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SIDING CONNECTIONS

2ND TO 1ST:

EXAMPLE - $3223 \, lbf + \left(\frac{5904 - 3223}{2} \right) lbf = 4564 \, lbf$
2ND TO 1ST LOAD

SIDEWALLS = $\frac{4564 \, lbf}{46 \, ft} = 100 \, plf$ LAPPED SHEATHING WITH 0.131×3" NAILS AT 6" O.C.

ENDWALLS = $\frac{8748 \, lbf}{24 \, ft} = 365 \, plf$ LAPPED SHEATHING WITH 0.131×3" NAILS AT 3" O.C.

RIM TO SILL (SILL TO FOUNDATION ON-SITE FOR SAME LOAD)

SIDEWALLS = $\frac{7593 \, lbf + 1181 \, lbf}{46 \, ft} = 191 \, plf$ LAPPED SHEATHING WITH 0.131×3" NAILS AT 6" O.C.

ENDWALLS = $\frac{14528 \, lbf}{24 \, ft} = 606 \, plf$ LAPPED SHEATHING WITH 0.131×3" NAILS AT 2" O.C.

* 0.131×3" NAIL = 108 lbf (WOOD → LAPPED SHEATHING)
** 0.131×3" NAIL = 132 lbf (WOOD → WOOD)

CORNER STUD CONNECTION

$\frac{132 \, lbf}{(6/12)} = (264 \, plf)(8 \, ft) = 2112 \, lbf$ → 0.131×3" NAILS FOR FULL HEIGHT OF WALL

RAFTER ROOF ADDITION

AREA = $0.5 (12 ft)(4/12 × 12 ft)(2) = 48 \, ft^2$
PRESSURE = 24.6 psf
  WIND LOAD ADDED TO MAIN HOME LINE B = $(24.6)(48) = 1180.8 \, lbf$

5.1

ASCE/SEI 7-05 Design Criteria Summary

Client: Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.
Location(s): State of ME
Substructure:
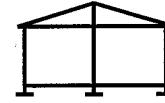
Plan Dimensions:

Ridge Length, B =	26.00 ft
Gable Width, L =	24.00 ft
Module Width, L_m =	12.00 ft

Vertical Dimensions:

Stories Above Grade, n =	1
Max. Blocking Height, h_b =	18 in.
Sidewall/Eave Height, h_e =	130 in.
Min. Mean Roof Height, h =	15 ft

Roof Configuration:

Framing Type:	Mono Pitch Truss
Roof Slope, a =	4.00 /12 pitch
Sidewall Overhang, L_{OH} =	12 in.
Endwall Overhang, B_{OH} =	12 in.
Roof Cavity Insulation, R =	30

Uniformly Distributed Design Loads:

Ground Floor

Floor Live, L =	40 psf
Floor Dead, D =	10 psf
Wall Dead Load, D_w =	5 psf
Wall Height, h_w =	108 in.

Roof

Top Chord Load =	54.1 psf
Top Chord Dead Load =	10 psf
Bottom Chord Live Load =	20 psf
Bottom Chord Dead Load =	10 psf

Misc. Design Parameters:

Occupancy Category:	II	(IBC Table 1604.5)

Roof/Snow Load:

Ground Snow Load, P_g =	50.0 psf
Ground Snow Load NY[1], P_{gNY} =	55.0 psf
Min. Design Load, Lr =	20.0 psf
Flat-Roof Snow Load, P_f =	38.5 psf
Sloped Roof Snow Load =	38.5 psf
Max. Unbalanced Load, P_{ub} =	54.1 psf
Snow Exposure Factor, C_e =	1.0
Snow Load Importance Factor, I_s =	1.00
Thermal Factor, C_t =	1.1

Wind Loads:

Basic Wind Speed =	100 mph
Wind Exposure =	C
Wind Importance Factor, I_w =	1.00
Internal Pressure Coefficient =	+/- 0.18
Mean Roof Height =	15.0 ft

Seismic Loads:

Seismic Importance Factor, I_E =		1.00
Mapped Coefficients:	S_S =	0.62 g
	S_1 =	0.15 g
Response Coefficients:	S_{DS} =	0.53 g
	S_{D1} =	0.22 g
Site Class =		D
IBC Design Category =		D
IRC Design Category =		C

Basic Seismic-Force-Resisting System:
A13 Light-frame walls with wood shear panels

Response Modification Factor R =	6.5
Design Base Shear C_S =	0.08 W

Analysis Procedure:
A13 Light-frame walls with wood shear panels

Flood Loads:

Site Specific flood loads have not been assessed in this analysis. For Buildings located in flood hazard areas, as established in Section 1612.3 of the IBC, floods loads must be considered as required by Section 1612 of the IBC. Furthermore, when required, the design information required by IBC section 1603.1.6 must be provided on the construction documents.

