	9.15	8.00	28.3	-28.3		
Line 4							
4-1	Left Wall End	15.25	4.60	-3.6	3.6		
4-1	Right Wall End	15.25	8.00	3.3	-3.3		
Line 5							
5-2	Left Wall End	18.30	4.70	-1.6	1.6		
5-2	Right Wall End	18.30	8.00	1.5	-1.5		
Line B							
B-1	Left Wall End	0.60	8.00	-0.2	0.2		
B-1	Right Wall End	5.50	8.00	-2.0	2.0		
B-2	Left Wall End	6.10	8.00	-2.2	2.2		
B-2	Right Wall End	12.20	8.00	2.2	-2.2		
B-3	Left Wall End	12.80	8.00	2.0	-2.0		
B-3	Right Wall End	17.70	8.00	0.2	-0.2		
Level 2				Drag Strut Force [kN]		Strap/Blocking Force [kN]	
Line-Wall	Position on Wall or Opening	Location [m]					
		X	Y	--->	<---	--->	<---
Line 1							
1-2	Left Wall End	0.00	4.80	-0.9	0.9		
1-2	Right Wall End	0.00	8.00	0.8	-0.8		
Line 2							
2-1	Left Wall End	3.05	4.60	-1.7	1.7		
2-1	Right Wall End	3.05	8.00	1.5	-1.5		
Line 3							
3-1	Right Wall End	9.15	8.00	17.8	-17.8		
Line 4							
4-1	Left Wall End	15.25	4.60	-1.6	1.7		
4-1	Right Wall End	15.25	8.00	1.5	-1.5		
Line 5							
5-2	Left Wall End	18.30	4.70	-0.9	0.9		
5-2	Right Wall End	18.30	8.00	0.8	-0.8		
Line B							
B-1	Left Wall End	0.60	8.00	-0.1	0.1		
B-1	Right Wall End	5.50	8.00	-0.8	0.8		
B-2	Left Wall End	6.10	8.00	-0.9	0.9		
B-2	Right Wall End	12.20	8.00	0.9	-0.9		
B-3	Left Wall End	12.80	8.00	0.8	-0.8		
B-3	Right Wall End	17.70	8.00	0.1	-0.1		
Level 3				Drag Strut Force [kN]		Strap/Blocking Force [kN]	
Line-Wall	Position on Wall or Opening	Location [m]					
		X	Y	--->	<---	--->	<---
Line 1							
1-2	Left Wall End	0.00	4.80	-3.4	3.4		
1-2	Right Wall End	0.00	8.00	3.0	-3.0		
Line 2							
2-1	Left Wall End	3.05	4.60	-0.1	0.1		
2-1	Right Wall End	3.05	8.00	0.1	-0.1		
Line 3							
3-1	Right Wall End	9.15	8.00	0.9	-0.9		
Line 4							
4-1	Left Wall End	15.25	4.60	-0.1	0.1		
4-1	Right Wall End	15.25	8.00	0.1	-0.1		
Line 5							
5-2	Left Wall End	18.30	4.70	-3.3	3.4		
5-2	Right Wall End	18.30	8.00	3.0	-3.0		
Line B							
B-1	Left Wall End	0.60	8.00	-0.0	0.0		
B-1	Right Wall End	5.50	8.00	-0.2	0.2		
B-2	Left Wall End	6.10	8.00	-0.2	0.2		

COLLECTOR FORCES (rigid wind design, continued)

B-2	Right Wall End	12.20	8.00	0.2	-0.2	
B-3	Left Wall End	12.80	8.00	0.2	-0.2	
B-3	Right Wall End	17.70	8.00	0.0	-0.0	

Legend:

Line-Wall - Shearline and wall number

Position... - Side of opening or wall end that drag strut is attached to

Location - Co-ordinates in Plan View

Drag Strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression. Based on factored shearline force.

----> Force in the west-to-east or south-to-north direction

<---- Force in the east-to-west or north-to-south direction

DEFLECTION (rigid wind design)

Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	vs N	Nail slip en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 1														
Line 1														
1-2	2	Both	Ext	0.67	3.20	2.75	21280	.01	.40	101	.03	.17	6.6	7.2
Line 2														
2-1	4	Both	1	0.00	3.40	2.75	21280	.02	-	-	-	-	6.2	7.7
		Both	2	1.54					.00	0	.00	.00		
Line 3														
3-1	4	Both	1	0.00	8.00	2.75	21280	.04	-	-	-	-	3.8	4.8
		Both	2	5.51					.00	0	.00	.00		
Line 4														
4-1	4	Both	1	0.00	3.40	2.75	21280	.02	-	-	-	-	6.2	7.7
		Both	2	1.52					.00	0	.00	.00		
Line 5														
5-2	2	Both	Ext	0.69	3.30	2.75	21280	.01	.41	104	.03	.18	6.4	7.0
Line A														
A-1	1	Both	Ext	0.87	18.30	2.75	21280	.00	.52	131	.04	.29	1.1	1.9
Line B														
B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.8
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.00	.00	0	.00	.00	3.1	3.8
		Both	2	0.57					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.8
		Both	2	0.00					-	-	-	-		
Line C														
C-1	1	Both	Ext	0.82	18.30	2.75	21280	.00	.49	123	.04	.26	1.1	1.8
Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	vs N	Nail slip en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 2														
Line 1														
1-2	2	Both	Ext	0.37	3.20	2.75	21280	.01	.22	56	.01	.05	6.3	6.6
Line 2														
2-1	4	Both	1	0.00	3.40	2.75	21280	.01	.00	0	.00	.00	5.5	6.9
		Both	2	0.70					.00	0	.00	.00		
Line 3														
3-1	4	Both	1	0.00	8.00	2.75	21280	.02	-	-	-	-	2.8	3.6
		Both	2	3.47					.00	0	.00	.00		
Line 4														
4-1	4	Both	1	0.00	3.40	2.75	21280	.01	.00	0	.00	.00	5.5	6.9
		Both	2	0.69					.00	0	.00	.00		
Line 5														
5-2	2	Both	Ext	0.38	3.30	2.75	21280	.01	.23	58	.01	.06	6.1	6.4
Line A														
A-1	1	Both	Ext	0.53	18.30	2.75	21280	.00	.32	80	.02	.11	1.0	1.4
Line B														
B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.7
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.00	-	-	-	-	2.9	3.7
		Both	2	0.25					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.7
		Both	2	0.00					-	-	-	-		
Line C														
C-1	1	Both	Ext	0.50	18.30	2.75	21280	.00	.30	76	.01	.10	1.0	1.4
Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	vs N	Nail slip en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 3														
Line 1														
1-2	5	Both	Ext	1.45	3.20	2.75	21280	.02	.41	217	.12	.81	0.7	1.9
Line 2														
2-1	4	Both	1	0.00	3.40	2.75	21280	.00	.00	0	.00	.00	5.2	6.5
		Both	2	0.03					.00	0	.00	.00		
Line 3														
3-1	4	Both	1	0.00	8.00	2.75	21280	.00	-	-	-	-	2.2	2.8
		Both	2	0.18					.00	0	.00	.00		
Line 4														
4-1	4	Both	1	0.00	3.40	2.75	21280	.00	.00	0	.00	.00	5.2	6.5

DEFLECTION (rigid wind design, continued)

Line 5	Both	2		0.03					.00	0	.00	.00		
5-2	6	Both	Ext	1.42	3.30	2.75	21280	.02	.46	212	.11	.77	0.6	1.9
Line A														
A-1	2	Both	Ext	0.17	18.30	2.75	21280	.00	.10	26	.00	.01	1.0	1.1
Line B														
B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.6
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.00	-	-	-	-	2.9	3.6
		Both	2	0.05					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.6
		Both	2	0.00					-	-	-	-		
Line C														
C-1	2	Both	Ext	0.16	18.30	2.75	21280	.00	.09	24	.00	.01	1.0	1.1

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B

W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall.

Dir – Force direction

Srf – Wall surface, interior or exterior for perimeter walls, 1 or 2 for interior partitions

v - SLS-factored shear force on wall segment = Design shear force / 1.4 wind factor x 0.75 SLS importance factor / 1.0 ULS importance factor

L - Width of wall segment between openings

H - Wall height

Defl - Horizontal shearwall deflection due to given term:

Bending = $2vHs^3 / 3EALs \times 10^6$; A - Cross sectional area of segment end stud(s); E - Stud mod. of elasticity from Framing Materials table

Shear = $1000 vHs / Bv$; Bv - Shear-through-thickness rigidity from Tables 9.1-9.3, value is in Sheathing Materials table

Nail slip = $2.5 Hs \times en$; en – From O86 A.11.7 = $(0.013 vs / d^2)^2$ wood, 0.76 v / vcap GWB

vs - shear force per nail along panel edge, d - nail diameter.

Hold - Restraint system (hold-down) = $da \times h / L$;

da - Vertical hold-down displacement; refer to Hold-down Displacement table for components.

L = Ls - (tension stud pack width + hold-down anchor bolt offset) - (1/2 compression stud pack width)

Total Defl – Deflection from bending + shear + nail slip + hold-down / unblocked factor Jus, as per O86 11.7.1.2,3

HOLD-DOWN DISPLACEMENT (rigid wind design)

Wall, segment	Dir	Hold- down	Tens. force kN	Vert. Manuf mm	Displacement Add mm	da mm	Slippage Vf kN	da mm	Shrink +Extra mm	Comp. force kN	Crush da mm	Total da mm	Horz Defl mm
Level 1													
Line 1													
1-2	Both	HDU8	13.61	1.2	.03	1.19	-	-	6.3	7.29	0.03	7.5	6.6
Line 2													
2-1	Both	HDU8	12.99	1.1	.03	1.13	-	-	6.3	6.96	0.03	7.4	6.2
Line 3													
3-1	Both	HDU8	51.74	4.4	.13	4.52	-	-	6.3	27.72	0.12	10.9	3.8
Line 4													
4-1	Both	HDU8	12.85	1.1	.03	1.12	-	-	6.3	6.88	0.03	7.4	6.2
Line 5													
5-2	Both	HDU8	13.62	1.2	.03	1.19	-	-	6.3	7.30	0.03	7.5	6.4
Line A													
A-1	Both	HDU8	8.82	.75	.02	0.77	-	-	6.3	4.72	0.02	7.1	1.1
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	4.95	.42	.01	0.43	-	-	6.3	2.65	0.01	6.7	3.1
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	8.27	.70	.02	0.72	-	-	6.3	4.43	0.02	7.0	1.1
Level 2													
Line 1													
1-2	Both	HDU8	9.75	.83	.02	0.85	-	-	6.3	5.22	0.02	7.2	6.3
Line 2													
2-1	Both	HDU8	4.18	.35	.01	0.36	-	-	6.3	2.24	0.01	6.7	5.5
Line 3													
3-1	Both	HDU8	20.57	1.7	.05	1.80	-	-	6.3	11.02	0.05	8.1	2.8
Line 4													
4-1	Both	HDU8	4.13	.35	.01	0.36	-	-	6.3	2.21	0.01	6.7	5.5
Line 5													
5-2	Both	HDU8	9.65	.82	.02	0.84	-	-	6.3	5.17	0.02	7.2	6.1
Line A													
A-1	Both	HDU8	3.89	.33	.01	0.34	-	-	6.3	2.09	0.01	6.6	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	1.69	.14	.00	0.15	-	-	6.3	0.90	0.00	6.4	2.9
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	3.66	.31	.01	0.32	-	-	6.3	1.96	0.01	6.6	1.0
Level 3													
Line 1													
1-2	Both	Anchor	-	(nu = 696 N)						-		0.8	0.7
Line 2													
2-1	Both	HDU8	0.17	.01	.00	0.01	-	-	6.3	0.09	0.00	6.3	5.2
Line 3													
3-1	Both	HDU8	0.93	.08	.00	0.08	-	-	6.3	0.50	0.00	6.4	2.2
Line 4													
4-1	Both	HDU8	0.17	.01	.00	0.01	-	-	6.3	0.09	0.00	6.3	5.2
Line 5													
5-2	Both	Anchor	-	(nu = 672 N)						-		0.7	0.6
Line A													
A-1	Both	HDU8	0.90	.08	.00	0.08	-	-	6.3	0.48	0.00	6.4	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	0.28	.02	.00	0.02	-	-	6.3	0.15	0.00	6.3	2.9
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	0.82	.07	.00	0.07	-	-	6.3	0.44	0.00	6.4	1.0

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B

Dir – Force direction

Tens., Comp. – Accumulated ULS hold-down tension force *T* and SLS compression force *C* from overturning, dead, and wind uplift loads.

Tens. – ULS-factored force, used for proportion of manufacturer's maximum elongation

Comp. – Factored for serviceability

da – Vertical displacements due to the following components:

Vert. Displacement - Vertical displacement of hold-down

Manuf – Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation

Unless marked with * = (ULS-factored tension force / hold-down capacity) x max displacement

* - Maximum displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.

Add – Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = $TL / (Ab \times Es)$

T – Serviceability-factored tension force (not shown)

Ab = bolt cross-sectional area

Es = steel modulus = 200 GPa

L = *Lb* – *Lh*

Lb = Total bolt length shown in Storey Information table

Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database

Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation

Nails = en from O86 A.11.7 = $(0.013 Pf / d^2)^2$, *d* = nail diameter

Shrink + Extra – Wood shrinkage plus extra displacement due to mis-cuts, gaps, etc.

Shrinkage = $0.002 \times (19\% \text{ fabrication} - 10\% \text{ in-service moisture contents}) \times Ls$

Ls = Length between anchor bolt fasteners subject to perp-to-grain shrinkage; see Storey Information table

Crush – Deformation of bottom plate at compression end of wall segment

= $0.5\text{mm} \times [r / 0.73, r < 0.73; (1 + (r - 0.73) / 0.27), 0.73 < r < 1; 2r^3, r > 1]$

$r = C / Qr$; $Qr = KD Ks Kz f_{cp} A$; *A* = cross sectional area of end studs

Total da – *Vert. Displacement* + *Slippage* + *Shrink* + *Crush* + *Extra*

Horz Defl – Restraint system term in deflection equation in O86 11.7.1.2 = $Hs/L \times da$

Hs = wall height; *L* = wall segment length *Ls* – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width)

Hs and *Ls* are shown in Deflection table

STOREY DRIFT (rigid wind design)

Level	Dir	Actual Storey Drift (mm)		Allowable Storey Drift		
		Max defl	Line	hs m	Drift mm	Ratio
1	N<->S	7.7	2	3.00	6.0	1.29
	E<->W	3.8	B		6.0	0.64
2	N<->S	6.9	2	3.00	6.0	1.15
	E<->W	3.7	B		6.0	0.61
3	N<->S	6.5	2	2.75	5.5	1.19
	E<->W	3.6	B		5.5	0.65

Legend:

Max defl – Largest deflection for any shearline on level in this direction; refer to Deflections table

Line – Shearline with largest deflection on level in this direction

hs – Storey height in 4.1.3.5.(3) = Height of walls plus joist depth between this level and the one above.

Drift = Allowable storey drift on this level from NBC 4.1.3.5.(3)

Ratio - Proportion of allowable storey drift experienced, on this level in this direction.

Notes:

***FAILURE** – Story drift on this level is greater than maximum allowed according to NBC 4.1.3.5.(3).

Out-of-plane Wind Design

COMPONENTS AND CLADDING by SHEARLINE

North-South Shearlines			Sheathing [kN/m^2]			Fastener Withdrawal [kN]					Service Condition Factor	
Line	Lev	Grp	Force	Cap	Force/Cap	Force		Cap	Force/Cap			
						End	Int		End	Int		
1	1	2	1.20	5.30	0.23	0.18	0.14	0.21	0.86	0.68	1.00	
	2	2	1.20	5.30	0.23	0.18	0.14	0.21	0.86	0.68	1.00	
	3	5	1.20	29.03	0.04	0.14	0.11	0.16	0.92	0.73	1.00	
5	2	2	1.20	5.30	0.23	0.18	0.14	0.21	0.86	0.68	1.00	
		1	2	1.20	5.30	0.23	0.18	0.14	0.21	0.86	0.68	1.00
		2	2	1.20	5.30	0.23	0.18	0.14	0.21	0.86	0.68	1.00
	3	6	1.20	20.66	0.06	0.14	0.11	0.17	0.84	0.66	1.00	
		2	1.20	5.30	0.23	0.18	0.14	0.21	0.86	0.68	1.00	
East-West Shearlines			Sheathing [kN/m^2]			Fastener Withdrawal [kN]					Service Condition Factor	
Line	Lev	Grp	Force	Cap	Force/Cap	Force		Cap	Force/Cap			
						End	Int		End	Int		
A	1	1	1.20	5.30	0.23	0.22	0.17	0.24	0.90	0.71	1.00	
	2	1	1.20	5.30	0.23	0.22	0.17	0.24	0.90	0.71	1.00	
	3	2	1.20	5.30	0.23	0.18	0.14	0.21	0.86	0.68	1.00	
C	1	1	1.20	5.30	0.23	0.22	0.17	0.24	0.90	0.71	1.00	
	2	1	1.20	5.30	0.23	0.22	0.17	0.24	0.90	0.71	1.00	
	3	2	1.20	5.30	0.23	0.18	0.14	0.21	0.86	0.68	1.00	

Legend:

Grp - Wall Design Group (results for all design groups for rigid, flexible design listed for each wall)

Sheathing:

Force - Factored C&C end zone pressure using the worst-case combination of negative (suction) and positive exterior and interior coefficients from NBC 4.1.7.5.(4) and 4.1.7.7.

Cap - Out-of-plane bending and shear capacity of exterior sheathing, using mp and vpsb strengths from O86 Tables 9.1-9.3. Assumes continuous over 3 spans, except for vertical panels and 24" stud spacing (2 spans).

Fastener Withdrawal:

Force - Factored force tributary to each nail in end zone and interior zone, using exterior suction pressure.

Cap - Factored withdrawal capacity of individual nail according to O86 12.9.4.

Flexible Diaphragm Seismic Design

SEISMIC INFORMATION

Level	Mass [kN]	Storey Shear [kN]		Shear Capacity [kN]		Over-capacity		Length of SFRS [m]	
		E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S
3	318.15	10.88	10.97	306.37	306.10	28.16	27.92	18.3	8.0
2	446.52	21.35	21.52	306.37	314.15	14.35	14.60	18.3	8.0
1	446.52	26.59	26.80	306.37	315.87	11.52	11.79	18.3	8.0
All	1211.19	-	-	-	-	1.25	1.24	-	-

Storey shear - Sum of factored, vertically accumulated shearline forces on level, including torsional effects.

Total unfactored base shear - 23.75 kN

IRREGULARITIES (NBC Table 4.1.8.6)

$leFaSa(0.2) = 0.129$

Only those provisions for height less than 20 m are considered.

No.	Irregularity Type	NBC 4.1.8... Commentary	Irregular for...		Fails for...		Notes
			Levels	Dir/Ln	Levels	Dir/Ln	
1	Vertical Stiffness	7 (1) (c) ; 10 (2) (a) J-118, 150	3, 2	Both	None	None	a
2	Weight (mass)	7 (1) (c) J-118	None	None	None	None	-
3	Vertical Geometric	7 (1) (c) ; 10 (2) (a) J-118, 150	None	None	None	None	-
4	In-Plane Disc. (offset)	7 (1) (c) ; 10 (2) (a) 15 (5), J-118, 150, 208	None	None	None	None	-
4	In-Plane Disc. (stiffness)	7 (1) (c) ; 10 (2) (a) J-118, 150	3, 2	1, 5	None	None	a
5	Out-of-Plane Offsets	7 (1) (c) ; 10 (2) (a) 15 (5), J-118, 150, 208	None	None	None	None	-
6	Weak Storey	7 (1) (c) ; 10 (1), (2) (b) J-118, 150	None	None	None	None	-
7	Torsional Sensitivity	7 (1) ; 10 (2) (a) 11 (10) ; 11 (11) (b) J-120, 150, 173-5	n/a	n/a	n/a	n/a	b
8	Non-orthogonal	7 (1) (c) J-120	n/a	n/a	n/a	n/a	c
9	Gravity-Induced	7 (1) ; 10 (2), (5-7) J-150	n/a	n/a	n/a	n/a	d

Notes:

a) Irregularity has no effect since $leFaSa(0.2) < 0.35$, as per NBC 4.1.8.7.(1)(a), 4.1.8.6.(3) and Commentary J-122.

b) This irregularity not applicable to flexible diaphragm design.

c) Not applicable, as all buildings modelled by Shearwalls are orthogonal.

d) Not applicable to structures using wood shear walls.

Irregularities:

1. Vertical Stiffness: Stiffness in a storey is less than 70% of the stiffness in an adjacent storey, or 80% of that of 3 storeys above or below. Table shows the storey followed by stiffer level(s), e.g. 4,5 or 4,1-3.

2. Weight (mass): Weight of any storey is more than 150% of weight of adjacent storey. Weight of storey is effective mass used for vertical seismic mass distribution. Table shows the heavy storey followed by light storey, e.g. 4,3.

3. Vertical Geometric: Horizontal dimension of SFRS in any storey more than 130% of that in adjacent storey. Shearwalls checks using the nearest and farthest points from all walls in a storey for each direction. It shows the storey with the long SRFS in the table, and the affected direction(s).

4. In-Plane Discontinuity in Vertical Element (offset): In plane offset of a lateral force-resisting element in the storey below. Shearwalls detects whenever the ends wall segments on adjacent storeys do not line up to within 3". It shows both upper and lower storey in table, e.g. 4,3, and shearlines affected.

4. In-Plane Discontinuity in Vertical Element (stiffness): Reduction in the lateral stiffness of the resisting element in the storey below. Shearwalls uses a linearized approximation of the deflection equation from O86 11.7.1.2 to determine constant shearwall stiffnesses, then compares the stiffness of collinear shearwall segments on adjacent storeys. It shows both upper and lower storey in table, e.g. 4,3, and shearlines affected.

5. Out-of-Plane Offsets: Discontinuities in the lateral force path. Shearwalls detects wherever shearwalls do not exist on a shearline for particular level, and the program has transferred the force from the shearline on the floor above directly into the diaphragm. It shows the storey without shear-resisting elements in the table, and the directions(s) affected.

6. Discontinuity in Capacity - Weak Storey: The storey shear strength is less than the storey above for the direction under consideration. Shearwalls determines the total capacity of all shearwalls for each direction on each level, and reports weaker lower levels in the table.

7. Torsional Sensitivity: Ratio B of maximum to average storey displacements is greater than 1.7. Applies only to rigid diaphragm design results. Shearwalls calculates shearline forces and deflections in the extreme shearlines for both positive and negative accidental eccentricity, and for each case computes $B_x = \text{largest deflection} / \text{average of the two}$. Table shows any storey and force direction for which B_x is greater than 1.7.

8. Non-orthogonal: Occurs when shearlines are not oriented at right angles (skewed shearwalls). Shearwalls does not currently allow input of skewed shearwalls, so this irregularity does not apply.

9. Gravity-Induced Lateral Demand: Any such demands in a typical wood-frame structure, such as from cantilevered floors, affect the overturning force on hold-downs; however these are not the predominant yielding mechanism so this irregularity does not apply.

SHEAR RESULTS (flexible seismic design)