Components and Cladding Loads:

Component	End Zone (psf)	Interior Zone (psf)
Window	+21.8 / -29.2	+21.8 / -23.7
Door	+18.6 / -22.7	+18.6 / -20.4
Roof Cladding	+12.6 / -51.4	+12.6 / -20
Overhang	-68.4	-40.7

NOTES:
1. Equivalent ground snow load at a thermal factor of 1.0 for use with the NYBC/NYRC ground snow load map.

ASCE/SEI 7-05 Wind Load Calculation

Client: Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.

Building Geometry:

Ridge Length, B =	26.0 ft
Total Width, L =	24.0 ft
Blocking Height, h_b =	18 in.
Sidewall/Eve Height, h_e =	130 in.
Roof Slope, a =	4.0 /12 pitch
Roof slope, a =	18.4 deg.
Sidewall Overhang, L_{OH} =	12 in.
Endwall Overhang, B_{OH} =	12 in.

Loading Conditions:

Basic Wind Speed, V_{3s} =	100 mph
Importance Factor, I_w =	1.00
Exposure Category:	C
Topographic Factor, K_{zt} =	1.0
Height & Exposure, K_h =	0.85
Directionality, K_d =	0.85
Wind Pressure, q_h =	18.5 psf
Internal Pressure, Gc_{pi} =	0.18
	-0.18

Height Above Grade:

Sidewall Eave, z =	12.3 ft
Roof Peak, z =	16.7 ft
Mean Roof Height, h =	15.0 ft

Component Dimensions:

Stud Height, h_s =	108 in
Truss Span, s_t =	144 in

Main Windforce-Resisting System Loads (MWFRS):

Normal to Surface

		1	2	3	4	5	6	1E	2E	3E	4E
Trans	+GC$_{pi}$	6.2	-16.1	-12.0	-11.0	-11.7	-11.7	11.1	-23.1	-15.8	-14.8
	-GCpi	12.9	-9.4	-5.3	-4.4	-5.0	-5.0	17.8	-16.5	-9.1	-8.1
	Max	12.9	-16.1	-12.0	-11.0	-11.7	-11.7	17.8	-23.1	-15.8	-14.8
Long	+GC$_{pi}$	4.1	-16.1	-10.2	-8.7	-11.7	-11.7	8.0	-23.1	-13.1	-11.3
	-GCpi	10.7	-9.4	-3.5	-2.0	-5.0	-5.0	14.6	-16.5	-6.5	-4.6
	Max	10.7	-16.1	-10.2	-8.7	-11.7	-11.7	14.6	-23.1	-13.1	-11.3

Summed and Projected

	HORIZONTAL LOADS				VERTICAL LOADS						MAXIMUM HORIZONTAL WALL LOADS			
	End Zone		Interior Zone		End Zone		Interior Zone		Windward Overhang		Zone			
	Wall	Roof	Wall	Roof	WW Roof	LW Roof	WW Roof	LW Roof	End	Interior	1E	4E	1	4
Trans	25.9	-7.3	17.2	-4.1	-23.1	-15.8	-16.1	-12.0	-34.6	-27.6	17.8	-14.8	12.9	-11.0
Long	19.2	-7.3	12.8	-4.1	-23.1	-13.1	-16.1	-10.2	-34.6	-27.6	17.8	-14.8	10.7	-8.7

Components and Cladding Loads (C&C):

C&C End Zone Distance, a = 3.0 ft

Roof Components:		Area (ft²)	Pressure (psf)	
			Pos	Neg
Zone 1:	Maximum	10	12.6	-20.0
	Minimum	50	10.0	-18.7
	Truss / Rafter	48.0	10.1	-18.7
	Overhang	1.0	n/a	-40.7
Zone 2:	Maximum	10	12.6	-34.8
	Minimum	100	10.0	-25.5
	Truss / Rafter	48.0	10.1	-28.5
	Overhang	1.0	n/a	-40.7
Zone 3:	Maximum	10	12.6	-51.4
	Minimum	100	10.0	-40.3
	Truss / Rafter	48.0	10.1	-43.9
	Overhang	1.0	n/a	-68.4