North-south Shearlines	W Gp	For Dir	Shear Force		Capacities [kN/m]						Ratio Fv/V
			FHS [m]	Fv/L [kN/m]	Vhd (vd) / L		Jhd	Vrs (vpb) / L		Vrs/L	
Line 1											
Level 3											
Ln1, Lev3	-	Both	3.20	0.08	-	-	-	-	-	-	0.12
Wall 1-2	5	Both	3.20	0.32	-	5.55	0.46	-	77.68	2.55	0.12
Level 2											
Ln1, Lev2	-	Both	3.20	0.16	-	-	-	-	-	-	0.17W
Wall 1-2	2	Both	3.20	0.62	-	4.03	0.93	-	5.36	3.76	0.17W
Level 1											
Ln1, Lev1	-	Both	3.20	0.20	-	-	-	-	-	-	0.19W
Wall 1-2	2	Both	3.20	0.78	-	4.03	1.00	-	5.36	4.03	0.19W
Line 2											
Level 3											
Ln2, Lev3	-	Both	3.40	0.23	-	-	-	-	-	-	0.04W#
Wall 2-1	4	Both	3.40	0.84	0.00	19.57	1.00	-	77.68	19.57	0.04W#
Level 2											
Ln2, Lev2	-	Both	3.40	0.46	-	-	-	-	-	-	0.08W#
Wall 2-1	4	Both	3.40	1.64	0.00	19.57	1.00	-	77.68	19.57	0.08W#
Level 1											
Ln2, Lev1	-	Both	3.40	0.57	-	-	-	-	-	-	0.10W#
Wall 2-1	4	Both	3.40	2.05	0.00	19.57	1.00	-	77.68	19.57	0.10W#
Line 3											
Level 3											
Ln3, Lev3	-	Both	8.00	0.27	-	-	-	-	-	-	0.02W#
Wall 3-1	4	Both	8.00	0.40	0.00	19.57	1.00	-	77.68	19.57	0.02W#
Level 2											
Ln3, Lev2	-	Both	8.00	0.52	-	-	-	-	-	-	0.04W#
Wall 3-1	4	Both	8.00	0.79	0.00	19.57	1.00	-	77.68	19.57	0.04W#
Level 1											
Ln3, Lev1	-	Both	8.00	0.65	-	-	-	-	-	-	0.05W#
Wall 3-1	4	Both	8.00	0.99	0.00	19.57	1.00	-	77.68	19.57	0.05W#
Line 4											
Level 3											
Ln4, Lev3	-	Both	3.40	0.23	-	-	-	-	-	-	0.04W#
Wall 4-1	4	Both	3.40	0.84	0.00	19.57	1.00	-	77.68	19.57	0.04W#
Level 2											
Ln4, Lev2	-	Both	3.40	0.46	-	-	-	-	-	-	0.08W#
Wall 4-1	4	Both	3.40	1.64	0.00	19.57	1.00	-	77.68	19.57	0.08W#
Level 1											
Ln4, Lev1	-	Both	3.40	0.57	-	-	-	-	-	-	0.10W#
Wall 4-1	4	Both	3.40	2.05	0.00	19.57	1.00	-	77.68	19.57	0.10W#
Line 5											
Level 3											
Ln5, Lev3	-	Both	3.30	0.08	-	-	-	-	-	-	0.12
Wall 5-2	6	Both	3.30	0.31	-	5.35	0.47	-	39.33	2.51	0.12
Level 2											
Ln5, Lev2	-	Both	3.30	0.16	-	-	-	-	-	-	0.16W
Wall 5-2	2	Both	3.30	0.61	-	4.03	0.94	-	5.36	3.77	0.16W
Level 1											
Ln5, Lev1	-	Both	3.30	0.20	-	-	-	-	-	-	0.19W
Wall 5-2	2	Both	3.30	0.75	-	4.03	1.00	-	5.36	4.03	0.19W
East-west Shearlines	W Gp	For Dir	Shear Force		Capacities [kN/m]						Ratio Fv/V
			FHS [m]	Fv/L [kN/m]	Vhd (vd) / L		Jhd	Vrs (vpb) / L		Vrs/L	
Line A											
Level 3											
LnA, Lev3	2	Both	18.30	0.21	-	4.03	1.00	-	5.36	4.03	0.05W
Level 2											
LnA, Lev2	1	Both	18.30	0.40	-	4.03	1.00	-	5.36	4.03	0.10W
Level 1											
LnA, Lev1	1	Both	18.30	0.50	-	4.03	1.00	-	5.36	4.03	0.12W
Line B											
Level 3											
LnB, Lev3	-	Both	15.90	0.28	-	-	-	-	-	-	-
Wall B-1	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#
Wall B-2	4	Both	6.10	0.84	0.00	19.57	1.00	-	77.68	19.57	0.04W#
Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

SHEAR RESULTS (flexible seismic design, continued)

Level 2											
LnB, Lev2	-	Both	15.90	0.55	-	-	-	-	-	-	-
Wall B-1	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#
Wall B-2	4	Both	6.10	1.65	0.00	19.57	1.00	-	77.68	19.57	0.08W#
Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#
Level 1											
LnB, Lev1	-	Both	15.90	0.69	-	-	-	-	-	-	-
Wall B-1	3^	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#
Wall B-2	4	Both	6.10	2.06	0.00	19.57	1.00	-	77.68	19.57	0.11W#
Wall B-3	3^	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#
Line C											
Level 3											
LnC, Lev3	2	Both	18.30	0.11	-	4.03	1.00	-	5.36	4.03	0.03W
Level 2											
LnC, Lev2	1	Both	18.30	0.21	-	4.03	1.00	-	5.36	4.03	0.05W
Level 1											
LnC, Lev1	1	Both	18.30	0.26	-	4.03	1.00	-	5.36	4.03	0.07W

Legend:

Results can have different meaning for shearlines, walls, and wall segments. Results for walls with no openings are the same as those for segments.
W Gp - Wall design group as listed in Sheathing and Framing Materials tables. "^" means that this wall is critical for all walls in the Standard Wall group.

Dir - Direction of seismic shear force along shearline. "Both" appears if results are identical for both directions.

FHS - Length of full height sheathing along shearline, wall, or segment

Fv/L - For shearlines = diaphragm shear force = factored shearline force divided by length of shearline; for wall segments = design shear force = factored shear force divided by length of full height sheathing.

Vhd(vd)/L - Factored unit sheathing connection resistance = Vrs from O86 11.6.2 without Jhd

For wood panels (11.6.2.2(a)) = $0.80 \times vd \times JD \times Jus \times Js$; vd = Nu (from 12.9.3) / nail spacing

JD - diaphragm and shearwall factor (12.9.3.1) = 1.3; Js - fastener spacing factor (11.5.1)

Jus - unblocked factor (11.5.4), shown in the Sheathing Materials table.

For gypsum wallboard (11.6.2.3) = $0.70 \times vd$; vd from Table 11.4

Jhd - Hold-down effect factor from 11.5.5

Vrs(vpb)/L - Factored unit panel buckling resistance (11.6.2.2(b)) = $0.80 \times vpb \times KD \times KS \times KT$.

KD - load-duration factor (5.3.2.1) = 1.15; KS - service-condition factor (9.4.2); KT - treatment factor = 1.0

Vrs/L - Factored unit shear resistance of wall segment = $\min(Vhd(vd)/L \times Jhd, Vrs(vpb)/L)$.

Refer to Detailed Shear Wall design output for strengths, factors and other intermediate values for Vrs, Vhd and Jhd.

"W" indicates that the wind design criterion was critical in selecting wall.

Notes:

According to O86 11.3.3.1 Note (1), there should be a balanced spatial distribution of gypsum wallboard and wood-based panels on every level in each direction.

#WARNING - The following walls fail because panel buckling from O86 11.6.2.2.(b) or a non-ductile nail strength mode from 12.9.3.2 governs for shear resistance Vrs, as per 11.8.1. Refer to the Detailed Shearwall Design output for these walls.

Level 1: B-1, B-2, B-3, 2-1, 3-1, 4-1

Level 2: B-1, B-2, B-3, 2-1, 3-1, 4-1

Level 3: B-1, B-2, B-3, 2-1, 3-1, 4-1

WARNING – Over-capacity ratio from O86 11.8.3.2 exceeded. See Seismic Information table for more details.

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

Hold-Down and Compression Design (flexible seismic design)

Level 1					Tensile Hold-down or Compressive Stud Force [kN]				Hold-down	Cap [kN]	Crit Resp.
Line- Wall	Posit'n	Location [m]		Note	Shear	Dead	Jx	Cmb'd			
Line 1							1.0				
1-2	L End	0.00	4.84		5.3			5.28	HDU8	60.3	0.09
1-2	L End	0.00	4.84		5.3			5.28	Compression	157.6	0.03
1-2	R End	0.00	7.96		5.3			5.28	HDU8	60.3	0.09
1-2	R End	0.00	7.96		5.3			5.28	Compression	157.6	0.03
Line 2							1.0				
2-1	L End	3.05	4.64		13.7			13.69	HDU8	60.3	0.23
2-1	L End	3.05	4.64		13.7			13.69	Compression	157.6	0.09
2-1	R End	3.05	7.96		13.7			13.69	HDU8	60.3	0.23
2-1	R End	3.05	7.96		13.7			13.69	Compression	157.6	0.09
Line 3							1.0				
3-1	L End	9.15	0.04		6.5			6.54	HDU8	60.3	0.11
3-1	L End	9.15	0.04		6.5			6.53	Compression	157.6	0.04
3-1	R End	9.15	7.96		6.5			6.54	HDU8	60.3	0.11
3-1	R End	9.15	7.96		6.5			6.53	Compression	157.6	0.04
Line 4							1.0				
4-1	L End	15.25	4.64		13.7			13.69	HDU8	60.3	0.23
4-1	L End	15.25	4.64		13.7			13.69	Compression	157.6	0.09
4-1	R End	15.25	7.96		13.7			13.69	HDU8	60.3	0.23
4-1	R End	15.25	7.96		13.7			13.69	Compression	157.6	0.09
Line 5							1.0				
5-2	L End	18.30	4.74		5.1			5.11	HDU8	60.3	0.08
5-2	L End	18.30	4.74		5.1			5.11	Compression	157.6	0.03
5-2	R End	18.30	7.96		5.1			5.11	HDU8	60.3	0.08
5-2	R End	18.30	7.96		5.1			5.11	Compression	157.6	0.03
Line A							1.0				
A-1	L End	0.04	0.00		3.3			3.30	HDU8	60.3	0.05
A-1	L End	0.04	0.00		3.3			3.30	Compression	157.6	0.02
A-1	R End	18.26	0.00		3.3			3.30	HDU8	60.3	0.05
A-1	R End	18.26	0.00		3.3			3.30	Compression	157.6	0.02
Line B							1.0				
B-2	L End	6.14	8.00		13.6			13.63	HDU8	60.3	0.23
B-2	L End	6.14	8.00		13.6			13.6	Compression	157.6	0.09
B-2	R End	12.16	8.00		13.6			13.63	HDU8	60.3	0.23
B-2	R End	12.16	8.00		13.6			13.6	Compression	157.6	0.09
Line C							1.0				
C-1	L End	0.04	12.20		1.7			1.73	HDU8	60.3	0.03
C-1	L End	0.04	12.20		1.7			1.73	Compression	157.6	0.01
C-1	R End	18.26	12.20		1.7			1.73	HDU8	60.3	0.03
C-1	R End	18.26	12.20		1.7			1.73	Compression	157.6	0.01
Level 2					Tensile Hold-down or Compressive Stud Force [kN]				Hold-down	Cap [kN]	Crit Resp.
Line- Wall	Posit'n	Location [m]		Note	Shear	Dead	Jx	Cmb'd			
Line 1							1.0				
1-2	L End	0.00	4.84		2.9			2.89	HDU8	60.3	0.05
1-2	L End	0.00	4.84		2.9			2.89	Compression	157.6	0.02
1-2	R End	0.00	7.96		2.9			2.89	HDU8	60.3	0.05
1-2	R End	0.00	7.96		2.9			2.89	Compression	157.6	0.02
Line 2							1.0				
2-1	L End	3.05	4.64		7.4			7.40	HDU8	60.3	0.12
2-1	L End	3.05	4.64		7.4			7.40	Compression	157.6	0.05
2-1	R End	3.05	7.96		7.4			7.40	HDU8	60.3	0.12
2-1	R End	3.05	7.96		7.4			7.40	Compression	157.6	0.05
Line 3							1.0				
3-1	L End	9.15	0.04		3.5			3.53	HDU8	60.3	0.06
3-1	L End	9.15	0.04		3.5			3.53	Compression	157.6	0.02
3-1	R End	9.15	7.96		3.5			3.53	HDU8	60.3	0.06
3-1	R End	9.15	7.96		3.5			3.53	Compression	157.6	0.02
Line 4							1.0				
4-1	L End	15.25	4.64		7.4			7.40	HDU8	60.3	0.12
4-1	L End	15.25	4.64		7.4			7.40	Compression	157.6	0.05
4-1	R End	15.25	7.96		7.4			7.40	HDU8	60.3	0.12
4-1	R End	15.25	7.96		7.4			7.40	Compression	157.6	0.05
Line 5							1.0				
5-2	L End	18.30	4.74		2.8			2.79	HDU8	60.3	0.05
5-2	L End	18.30	4.74		2.8			2.79	Compression	157.6	0.02
5-2	R End	18.30	7.96		2.8			2.79	HDU8	60.3	0.05
5-2	R End	18.30	7.96		2.8			2.79	Compression	157.6	0.02

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

Hold-Down and Compression Design (flexible seismic design, continued)

Line A					1.0					
A-1	L End	0.04	0.00		1.8	1.79	HDU8	60.3	0.03	
A-1	L End	0.04	0.00		1.8	1.79	Compression	157.6	0.01	
A-1	R End	18.26	0.00		1.8	1.79	HDU8	60.3	0.03	
A-1	R End	18.26	0.00		1.8	1.79	Compression	157.6	0.01	
Line B					1.0					
B-2	L End	6.14	8.00		7.4	7.37	HDU8	60.3	0.12	
B-2	L End	6.14	8.00		7.4	7.37	Compression	157.6	0.05	
B-2	R End	12.16	8.00		7.4	7.37	HDU8	60.3	0.12	
B-2	R End	12.16	8.00		7.4	7.4	Compression	157.6	0.05	
Line C					1.0					
C-1	L End	0.04	12.20		0.9	0.94	HDU8	60.3	0.02	
C-1	L End	0.04	12.20		0.9	0.94	Compression	157.6	0.01	
C-1	R End	18.26	12.20		0.9	0.94	HDU8	60.3	0.02	
C-1	R End	18.26	12.20		0.9	0.94	Compression	157.6	0.01	
Level 3					Tensile Hold-down or Compressive Stud Force [kN]			Cap	Crit	
Line-Wall	Posit'n	Location [m]		Note	Shear	Dead	Jx	Cmb'd	Hold-down	Resp.
		X	Y						[kN]	
Line 1					1.0					
1-2	L End	0.00	4.84		1.0	0.97	Anchorage			
1-2	L End	0.00	4.84		1.0	0.96	Compression	157.6	0.01	
1-2	R End	0.00	7.96		1.0	0.97	Anchorage			
1-2	R End	0.00	7.96		1.0	0.96	Compression	157.6	0.01	
Line 2					1.0					
2-1	L End	3.05	4.64		2.4	2.35	HDU8	60.3	0.04	
2-1	L End	3.05	4.64		2.4	2.35	Compression	157.6	0.01	
2-1	R End	3.05	7.96		2.4	2.35	HDU8	60.3	0.04	
2-1	R End	3.05	7.96		2.4	2.35	Compression	157.6	0.01	
Line 3					1.0					
3-1	L End	9.15	0.04		1.1	1.12	HDU8	60.3	0.02	
3-1	L End	9.15	0.04		1.1	1.12	Compression	157.6	0.01	
3-1	R End	9.15	7.96		1.1	1.12	HDU8	60.3	0.02	
3-1	R End	9.15	7.96		1.1	1.12	Compression	157.6	0.01	
Line 4					1.0					
4-1	L End	15.25	4.64		2.4	2.35	HDU8	60.3	0.04	
4-1	L End	15.25	4.64		2.4	2.35	Compression	157.6	0.01	
4-1	R End	15.25	7.96		2.4	2.35	HDU8	60.3	0.04	
4-1	R End	15.25	7.96		2.4	2.35	Compression	157.6	0.01	
Line 5					1.0					
5-2	L End	18.30	4.74		0.9	0.93	Anchorage			
5-2	L End	18.30	4.74		0.9	0.93	Compression	157.6	0.01	
5-2	R End	18.30	7.96		0.9	0.93	Anchorage			
5-2	R End	18.30	7.96		0.9	0.93	Compression	157.6	0.01	
Line A					1.0					
A-1	L End	0.04	0.00		0.6	0.57	HDU8	60.3	0.01	
A-1	L End	0.04	0.00		0.6	0.57	Compression	157.6	0.00	
A-1	R End	18.26	0.00		0.6	0.57	HDU8	60.3	0.01	
A-1	R End	18.26	0.00		0.6	0.57	Compression	157.6	0.00	
Line B					1.0					
B-2	L End	6.14	8.00		2.3	2.34	HDU8	60.3	0.04	
B-2	L End	6.14	8.00		2.3	2.34	Compression	157.6	0.01	
B-2	R End	12.16	8.00		2.3	2.34	HDU8	60.3	0.04	
B-2	R End	12.16	8.00		2.3	2.3	Compression	157.6	0.01	
Line C					1.0					
C-1	L End	0.04	12.20		0.3	0.30	HDU8	60.3	0.00	
C-1	L End	0.04	12.20		0.3	0.30	Compression	157.6	0.00	
C-1	R End	18.26	12.20		0.3	0.30	HDU8	60.3	0.00	
C-1	R End	18.26	12.20		0.3	0.30	Compression	157.6	0.00	

Legend:

Line-Wall:

At wall or opening – Shearline and wall number

At vertical element - Shearline

Posit'n - Stud that hold-down is attached to:

V Elem - Vertical element column or strengthened studs required where not at wall end or opening

L or R End - At left or right wall end

L or R Op n - At left or right side of opening n

Location - Co-ordinates in Plan View

Note - Number(s) of note(s) below to apply

Tensile Hold-down or Compressive Stud Force: Upwards force on hold-down at one end of the wall or downward force on bottom plate under studs

at the other end, for each force direction. Includes forces transferred from upper levels.

Shear – Overturning component = $V \times h / L$; V = force on segment J_x – Overturning moment reduction factor from NBC 4.1.8.11.(8), applied to shear component; h = wall height + joist depth (O86 Fig. 11.7); L = wall segment length – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width). When anchorages used L = segment length – 300 mm (O86 11.6.4.1).

Dead - Dead load resisting component

Cmb'd - Sum of factored overturning and forces

Hold-down – Device used from hold-down database or "Anchorage" if no hold-down required.

Cap – allowable tension load

Crit. Resp. – Critical Response = Combined hold-down force / Allowable tension load

Notes:

Moment arm L used in hold-down force calculations is wall length minus the user-input hold-down offset at each end of wall. For anchorages, maximum moment arm is wall length minus 300 mm. Refer to O86 11.6.4.1.

HDU8-SDS2.5 for studs with thickness > 0.11 m and depth > 0.09 m : Uses 20 1/4" x 2 1/2" SDS heavy-duty screws; 7/8" anchor bolt.

Unfactored as per load combination 5 from NBC Table 4.1.3.2.A and without companion loads for maximum effect.

COLLECTOR FORCES (flexible seismic design)

Level 1		Position on Wall or Opening	Location [m]		Notes	Drag Strut Force [kN]	
Line- Wall			X	Y		--->	<---
Line 1							
1-2	Left Wall End		0.00	4.80		-1.2	1.2
1-2	Right Wall End		0.00	8.00		1.0	-1.0
Line 2							
2-1	Left Wall End		3.05	4.60		-3.1	3.1
2-1	Right Wall End		3.05	8.00		2.9	-2.9
Line 3							
3-1	Right Wall End		9.15	8.00		3.3	-3.3
Line 4							
4-1	Left Wall End		15.25	4.60		-3.1	3.1
4-1	Right Wall End		15.25	8.00		2.9	-2.9
Line 5							
5-2	Left Wall End		18.30	4.70		-1.1	1.2
5-2	Right Wall End		18.30	8.00		1.0	-1.0
Line B							
B-1	Left Wall End		0.60	8.00		-0.5	0.5
B-1	Right Wall End		5.50	8.00		-4.5	4.5
B-2	Left Wall End		6.10	8.00		-5.0	5.0
B-2	Right Wall End		12.20	8.00		5.0	-5.0
B-3	Left Wall End		12.80	8.00		4.5	-4.5
B-3	Right Wall End		17.70	8.00		0.5	-0.5
Level 2		Position on Wall or Opening	Location [m]		Notes	Drag Strut Force [kN]	
Line- Wall			X	Y		--->	<---
Line 1							
1-2	Left Wall End		0.00	4.80		-0.9	0.9
1-2	Right Wall End		0.00	8.00		0.8	-0.8
Line 2							
2-1	Left Wall End		3.05	4.60		-2.5	2.5
2-1	Right Wall End		3.05	8.00		2.3	-2.3
Line 3							
3-1	Right Wall End		9.15	8.00		2.6	-2.6
Line 4							
4-1	Left Wall End		15.25	4.60		-2.5	2.5
4-1	Right Wall End		15.25	8.00		2.3	-2.3
Line 5							
5-2	Left Wall End		18.30	4.70		-0.9	0.9
5-2	Right Wall End		18.30	8.00		0.8	-0.8
Line B							
B-1	Left Wall End		0.60	8.00		-0.4	0.4
B-1	Right Wall End		5.50	8.00		-3.6	3.6
B-2	Left Wall End		6.10	8.00		-4.0	4.0
B-2	Right Wall End		12.20	8.00		4.0	-4.0
B-3	Left Wall End		12.80	8.00		3.6	-3.6
B-3	Right Wall End		17.70	8.00		0.4	-0.4
Level 3		Position on Wall or Opening	Location [m]		Notes	Drag Strut Force [kN]	
Line- Wall			X	Y		--->	<---
Line 1							
1-2	Left Wall End		0.00	4.80		-0.5	0.5
1-2	Right Wall End		0.00	8.00		0.4	-0.4
Line 2							
2-1	Left Wall End		3.05	4.60		-1.3	1.3
2-1	Right Wall End		3.05	8.00		1.2	-1.2
Line 3							
3-1	Right Wall End		9.15	8.00		1.3	-1.3
Line 4							
4-1	Left Wall End		15.25	4.60		-1.3	1.3
4-1	Right Wall End		15.25	8.00		1.2	-1.2
Line 5							
5-2	Left Wall End		18.30	4.70		-0.5	0.5
5-2	Right Wall End		18.30	8.00		0.4	-0.4
Line B							
B-1	Left Wall End		0.60	8.00		-0.2	0.2
B-1	Right Wall End		5.50	8.00		-1.8	1.9
B-2	Left Wall End		6.10	8.00		-2.0	2.1

COLLECTOR FORCES (flexible seismic design, continued)

B-2	Right Wall End	12.20	8.00	2.1	-2.0
B-3	Left Wall End	12.80	8.00	1.9	-1.8
B-3	Right Wall End	17.70	8.00	0.2	-0.2

Legend:

Line-Wall - Shearline and wall number

Position... - Side of opening or wall end that drag strut is attached to

Location - Co-ordinates in Plan View

Drag Strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression. Based on shearline force unless otherwise noted below. Increased by 20% as per O86 11.8.6.

----> Force in the west-to-east or south-to-north direction

<---- Force in the east-to-west or north-to-south direction

DEFLECTION (flexible seismic design)

Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	vs N	Nail slip en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 1														
Line 1 1-2	2	Both	Ext	0.78	3.20	2.75	21280	.01	.46	117	.03	.23	6.0	6.7
Line 2 2-1	4	Both	1	0.00	3.40	2.75	21280	.03	-	-	-	-	6.2	7.8
		Both	2	2.05					.00	0	.00	.00		
Line 3 3-1	4	Both	1	0.00	8.00	2.75	21280	.01	-	-	-	-	2.4	3.0
		Both	2	0.99					.00	0	.00	.00		
Line 4 4-1	4	Both	1	0.00	3.40	2.75	21280	.03	-	-	-	-	6.2	7.8
		Both	2	2.05					.00	0	.00	.00		
Line 5 5-2	2	Both	Ext	0.75	3.30	2.75	21280	.01	.45	113	.03	.22	5.8	6.4
Line A A-1	1	Both	Ext	0.50	18.30	2.75	21280	.00	.30	75	.01	.10	1.0	1.4
Line B B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	4.3
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.02	-	-	-	-	3.4	4.3
		Both	2	2.06					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	4.3
		Both	2	0.00					-	-	-	-		
Line C C-1	1	Both	Ext	0.26	18.30	2.75	21280	.00	.16	40	.00	.03	1.0	1.2
Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	vs N	Nail slip en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 2														
Line 1 1-2	2	Both	Ext	0.62	3.20	2.75	21280	.01	.37	94	.02	.15	5.8	6.3
Line 2 2-1	4	Both	1	0.00	3.40	2.75	21280	.03	-	-	-	-	5.8	7.2
		Both	2	1.64					.00	0	.00	.00		
Line 3 3-1	4	Both	1	0.00	8.00	2.75	21280	.01	.00	0	.00	.00	2.3	2.9
		Both	2	0.79					.00	0	.00	.00		
Line 4 4-1	4	Both	1	0.00	3.40	2.75	21280	.03	-	-	-	-	5.8	7.2
		Both	2	1.64					.00	0	.00	.00		
Line 5 5-2	2	Both	Ext	0.61	3.30	2.75	21280	.01	.36	91	.02	.14	5.6	6.1
Line A A-1	1	Both	Ext	0.40	18.30	2.75	21280	.00	.24	61	.01	.06	1.0	1.3
Line B B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	4.0
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.01	-	-	-	-	3.2	4.0
		Both	2	1.65					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	4.0
		Both	2	0.00					-	-	-	-		
Line C C-1	1	Both	Ext	0.21	18.30	2.75	21280	.00	.13	32	.00	.02	1.0	1.1
Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	vs N	Nail slip en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 3														
Line 1 1-2	5	Both	Ext	0.32	3.20	2.75	21280	.01	.09	48	.01	.04	0.1	0.2
Line 2 2-1	4	Both	1	0.00	3.40	2.75	21280	.01	.00	0	.00	.00	5.4	6.7
		Both	2	0.84					.00	0	.00	.00		
Line 3 3-1	4	Both	1	0.00	8.00	2.75	21280	.00	-	-	-	-	2.2	2.8
		Both	2	0.40					.00	0	.00	.00		
Line 4 4-1	4	Both	1	0.00	3.40	2.75	21280	.01	.00	0	.00	.00	5.4	6.7

DEFLECTION (flexible seismic design, continued)

Line 5	Both	2	0.84						.00	0	.00	.00		
5-2	6	Both	Ext	0.31	3.30	2.75	21280	.00	.10	46	.01	.04	0.0	0.2
Line A														
A-1	2	Both	Ext	0.21	18.30	2.75	21280	.00	.12	31	.00	.02	1.0	1.1
Line B														
B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.7
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.01	.00	0	.00	.00	3.0	3.7
		Both	2	0.84					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.7
		Both	2	0.00					-	-	-	-		
Line C														
C-1	2	Both	Ext	0.11	18.30	2.75	21280	.00	.06	16	.00	.00	1.0	1.0

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B

W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall.

Dir – Force direction

Srf - Wall surface, interior or exterior for perimeter walls, 1 or 2 for interior partitions

v - Shear force per unit distance on wall segment

L - Width of wall segment between openings

H - Wall height

Defl - Horizontal shearwall deflection due to given term:

Bending = $2vHs^3 / 3EALs \times 10^6$; A - Cross sectional area of segment end stud(s); E - Stud mod. of elasticity from Framing Materials table

Shear = $1000 vHs / Bv$; Bv - Shear-through-stiffness rigidity from O86 Tables 9.1-9.3, value is in Sheathing Materials table

Nail slip = $2.5 Hs \times en$; en – From A.11.7 = $(0.013 vs / d^2)^2$ wood, $0.76 v / vcap$ GWB

vs - shear force per nail along panel edge, d - nail diameter.

Hold - Restraint system (hold-down) = $da \times h / L$;

da - Vertical hold-down displacement; refer to Hold-down Displacement table for components.

L = $Ls - (tension\ stud\ pack\ width + hold-down\ anchor\ bolt\ offset) - (1/2\ compression\ stud\ pack\ width)$

Total Defl = Deflection from bending + shear + nail slip + hold-down / unblocked factor Jus, as per O86 11.7.1.2,3

HOLD-DOWN DISPLACEMENT (flexible seismic design)

Wall, segment	Dir	Hold- down	Tens. force kN	Vert. Manuf mm	Displacement Add mm	da mm	Slippage Vf kN	da mm	Shrink +Extra mm	Comp. force kN	Crush da mm	Total da mm	Horz Defl mm
Level 1													
Line 1													
1-2	Both	HDU8	5.28	.45	.01	0.46	-	-	6.3	5.28	0.02	6.8	6.0
Line 2													
2-1	Both	HDU8	13.69	1.2	.03	1.20	-	-	6.3	13.69	0.06	7.5	6.2
Line 3													
3-1	Both	HDU8	6.54	.55	.02	0.57	-	-	6.3	6.54	0.03	6.9	2.4
Line 4													
4-1	Both	HDU8	13.69	1.2	.03	1.20	-	-	6.3	13.69	0.06	7.5	6.2
Line 5													
5-2	Both	HDU8	5.11	.43	.01	0.45	-	-	6.3	5.11	0.02	6.8	5.8
Line A													
A-1	Both	HDU8	3.30	.28	.01	0.29	-	-	6.3	3.30	0.01	6.6	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	13.63	1.2	.03	1.19	-	-	6.3	13.63	0.06	7.5	3.4
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	1.73	.15	.00	0.15	-	-	6.3	1.73	0.01	6.4	1.0
Level 2													
Line 1													
1-2	Both	HDU8	2.89	.24	.01	0.25	-	-	6.3	2.89	0.01	6.6	5.8
Line 2													
2-1	Both	HDU8	7.40	.63	.02	0.65	-	-	6.3	7.40	0.03	7.0	5.8
Line 3													
3-1	Both	HDU8	3.53	.30	.01	0.31	-	-	6.3	3.53	0.02	6.6	2.3
Line 4													
4-1	Both	HDU8	7.40	.63	.02	0.65	-	-	6.3	7.40	0.03	7.0	5.8
Line 5													
5-2	Both	HDU8	2.79	.24	.01	0.24	-	-	6.3	2.79	0.01	6.5	5.6
Line A													
A-1	Both	HDU8	1.79	.15	.00	0.16	-	-	6.3	1.79	0.01	6.5	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	7.37	.62	.02	0.64	-	-	6.3	7.37	0.03	7.0	3.2
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	0.94	.08	.00	0.08	-	-	6.3	0.94	0.00	6.4	1.0
Level 3													
Line 1													
1-2	Both	Anchor	-	(nu = 696 N)						-		0.1	0.1
Line 2													
2-1	Both	HDU8	2.35	.20	.01	0.21	-	-	6.3	2.35	0.01	6.5	5.4
Line 3													
3-1	Both	HDU8	1.12	.10	.00	0.10	-	-	6.3	1.12	0.00	6.4	2.2
Line 4													
4-1	Both	HDU8	2.35	.20	.01	0.21	-	-	6.3	2.35	0.01	6.5	5.4
Line 5													
5-2	Both	Anchor	-	(nu = 672 N)						-		0.1	0.0
Line A													
A-1	Both	HDU8	0.57	.05	.00	0.05	-	-	6.3	0.57	0.00	6.3	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	2.34	.20	.01	0.20	-	-	6.3	2.34	0.01	6.5	3.0
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	0.30	.03	.00	0.03	-	-	6.3	0.30	0.00	6.3	1.0

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B

Dir – Force direction

Tens., Comp. – Accumulated ULS hold-down tension force T and SLS compression force C from overturning and dead loads. T does not include 1.2 factor from O86 11.8.2.

da – Vertical displacements due to the following components:

Vert. Displacement - Vertical displacement of hold-down

Manuf – Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation

*Unless marked with * = (tension force / hold-down capacity) x max displacement*

** - Maximum displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.*

Add – Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = $TL / (Ab \times Es)$

Ab = bolt cross-sectional area

Es = steel modulus = 200 GPa

L = Lb – Lh

Lb = Total bolt length shown in Storey Information table

Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database

Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation

Nails = en from O86 A.11.7 = $(0.013 Pf / d^2)^2$, d = nail diameter

Shrink + Extra – Wood shrinkage plus extra displacement due to mis-cuts, gaps, etc.

Shrinkage = $0.002 \times (19\% \text{ fabrication} - 10\% \text{ in-service moisture contents}) \times Ls$

Ls = Length between anchor bolt fasteners subject to perp-to-grain shrinkage; see Storey Information table

Crush – Deformation of bottom plate at compression end of wall segment

= $0.5\text{mm} \times [r / 0.73, r < 0.73; (1 + (r - 0.73) / 0.27), 0.73 < r < 1; 2r^3, r > 1]$

$r = C / Qr$; $Qr = KD Ks Kz f_{cp} A$; A = cross sectional area of end studs

Total da – Vert. Displacement + Slippage + Shrink + Crush + Extra

Horz Defl – Restraint system term in deflection equation in O86 11.7.1.2 = $Hs/L \times da$

Hs = wall height; L = wall segment length Ls – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width)

Hs and Ls are shown in Deflection table

STOREY DRIFT (flexible seismic design)

Level	Dir	RdRo/I	Actual Storey Drift (mm)			Amp defl	Allowable Storey Drift		
			Const defl	Max defl	Line		hs m	Drift mm	Ratio
1	N<->S	5.1	5.1	7.8	2	19.1	3.00	75.1	0.25
	E<->W	5.1	2.8	4.3	B	10.4		75.1	0.14
2	N<->S	5.1	5.1	7.2	2	16.1	3.00	75.1	0.21
	E<->W	5.1	2.8	4.0	B	8.7		75.1	0.12
3	N<->S	5.1	5.1	6.7	2	13.5	2.75	68.8	0.20
	E<->W	5.1	2.8	3.7	B	7.3		68.8	0.11

Legend:

RdRo/I – Amplification factor from NBC 4.1.8.13.(2)

Refer to Site Information for response modification factors Rd, Ro from Table 4.1.8.9 and Importance factor I from 4.1.8.5.(1)

Const defl – Deflection due to shrinkage, gaps, bolt hole, etc. (constant with respect to force)

Max defl – Largest deflection for any shear line on this level in this direction; refer to Deflection table

Line – Shearline with largest deflection on this level

Amp defl – Amplified deflection = const defl + (max defl – const defl) x RdRo/I

hs – Storey height = Height of walls plus joist depth between this level and the one above.

Drift = Allowable storey drift on this level from NBC 4.1.8.13.(3) = 0.025x hs

Ratio - Proportion of allowable storey drift experienced on line with maximum deflection.

Rigid Diaphragm Seismic Design

SEISMIC INFORMATION

Level	Mass [kN]	Storey Shear [kN]		Shear Capacity [kN]		Over-capacity		Length of SFRS [m]	
		E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S
3	318.15	10.53	10.86	306.37	306.10	29.09	28.18	18.3	8.0
2	446.52	22.39	19.70	306.37	307.82	13.69	15.62	18.3	8.0
1	446.52	27.83	24.61	306.37	315.87	11.01	12.83	18.3	8.0
All	1211.19	-	-	-	-	1.24	1.22	-	-

Storey shear - Sum of factored, vertically accumulated shearline forces on level, including torsional effects.

Total unfactored base shear - 23.75 kN

IRREGULARITIES (NBC Table 4.1.8.6)

leFaSa(0.2) = 0.129

Only those provisions for height less than 20 m are considered.

No.	Irregularity Type	NBC 4.1.8... Commentary	Irregular for...		Fails for...		Notes
			Levels	Dir/Ln	Levels	Dir/Ln	
1	Vertical Stiffness	7 (1) (c) ; 10 (2) (a) J-118, 150	3, 2	Both	None	None	a
2	Weight (mass)	7 (1) (c) J-118	None	None	None	None	-
3	Vertical Geometric	7 (1) (c) ; 10 (2) (a) J-118, 150	None	None	None	None	-
4	In-Plane Disc. (offset)	7 (1) (c) ; 10 (2) (a) 15 (5) , J-118, 150, 208	None	None	None	None	-
4	In-Plane Disc. (stiffness)	7 (1) (c) ; 10 (2) (a) J-118, 150	3, 2	1, 5	None	None	a
5	Out-of-Plane Offsets	7 (1) (c) ; 10 (2) (a) 15 (5) , J-118, 150, 208	None	None	None	None	-
6	Weak Storey	7 (1) (c) ; 10 (1) , (2) (b) J-118, 150	None	None	None	None	-
7	Torsional Sensitivity	7 (1) ; 10 (2) (a) 11 (10) ; 11 (11) (b) J-120, 150, 173-5	None	None	None	None	-
8	Non-orthogonal	7 (1) (c) J-120	n/a	n/a	n/a	n/a	b
9	Gravity-Induced	7 (1) ; 10 (2) , (5-7) J-150	n/a	n/a	n/a	n/a	c

Notes:

a) Irregularity has no effect since leFaSa(0.2) < 0.35, as per NBC 4.1.8.7.(1)(a), 4.1.8.6.(3) and Commentary J-122.

b) Not applicable, as all buildings modelled by Shearwalls are orthogonal.

c) Not applicable to structures using wood shear walls.

Irregularities:

1. Vertical Stiffness: Stiffness in a storey is less than 70% of the stiffness in an adjacent storey, or 80% of that of 3 storeys above or below. Table shows the storey followed by stiffer level(s), e.g. 4,5 or 4,1-3.

2. Weight (mass): Weight of any storey is more than 150% of weight of adjacent storey. Weight of storey is effective mass used for vertical seismic mass distribution. Table shows the heavy storey followed by light storey, e.g. 4,3.

3. Vertical Geometric: Horizontal dimension of SFRS in any storey more than 130% of that in adjacent storey. Shearwalls checks using the nearest and farthest points from all walls in a storey for each direction. It shows the storey with the long SFRS in the table, and the affected direction(s).

4. In-Plane Discontinuity in Vertical Element (offset): In plane offset of a lateral force-resisting element in the storey below. Shearwalls detects whenever the ends wall segments on adjacent storeys do not line up to within 3". It shows both upper and lower storey in table, e.g. 4,3, and shearlines affected.

4. In-Plane Discontinuity in Vertical Element (stiffness): Reduction in the lateral stiffness of the resisting element in the storey below. Shearwalls uses a linearized approximation of the deflection equation from O86 11.7.1.2 to determine constant shearwall stiffnesses, then compares the stiffness of collinear shearwall segments on adjacent storeys. It shows both upper and lower storey in table, e.g. 4,3, and shearlines affected.

5. Out-of-Plane Offsets: Discontinuities in the lateral force path. Shearwalls detects wherever shearwalls do not exist on a shearline for particular level, and the program has transferred the force from the shearline on the floor above directly into the diaphragm. It shows the storey without shear-resisting elements in the table, and the directions(s) affected.

6. Discontinuity in Capacity - Weak Storey: The storey shear strength is less than the storey above for the direction under consideration. Shearwalls determines the total capacity of all shearwalls for each direction on each level, and reports weaker lower levels in the table.

7. Torsional Sensitivity: Ratio B of maximum to average storey displacements is greater than 1.7. Applies only to rigid diaphragm design results. Shearwalls calculates shearline forces and deflections in the extreme shearlines for both positive and negative accidental eccentricity, and for each case computes B_x = largest deflection / average of the two. Table shows any storey and force direction for which B_x is greater than 1.7.

8. Non-orthogonal: Occurs when shearlines are not oriented at right angles (skewed shearwalls). Shearwalls does not currently allow input of skewed shearwalls, so this irregularity does not apply.

9. Gravity-Induced Lateral Demand: Any such demands in a typical wood-frame structure, such as from cantilevered floors, affect the overturning force on hold-downs; however these are not the predominant yielding mechanism so this irregularity does not apply.

SHEAR RESULTS (rigid seismic design)

North-south Shearlines	W Gp	For Dir	Shear Force		Capacities [kN/m]						Ratio Fv/V
			FHS [m]	Fv/L [kN/m]	Vhd (vd) / L		Jhd	Vrs (vpb) / L		Vrs/L	
Line 1											
Level 3											
Ln1, Lev3	-	Both	3.20	0.39	-	-	-	-	-	-	0.58
Wall 1-2	5^	Both	3.20	1.48	-	5.55	0.46	-	77.68	2.55	0.58
Level 2											
Ln1, Lev2	-	Both	3.20	0.09	-	-	-	-	-	-	0.12W
Wall 1-2	2	Both	3.20	0.32	-	4.03	0.68	-	5.36	2.76	0.12W
Level 1											
Ln1, Lev1	-	Both	3.20	0.11	-	-	-	-	-	-	0.10W
Wall 1-2	2	Both	3.20	0.42	-	4.03	1.00	-	5.36	4.03	0.10W
Line 2											
Level 3											
Ln2, Lev3	-	Both	3.40	0.01	-	-	-	-	-	-	0.00W#
Wall 2-1	4	Both	3.40	0.03	0.00	19.57	1.00	-	77.68	19.57	0.00W#
Level 2											
Ln2, Lev2	-	Both	3.40	0.13	-	-	-	-	-	-	0.02W#
Wall 2-1	4	Both	3.40	0.45	0.00	19.57	1.00	-	77.68	19.57	0.02W#
Level 1											
Ln2, Lev1	-	Both	3.40	0.17	-	-	-	-	-	-	0.03W#
Wall 2-1	4	Both	3.40	0.62	0.00	19.57	1.00	-	77.68	19.57	0.03W#
Line 3											
Level 3											
Ln3, Lev3	-	Both	8.00	0.09	-	-	-	-	-	-	0.01W#
Wall 3-1	4	Both	8.00	0.14	0.00	19.57	1.00	-	77.68	19.57	0.01W#
Level 2											
Ln3, Lev2	-	Both	8.00	1.19	-	-	-	-	-	-	0.09W#
Wall 3-1	4	Both	8.00	1.81	0.00	19.57	1.00	-	77.68	19.57	0.09W#
Level 1											
Ln3, Lev1	-	Both	8.00	1.45	-	-	-	-	-	-	0.11W#
Wall 3-1	4	Both	8.00	2.21	0.00	19.57	1.00	-	77.68	19.57	0.11W#
Line 4											
Level 3											
Ln4, Lev3	-	Both	3.40	0.01	-	-	-	-	-	-	0.00W#
Wall 4-1	4	Both	3.40	0.03	0.00	19.57	1.00	-	77.68	19.57	0.00W#
Level 2											
Ln4, Lev2	-	Both	3.40	0.12	-	-	-	-	-	-	0.02W#
Wall 4-1	4	Both	3.40	0.45	0.00	19.57	1.00	-	77.68	19.57	0.02W#
Level 1											
Ln4, Lev1	-	Both	3.40	0.17	-	-	-	-	-	-	0.03W#
Wall 4-1	4	Both	3.40	0.61	0.00	19.57	1.00	-	77.68	19.57	0.03W#
Line 5											
Level 3											
Ln5, Lev3	-	Both	3.30	0.39	-	-	-	-	-	-	0.58
Wall 5-2	6^	Both	3.30	1.45	-	5.35	0.47	-	39.33	2.51	0.58
Level 2											
Ln5, Lev2	-	Both	3.30	0.09	-	-	-	-	-	-	0.12W
Wall 5-2	2	Both	3.30	0.34	-	4.03	0.70	-	5.36	2.82	0.12W
Level 1											
Ln5, Lev1	-	Both	3.30	0.12	-	-	-	-	-	-	0.11W
Wall 5-2	2	Both	3.30	0.44	-	4.03	1.00	-	5.36	4.03	0.11W
East-west Shearlines	W Gp	For Dir	Shear Force		Capacities [kN/m]						Ratio Fv/V
			FHS [m]	Fv/L [kN/m]	Vhd (vd) / L		Jhd	Vrs (vpb) / L		Vrs/L	
Line A											
Level 3											
LnA, Lev3	2	Both	18.30	0.28	-	4.03	1.00	-	5.36	4.03	0.07W
Level 2											
LnA, Lev2	1	Both	18.30	0.60	-	4.03	1.00	-	5.36	4.03	0.15W
Level 1											
LnA, Lev1	1	Both	18.30	0.74	-	4.03	1.00	-	5.36	4.03	0.18W
Line B											
Level 3											
LnB, Lev3	-	Both	15.90	0.03	-	-	-	-	-	-	-
Wall B-1	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#
Wall B-2	4	Both	6.10	0.08	0.00	19.57	1.00	-	77.68	19.57	0.00W#
Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

SHEAR RESULTS (rigid seismic design, continued)

Level 2											
LnB, Lev2	-	Both	15.90	0.04	-	-	-	-	-	-	-
Wall B-1	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#
Wall B-2	4	Both	6.10	0.11	0.00	19.57	1.00	-	77.68	19.57	0.01W#
Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#
Level 1											
LnB, Lev1	-	Both	15.90	0.05	-	-	-	-	-	-	-
Wall B-1	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#
Wall B-2	4	Both	6.10	0.16	0.00	19.57	1.00	-	77.68	19.57	0.01W#
Wall B-3	3	Both	4.90	0.00	0.00	4.03	1.00	-	5.36	4.03	0.00#
Line C											
Level 3											
LnC, Lev3	2	Both	18.30	0.26	-	4.03	1.00	-	5.36	4.03	0.07W
Level 2											
LnC, Lev2	1	Both	18.30	0.59	-	4.03	1.00	-	5.36	4.03	0.15W
Level 1											
LnC, Lev1	1	Both	18.30	0.72	-	4.03	1.00	-	5.36	4.03	0.18W

Legend:

Results can have different meaning for shearlines, walls, and wall segments. Results for walls with no openings are the same as those for segments.

W Gp - Wall design group as listed in Sheathing and Framing Materials tables. "A" means that this wall is critical for all walls in the Standard Wall group.

Dir - Direction of seismic shear force along shearline. "Both" appears if results are identical for both directions.

FHS - Length of full height sheathing along shearline, wall, or segment

Fv/L - For shearlines = diaphragm shear force = factored shearline force divided by length of shearline; for wall segments = design shear force = factored shear force divided by length of full height sheathing.

Vhd(vd)/L - Factored unit sheathing connection resistance = Vrs from O86 11.6.2 without Jhd

For wood panels (11.6.2.2(a)) = $0.80 \times vd \times JD \times Jus \times Js$; $vd = Nu$ (from 12.9.3) / nail spacing

JD - diaphragm and shearwall factor (12.9.3.1) = 1.3; Js - fastener spacing factor (11.5.1)

Jus - unblocked factor (11.5.4), shown in the Sheathing Materials table.

For gypsum wallboard (11.6.2.3) = $0.70 \times vd$; vd from Table 11.4

Jhd - Hold-down effect factor from 11.5.5

Vrs(vpb)/L - Factored unit panel buckling resistance (11.6.2.2(b)) = $0.80 \times vpb \times KD \times KS \times KT$.

KD - load-duration factor (5.3.2.1) = 1.15; KS - service-condition factor (9.4.2); KT - treatment factor = 1.0

Vrs/L - Factored unit shear resistance of wall segment = $\min(Vhd(vd)/L \times Jhd, Vrs(vpb)/L)$.

Refer to Detailed Shear Wall design output for strengths, factors and other intermediate values for Vrs, Vhd and Jhd.

"W" indicates that the wind design criterion was critical in selecting wall.

Notes:

According to O86 11.3.3.1 Note (1), there should be a balanced spatial distribution of gypsum wallboard and wood-based panels on every level in each direction.

#WARNING - The following walls fail because panel buckling from O86 11.6.2.2.(b) or a non-ductile nail strength mode from 12.9.3.2 governs for shear resistance Vrs, as per 11.8.1. Refer to the Detailed Shearwall Design output for these walls.

Level 1: B-1, B-2, B-3, 2-1, 3-1, 4-1

Level 2: B-1, B-2, B-3, 2-1, 3-1, 4-1

Level 3: B-1, B-2, B-3, 2-1, 3-1, 4-1

WARNING – Over-capacity ratio from O86 11.8.3.2 exceeded. See Seismic Information table for more details.

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

Hold-Down and Compression Design (rigid seismic design)

Level 1					Tensile Hold-down or Compressive Stud Force [kN]				Hold-down	Cap [kN]	Crit Resp.
Line- Wall	Posit'n	Location [m]		Note	Shear	Dead	Jx	Cmb'd			
Line 1							1.0				
1-2	L End	0.00	4.84		6.8			6.78	HDU8	60.3	0.11
1-2	L End	0.00	4.84		6.8			6.8	Compression	157.6	0.04
1-2	R End	0.00	7.96		6.8			6.78	HDU8	60.3	0.11
1-2	R End	0.00	7.96		6.8			6.8	Compression	157.6	0.04
Line 2							1.0				
2-1	L End	3.05	4.64		3.4			3.38	HDU8	60.3	0.06
2-1	L End	3.05	4.64		3.4			3.4	Compression	157.6	0.02
2-1	R End	3.05	7.96		3.4			3.38	HDU8	60.3	0.06
2-1	R End	3.05	7.96		3.4			3.4	Compression	157.6	0.02
Line 3							1.0				
3-1	L End	9.15	0.04		12.6			12.58	HDU8	60.3	0.21
3-1	L End	9.15	0.04		12.6			12.58	Compression	157.6	0.08
3-1	R End	9.15	7.96		12.6			12.58	HDU8	60.3	0.21
3-1	R End	9.15	7.96		12.6			12.6	Compression	157.6	0.08
Line 4							1.0				
4-1	L End	15.25	4.64		3.3			3.33	HDU8	60.3	0.06
4-1	L End	15.25	4.64		3.3			3.3	Compression	157.6	0.02
4-1	R End	15.25	7.96		3.3			3.33	HDU8	60.3	0.06
4-1	R End	15.25	7.96		3.3			3.3	Compression	157.6	0.02
Line 5							1.0				
5-2	L End	18.30	4.74		6.8			6.76	HDU8	60.3	0.11
5-2	L End	18.30	4.74		6.8			6.8	Compression	157.6	0.04
5-2	R End	18.30	7.96		6.8			6.76	HDU8	60.3	0.11
5-2	R End	18.30	7.96		6.8			6.8	Compression	157.6	0.04
Line A							1.0				
A-1	L End	0.04	0.00		4.8			4.84	HDU8	60.3	0.08
A-1	L End	0.04	0.00		4.8			4.8	Compression	157.6	0.03
A-1	R End	18.26	0.00		4.8			4.84	HDU8	60.3	0.08
A-1	R End	18.26	0.00		4.8			4.8	Compression	157.6	0.03
Line B							1.0				
B-2	L End	6.14	8.00		1.0			1.03	HDU8	60.3	0.02
B-2	L End	6.14	8.00		1.0			1.03	Compression	157.6	0.01
B-2	R End	12.16	8.00		1.0			1.03	HDU8	60.3	0.02
B-2	R End	12.16	8.00		1.0			1.0	Compression	157.6	0.01
Line C							1.0				
C-1	L End	0.04	12.20		4.7			4.69	HDU8	60.3	0.08
C-1	L End	0.04	12.20		4.7			4.7	Compression	157.6	0.03
C-1	R End	18.26	12.20		4.7			4.69	HDU8	60.3	0.08
C-1	R End	18.26	12.20		4.7			4.7	Compression	157.6	0.03
Level 2					Tensile Hold-down or Compressive Stud Force [kN]				Hold-down	Cap [kN]	Crit Resp.
Line- Wall	Posit'n	Location [m]		Note	Shear	Dead	Jx	Cmb'd			
Line 1							1.0				
1-2	L End	0.00	4.84		5.5			5.49	HDU8	60.3	0.09
1-2	L End	0.00	4.84		5.5			5.5	Compression	157.6	0.03
1-2	R End	0.00	7.96		5.5			5.49	HDU8	60.3	0.09
1-2	R End	0.00	7.96		5.5			5.5	Compression	157.6	0.03
Line 2							1.0				
2-1	L End	3.05	4.64		1.5			1.48	HDU8	60.3	0.02
2-1	L End	3.05	4.64		1.5			1.5	Compression	157.6	0.01
2-1	R End	3.05	7.96		1.5			1.48	HDU8	60.3	0.02
2-1	R End	3.05	7.96		1.5			1.5	Compression	157.6	0.01
Line 3							1.0				
3-1	L End	9.15	0.04		5.9			5.89	HDU8	60.3	0.10
3-1	L End	9.15	0.04		5.9			5.89	Compression	157.6	0.04
3-1	R End	9.15	7.96		5.9			5.89	HDU8	60.3	0.10
3-1	R End	9.15	7.96		5.9			5.9	Compression	157.6	0.04
Line 4							1.0				
4-1	L End	15.25	4.64		1.5			1.46	HDU8	60.3	0.02
4-1	L End	15.25	4.64		1.5			1.5	Compression	157.6	0.01
4-1	R End	15.25	7.96		1.5			1.46	HDU8	60.3	0.02
4-1	R End	15.25	7.96		1.5			1.5	Compression	157.6	0.01
Line 5							1.0				
5-2	L End	18.30	4.74		5.4			5.42	HDU8	60.3	0.09
5-2	L End	18.30	4.74		5.4			5.4	Compression	157.6	0.03
5-2	R End	18.30	7.96		5.4			5.42	HDU8	60.3	0.09
5-2	R End	18.30	7.96		5.4			5.4	Compression	157.6	0.03

Canadian Wood Council	Conseil Canadien du bois
--------------------------------------	---

Hold-Down and Compression Design (rigid seismic design, continued)

Line A					1.0						
A-1	L End	0.04	0.00		2.6	2.60	HDU8	60.3	0.04		
A-1	L End	0.04	0.00		2.6	2.6	Compression	157.6	0.02		
A-1	R End	18.26	0.00		2.6	2.60	HDU8	60.3	0.04		
A-1	R End	18.26	0.00		2.6	2.6	Compression	157.6	0.02		
Line B					1.0						
B-2	L End	6.14	8.00		0.6	0.55	HDU8	60.3	0.01		
B-2	L End	6.14	8.00		0.6	0.55	Compression	157.6	0.00		
B-2	R End	12.16	8.00		0.6	0.55	HDU8	60.3	0.01		
B-2	R End	12.16	8.00		0.6	0.55	Compression	157.6	0.00		
Line C					1.0						
C-1	L End	0.04	12.20		2.5	2.50	HDU8	60.3	0.04		
C-1	L End	0.04	12.20		2.5	2.5	Compression	157.6	0.02		
C-1	R End	18.26	12.20		2.5	2.50	HDU8	60.3	0.04		
C-1	R End	18.26	12.20		2.5	2.5	Compression	157.6	0.02		
Level 3					Tensile Hold-down or Compressive Stud Force [kN]						
Line-Wall	Posit'n	Location [m]		Note	Shear	Dead	Jx	Cmb'd	Hold-down	Cap [kN]	Crit Resp.
Line 1					1.0						
1-2	L End	0.00	4.84		4.5		4.49	Anchorage			
1-2	L End	0.00	4.84		4.5		4.5	Compression	157.6	0.03	
1-2	R End	0.00	7.96		4.5		4.49	Anchorage			
1-2	R End	0.00	7.96		4.5		4.5	Compression	157.6	0.03	
Line 2					1.0						
2-1	L End	3.05	4.64		0.1		0.09	HDU8	60.3	0.00	
2-1	L End	3.05	4.64		0.1		0.1	Compression	157.6	0.00	
2-1	R End	3.05	7.96		0.1		0.09	HDU8	60.3	0.00	
2-1	R End	3.05	7.96		0.1		0.1	Compression	157.6	0.00	
Line 3					1.0						
3-1	L End	9.15	0.04		0.4		0.39	HDU8	60.3	0.01	
3-1	L End	9.15	0.04		0.4		0.39	Compression	157.6	0.00	
3-1	R End	9.15	7.96		0.4		0.39	HDU8	60.3	0.01	
3-1	R End	9.15	7.96		0.4		0.4	Compression	157.6	0.00	
Line 4					1.0						
4-1	L End	15.25	4.64		0.1		0.09	HDU8	60.3	0.00	
4-1	L End	15.25	4.64		0.1		0.1	Compression	157.6	0.00	
4-1	R End	15.25	7.96		0.1		0.09	HDU8	60.3	0.00	
4-1	R End	15.25	7.96		0.1		0.1	Compression	157.6	0.00	
Line 5					1.0						
5-2	L End	18.30	4.74		4.4		4.38	Anchorage			
5-2	L End	18.30	4.74		4.4		4.4	Compression	157.6	0.03	
5-2	R End	18.30	7.96		4.4		4.38	Anchorage			
5-2	R End	18.30	7.96		4.4		4.4	Compression	157.6	0.03	
Line A					1.0						
A-1	L End	0.04	0.00		0.8		0.78	HDU8	60.3	0.01	
A-1	L End	0.04	0.00		0.8		0.8	Compression	157.6	0.00	
A-1	R End	18.26	0.00		0.8		0.78	HDU8	60.3	0.01	
A-1	R End	18.26	0.00		0.8		0.8	Compression	157.6	0.00	
Line B					1.0						
B-2	L End	6.14	8.00		0.2		0.23	HDU8	60.3	0.00	
B-2	L End	6.14	8.00		0.2		0.23	Compression	157.6	0.00	
B-2	R End	12.16	8.00		0.2		0.23	HDU8	60.3	0.00	
B-2	R End	12.16	8.00		0.2		0.23	Compression	157.6	0.00	
Line C					1.0						
C-1	L End	0.04	12.20		0.7		0.73	HDU8	60.3	0.01	
C-1	L End	0.04	12.20		0.7		0.7	Compression	157.6	0.00	
C-1	R End	18.26	12.20		0.7		0.73	HDU8	60.3	0.01	
C-1	R End	18.26	12.20		0.7		0.7	Compression	157.6	0.00	

Legend:

Line-Wall:

At wall or opening – Shearline and wall number

At vertical element - Shearline

Posit'n - Stud that hold-down is attached to:

V Elem - Vertical element column or strengthened studs required where not at wall end or opening

L or R End - At left or right wall end

L or R Op n - At left or right side of opening n

Location - Co-ordinates in Plan View

Note - Number(s) of note(s) below to apply

Tensile Hold-down or Compressive Stud Force: Upwards force on hold-down at one end of the wall or downward force on bottom plate under studs

at the other end, for each force direction. Includes forces transferred from upper levels.

Shear – Overturning component = $V \times h / L$; V = force on segment J_x – Overturning moment reduction factor from NBC 4.1.8.11.(8), applied to shear component; h = wall height + joist depth (O86 Fig. 11.7); L = wall segment length – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width). When anchorages used L = segment length – 300 mm (O86 11.6.4.1).

Dead - Dead load resisting component

Cmb'd - Sum of factored overturning and forces

Hold-down – Device used from hold-down database or "Anchorage" if no hold-down required.

Cap – allowable tension load

Crit. Resp. – Critical Response = Combined hold-down force / Allowable tension load

Notes:

Moment arm L used in hold-down force calculations is wall length minus the user-input hold-down offset at each end of wall. For anchorages, maximum moment arm is wall length minus 300 mm. Refer to O86 11.6.4.1.

HDU8-SDS2.5 for studs with thickness > 0.11 m and depth > 0.09 m : Uses 20 1/4" x 2 1/2" SDS heavy-duty screws; 7/8" anchor bolt.

Unfactored as per load combination 5 from NBC Table 4.1.3.2.A and without companion loads for maximum effect.

COLLECTOR FORCES (rigid seismic design)

Level 1		Position on Wall or Opening	Location [m]		Notes	Drag Strut Force [kN]	
Line- Wall			X	Y		--->	<---
Line 1							
1-2	Left Wall End		0.00	4.80		-0.6	0.6
1-2	Right Wall End		0.00	8.00		0.6	-0.5
Line 2							
2-1	Left Wall End		3.05	4.60		-0.9	0.9
2-1	Right Wall End		3.05	8.00		0.9	-0.9
Line 3							
3-1	Right Wall End		9.15	8.00		7.3	-7.3
Line 4							
4-1	Left Wall End		15.25	4.60		-0.9	0.9
4-1	Right Wall End		15.25	8.00		0.9	-0.8
Line 5							
5-2	Left Wall End		18.30	4.70		-0.7	0.7
5-2	Right Wall End		18.30	8.00		0.6	-0.6
Line B							
B-1	Left Wall End		0.60	8.00		-0.0	0.0
B-1	Right Wall End		5.50	8.00		-0.3	0.3
B-2	Left Wall End		6.10	8.00		-0.4	0.4
B-2	Right Wall End		12.20	8.00		0.4	-0.4
B-3	Left Wall End		12.80	8.00		0.3	-0.3
B-3	Right Wall End		17.70	8.00		0.0	-0.0
Level 2							
Line- Wall		Position on Wall or Opening	Location [m]		Notes	Drag Strut Force [kN]	
			X	Y		--->	<---
Line 1							
1-2	Left Wall End		0.00	4.80		-0.5	0.5
1-2	Right Wall End		0.00	8.00		0.4	-0.4
Line 2							
2-1	Left Wall End		3.05	4.60		-0.7	0.7
2-1	Right Wall End		3.05	8.00		0.6	-0.6
Line 3							
3-1	Right Wall End		9.15	8.00		6.0	-6.0
Line 4							
4-1	Left Wall End		15.25	4.60		-0.7	0.7
4-1	Right Wall End		15.25	8.00		0.6	-0.6
Line 5							
5-2	Left Wall End		18.30	4.70		-0.5	0.5
5-2	Right Wall End		18.30	8.00		0.5	-0.5
Line B							
B-1	Left Wall End		0.60	8.00		-0.0	0.0
B-1	Right Wall End		5.50	8.00		-0.2	0.2
B-2	Left Wall End		6.10	8.00		-0.2	0.3
B-2	Right Wall End		12.20	8.00		0.3	-0.2
B-3	Left Wall End		12.80	8.00		0.2	-0.2
B-3	Right Wall End		17.70	8.00		0.0	-0.0
Level 3							
Line- Wall		Position on Wall or Opening	Location [m]		Notes	Drag Strut Force [kN]	
			X	Y		--->	<---
Line 1							
1-2	Left Wall End		0.00	4.80		-2.2	2.2
1-2	Right Wall End		0.00	8.00		2.0	-1.9
Line 2							
2-1	Left Wall End		3.05	4.60		-0.0	0.1
2-1	Right Wall End		3.05	8.00		0.0	-0.0
Line 3							
3-1	Right Wall End		9.15	8.00		0.5	-0.5
Line 4							
4-1	Left Wall End		15.25	4.60		-0.0	0.1
4-1	Right Wall End		15.25	8.00		0.0	-0.0
Line 5							
5-2	Left Wall End		18.30	4.70		-2.2	2.2
5-2	Right Wall End		18.30	8.00		2.0	-2.0
Line B							
B-1	Left Wall End		0.60	8.00		-0.0	0.0
B-1	Right Wall End		5.50	8.00		-0.2	0.2
B-2	Left Wall End		6.10	8.00		-0.2	0.2

COLLECTOR FORCES (rigid seismic design, continued)

B-2	Right Wall End	12.20	8.00	0.2	-0.2
B-3	Left Wall End	12.80	8.00	0.2	-0.2
B-3	Right Wall End	17.70	8.00	0.0	-0.0

Legend:

Line-Wall - Shearline and wall number

Position... - Side of opening or wall end that drag strut is attached to

Location - Co-ordinates in Plan View

Drag Strut Force - Axial force in transfer element at openings, gaps, or changes in design shear along shearline. + : tension; - : compression. Based on shearline force unless otherwise noted below. Increased by 20% as per O86 11.8.6.

----> Force in the west-to-east or south-to-north direction

<---- Force in the east-to-west or north-to-south direction

DEFLECTION (rigid seismic design)

Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	vs N	Nail slip en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 1														
Line 1 1-2	2	Both	Ext	0.42	3.20	2.75	21280	.01	.25	63	.01	.07	6.1	6.4
Line 2 2-1	4	Both	1	0.00	3.40	2.75	21280	.01	.00	0	.00	.00	5.5	6.8
		Both	2	0.62					.00	0	.00	.00		
Line 3 3-1	4	Both	1	0.00	8.00	2.75	21280	.01	-	-	-	-	2.6	3.2
		Both	2	2.21					.00	0	.00	.00		
Line 4 4-1	4	Both	1	0.00	3.40	2.75	21280	.01	.00	0	.00	.00	5.5	6.8
		Both	2	0.61					.00	0	.00	.00		
Line 5 5-2	2	Both	Ext	0.44	3.30	2.75	21280	.01	.26	65	.01	.07	5.9	6.2
Line A A-1	1	Both	Ext	0.74	18.30	2.75	21280	.00	.44	111	.03	.21	1.0	1.7
Line B B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.6
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.00	-	-	-	-	2.9	3.6
		Both	2	0.16					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.6
		Both	2	0.00					-	-	-	-		
Line C C-1	1	Both	Ext	0.72	18.30	2.75	21280	.00	.43	109	.03	.20	1.0	1.7
Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	vs N	Nail slip en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 2														
Line 1 1-2	2	Both	Ext	0.32	3.20	2.75	21280	.01	.19	49	.01	.04	6.0	6.2
Line 2 2-1	4	Both	1	0.00	3.40	2.75	21280	.01	-	-	-	-	5.3	6.7
		Both	2	0.45					.00	0	.00	.00		
Line 3 3-1	4	Both	1	0.00	8.00	2.75	21280	.01	-	-	-	-	2.4	3.0
		Both	2	1.81					.00	0	.00	.00		
Line 4 4-1	4	Both	1	0.00	3.40	2.75	21280	.01	-	-	-	-	5.3	6.6
		Both	2	0.45					.00	0	.00	.00		
Line 5 5-2	2	Both	Ext	0.34	3.30	2.75	21280	.01	.20	51	.01	.04	5.8	6.0
Line A A-1	1	Both	Ext	0.60	18.30	2.75	21280	.00	.36	90	.02	.14	1.0	1.5
Line B B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.6
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.00	-	-	-	-	2.9	3.6
		Both	2	0.11					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.6
		Both	2	0.00					-	-	-	-		
Line C C-1	1	Both	Ext	0.59	18.30	2.75	21280	.00	.35	88	.02	.13	1.0	1.5
Wall, segment	W Gp	Dir	Srf	v kN/m	Ls m	Hs m	Bending A mm2	Defl mm	Shear Defl mm	vs N	Nail slip en mm	Defl mm	Hold Defl mm	Total Defl mm
Level 3														
Line 1 1-2	5	Both	Ext	1.48	3.20	2.75	21280	.02	.41	222	.12	.84	0.7	2.0
Line 2 2-1	4	Both	1	0.00	3.40	2.75	21280	.00	.00	0	.00	.00	5.2	6.5
		Both	2	0.03					.00	0	.00	.00		
Line 3 3-1	4	Both	1	0.00	8.00	2.75	21280	.00	-	-	-	-	2.2	2.7
		Both	2	0.14					.00	0	.00	.00		
Line 4 4-1	4	Both	1	0.00	3.40	2.75	21280	.00	.00	0	.00	.00	5.2	6.5

DEFLECTION (rigid seismic design, continued)

Line 5	Both	2		0.03					.00	0	.00	.00		
5-2	6	Both	Ext	1.45	3.30	2.75	21280	.02	.47	217	.12	.81	0.7	2.0
Line A														
A-1	2	Both	Ext	0.28	18.30	2.75	21280	.00	.17	43	.00	.03	1.0	1.2
Line B														
B-1	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.6
		Both	2	0.00					-	-	-	-		
B-2	4	Both	1	0.00	6.10	2.75	21280	.00	-	-	-	-	2.9	3.6
		Both	2	0.08					.00	0	.00	.00		
B-3	3	Both	1	0.00	4.90	2.75	21280	-	-	-	-	-	-	3.6
		Both	2	0.00					-	-	-	-		
Line C														
C-1	2	Both	Ext	0.26	18.30	2.75	21280	.00	.16	40	.00	.03	1.0	1.1

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B

W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall.

Dir – Force direction

Srf - Wall surface, interior or exterior for perimeter walls, 1 or 2 for interior partitions

v - Shear force per unit distance on wall segment

L - Width of wall segment between openings

H - Wall height

Defl - Horizontal shearwall deflection due to given term:

Bending = $2vHs^3 / 3EALs \times 10^6$; A - Cross sectional area of segment end stud(s); E - Stud mod. of elasticity from Framing Materials table

Shear = $1000 vHs / Bv$; Bv - Shear-through-stiffness rigidity from O86 Tables 9.1-9.3, value is in Sheathing Materials table

Nail slip = $2.5 Hs \times en$; en – From A.11.7 = $(0.013 vs / d^2)^2$ wood, $0.76 v / vcap$ GWB

vs - shear force per nail along panel edge, d - nail diameter.

Hold - Restraint system (hold-down) = $da \times h / L$;

da - Vertical hold-down displacement; refer to Hold-down Displacement table for components.

L = $Ls - (tension\ stud\ pack\ width + hold-down\ anchor\ bolt\ offset) - (1/2\ compression\ stud\ pack\ width)$

Total Defl = Deflection from bending + shear + nail slip + hold-down / unblocked factor Jus, as per O86 11.7.1.2,3

HOLD-DOWN DISPLACEMENT (rigid seismic design)

Wall, segment	Dir	Hold- down	Tens. force kN	Vert. Manuf mm	Displacement Add mm	da mm	Slippage Vf kN	da mm	Shrink +Extra mm	Comp. force kN	Crush da mm	Total da mm	Horz Defl mm
Level 1													
Line 1													
1-2	Both	HDU8	6.78	.57	.02	0.59	-	-	6.3	6.78	0.03	6.9	6.1
Line 2													
2-1	Both	HDU8	3.38	.29	.01	0.29	-	-	6.3	3.38	0.01	6.6	5.5
Line 3													
3-1	Both	HDU8	12.58	1.1	.03	1.10	-	-	6.3	12.58	0.05	7.4	2.6
Line 4													
4-1	Both	HDU8	3.33	.28	.01	0.29	-	-	6.3	3.33	0.01	6.6	5.5
Line 5													
5-2	Both	HDU8	6.76	.57	.02	0.59	-	-	6.3	6.76	0.03	6.9	5.9
Line A													
A-1	Both	HDU8	4.84	.41	.01	0.42	-	-	6.3	4.84	0.02	6.7	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	1.03	.09	.00	0.09	-	-	6.3	1.03	0.00	6.4	2.9
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	4.69	.40	.01	0.41	-	-	6.3	4.69	0.02	6.7	1.0
Level 2													
Line 1													
1-2	Both	HDU8	5.49	.47	.01	0.48	-	-	6.3	5.49	0.02	6.8	6.0
Line 2													
2-1	Both	HDU8	1.48	.13	.00	0.13	-	-	6.3	1.48	0.01	6.4	5.3
Line 3													
3-1	Both	HDU8	5.89	.50	.01	0.51	-	-	6.3	5.89	0.03	6.8	2.4
Line 4													
4-1	Both	HDU8	1.46	.12	.00	0.13	-	-	6.3	1.46	0.01	6.4	5.3
Line 5													
5-2	Both	HDU8	5.42	.46	.01	0.47	-	-	6.3	5.42	0.02	6.8	5.8
Line A													
A-1	Both	HDU8	2.60	.22	.01	0.23	-	-	6.3	2.60	0.01	6.5	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	0.55	.05	.00	0.05	-	-	6.3	0.55	0.00	6.3	2.9
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	2.50	.21	.01	0.22	-	-	6.3	2.50	0.01	6.5	1.0
Level 3													
Line 1													
1-2	Both	Anchor	-	(nu = 696 N)						-		0.8	0.7
Line 2													
2-1	Both	HDU8	0.09	.01	.00	0.01	-	-	6.3	0.09	0.00	6.3	5.2
Line 3													
3-1	Both	HDU8	0.39	.03	.00	0.03	-	-	6.3	0.39	0.00	6.3	2.2
Line 4													
4-1	Both	HDU8	0.09	.01	.00	0.01	-	-	6.3	0.09	0.00	6.3	5.2
Line 5													
5-2	Both	Anchor	-	(nu = 672 N)						-		0.8	0.7
Line A													
A-1	Both	HDU8	0.78	.07	.00	0.07	-	-	6.3	0.78	0.00	6.4	1.0
Line B													
B-1	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
B-2	Both	HDU8	0.23	.02	.00	0.02	-	-	6.3	0.23	0.00	6.3	2.9
B-3	Both	HDU8	0.00	.00	.00	0.00	-	-	.00	0.00	0.00	0.0	-
Line C													
C-1	Both	HDU8	0.73	.06	.00	0.06	-	-	6.3	0.73	0.00	6.4	1.0

Legend:

Wall, segment – Wall and segment between openings, e.g. B-3,2 = second segment on Wall 3 on Shearline B

Dir – Force direction

Tens., Comp. – Accumulated ULS hold-down tension force T and SLS compression force C from overturning and dead loads. T does not include 1.2 factor from O86 11.8.2.

da – Vertical displacements due to the following components:

Vert. Displacement - Vertical displacement of hold-down

Manuf – Using manufacturer's value for anchor bolt length, or no bolt contribution for connector-only elongation

*Unless marked with * = (tension force / hold-down capacity) x max displacement*

** - Maximum displacement is used. May result in higher than actual displacements for lightly loaded hold-downs, causing the segment to draw less force due to lower than actual stiffness.*

Add – Due to longer anchor bolt length than manufacturer's value, or entire bolt length for connector-only elongation = $TL / (Ab \times Es)$

Ab = bolt cross-sectional area

Es = steel modulus = 200 GPa

L = Lb – Lh

Lb = Total bolt length shown in Storey Information table

Lh = Manufacturer's anchor bolt length for given displacement/elongation from hold-down database

Slippage – Due to vertical slippage of hold-down fasteners attached to stud(s) when not combined with elongation

Nails = en from O86 A.11.7 = $(0.013 Pf / d^2)^2$, d = nail diameter

Shrink + Extra – Wood shrinkage plus extra displacement due to mis-cuts, gaps, etc.

Shrinkage = $0.002 \times (19\% \text{ fabrication} - 10\% \text{ in-service moisture contents}) \times Ls$

Ls = Length between anchor bolt fasteners subject to perp-to-grain shrinkage; see Storey Information table

Crush – Deformation of bottom plate at compression end of wall segment

= $0.5\text{mm} \times [r / 0.73, r < 0.73; (1 + (r - 0.73) / 0.27), 0.73 < r < 1; 2r^3, r > 1]$

$r = C / Qr$; $Qr = KD Ks Kz f_{cp} A$; A = cross sectional area of end studs

Total da – Vert. Displacement + Slippage + Shrink + Crush + Extra

Horz Defl – Restraint system term in deflection equation in O86 11.7.1.2 = $Hs / L \times da$

Hs = wall height; L = wall segment length Ls – (tension stud pack width + hold-down anchor bolt offset) – (1/2 compression stud pack width)

Hs and Ls are shown in Deflection table

STOREY DRIFT (rigid seismic design)

Level	Dir	RdRo/I	Actual Storey Drift (mm)			Amp defl	Allowable Storey Drift		
			Const defl	Max defl	Line		hs m	Drift mm	Ratio
1	N<->S	5.1	5.1	6.8	2	14.0	3.00	75.1	0.19
	E<->W	5.1	2.8	3.6	B	7.0		75.1	0.09
2	N<->S	5.1	5.1	6.7	2	13.1	3.00	75.1	0.17
	E<->W	5.1	2.8	3.6	B	6.8		75.1	0.09
3	N<->S	5.1	5.1	6.5	2	12.4	2.75	68.8	0.18
	E<->W	5.1	2.8	3.6	B	6.7		68.8	0.10

Legend:

RdRo/I – Amplification factor from NBC 4.1.8.13.(2)

Refer to Site Information for response modification factors Rd, Ro from Table 4.1.8.9 and Importance factor I from 4.1.8.5.(1)

Const defl – Deflection due to shrinkage, gaps, bolt hole, etc. (constant with respect to force)

Max defl – Largest deflection for any shear line on this level in this direction; refer to Deflection table

Line – Shearline with largest deflection on this level

Amp defl – Amplified deflection = const defl + (max defl – const defl) x RdRo/I

hs – Storey height = Height of walls plus joist depth between this level and the one above.

Drift = Allowable storey drift on this level from NBC 4.1.8.13.(3) = 0.025x hs

Ratio - Proportion of allowable storey drift experienced on line with maximum deflection.