Wall Components:		Area (ft²)	Pressure (psf)	
			Pos	Neg
Zone 4:	Maximum	10	21.8	-23.7
	Minimum	100	18.6	-20.4
	Door	100.0	18.6	-20.4
	Stud	27.0	20.4	-22.3
Zone 5:	Maximum	10	21.8	-29.2
	Minimum	100.0	18.6	-22.7
	Door	100.0	18.6	-22.7
	Stud	27.0	20.4	-26.4

6.2

ASCE/SEI 7-05 Seismic Load Calculation

Client: Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.
Location: State of ME

Design Classification:

Occupancy Category: II
Importance Category, I_E : 1.00
Site Class: D
ASCE 7 Design Category: D
IRC Design Category: C
Seismic Resisting System: *A13 Light-frame walls with wood shear panels*
Response Factor, R: 6.5
System Overstrength Factor, Ω_o: 3.0
Deflection Amplification Fctor, C_d: 4.0

Response Acceleration: *(ASCE 7, Figs. 22-1, 22-2)*

Short Period (S_s) = 61.657 %g
1-Second Period (S_1) = 15.25 %g

Spectral Response Acceleration:

Mapped		Site Coeff.		Maximum		Design	
S_S	S_1	F_a	F_v	S_{MS}	S_{M1}	S_{DS}	S_{D1}
0.62	0.15	1.31	2.19	0.81	0.33	0.54	0.22

Fundamental Period: *(ASCE 7, Sec.12.8.1.1)*

Period Coefficient, C_T = 0.020
Height to Highest Level , h_n = 10.8 ft $T_a = C_T h_n^{3/4}$ =   0.119 sec

Seismic Response Coefficient: *(Lateral Force Procedure, ASCE 7, Sec. 9.5.5.2)*

$$C_{s\,min} = 0.044 S_{DS} I_E = 0.024$$

$$C_s = \frac{S_{DS}}{R/I_E} = 0.083$$

$$C_{s\,max} = \frac{S_{D1}}{(R/I_E)T} = 0.29$$

Min. For SDC E of F:

$$C_{s\,min} = \frac{0.5 S_1}{R/I_E} = 0.012$$

Sec 12.8.1.1 Design C_s = 0.083

Seismic Response Coefficient: *(Simplified Analysis, Sec. 1617.5)*

$$F =$$

$$C_s = \frac{1.2 S_{DS}}{R} = 0.099$$

Sec 12.14.8 Design C_s = 0.099

Seismic Base Shear:

Base Shear Coefficient, C_s =   0.083 W

Minimum Interconnection Force: *(ASCE 7, Sec. 12.1.3)*

0.133 x S_{DS} =   0.071 W
Min. =   0.050 W
CS_{CXN} =   0.071 W

6.3

ASCE/SEI 7-05 Snow Load Assessment

Client: Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.

Design Parameters:

Eave to ridge Distance, W =	13 ft
Ground Snow Load, p_g =	50 psf
Exposure Factor, C_e =	1.0
Thermal Factor, C_t =	1.1
Importance Factor, I_s =	1.0
Framing Type:	*Trusses/Other*

Snow Density (γ):

$$\gamma = 0.13\,p_g + 14 = \quad 20.5 \text{ pcf}$$
but not more than 30 pcf

Flat-Roof Snow Load (p_f):

$$p_f = 0.7 C_e C_t I p_g = \quad 38.5 \text{ psf}$$

Rain on Snow Surcharge:

	amax =	0.26 deg
pg <= 20 psf	prss =	0.0 psf
	pf =	38.5 psf

Minimum Values for Low-Slope Roofs:
Applicable to roof slopes less than

	Monoslope roofs =	15.0 deg
or	$a_{min} = 70/W + 0.5 =$	5.9 deg
		2.38 deg
	amin =	15.0 deg

$p_g <= 20\,psf$	$p_f = I_s P_g =$	50.0 psf
$p_g > 20\,psf$	$p_f = 20 I_s =$	20.0 psf
	pfmin =	20.0 psf
	$p_f =$	**38.5 psf**

Unbalanced Snow Loads:
Applicable to roof slopes between:

	$a_{max} =$	70.00 deg
$a_{min} = 70/W + 0.5 =$		5.88 deg
	$a_{min} =$	2.38 deg
	governing $a_{min} =$	2.38 deg

Unbalanced Loads:

S =	3.00 /1	
$W = l_u =$	13.0 ft	
$h_d =$	1.31 ft	

p_{ww} (psf)	p_{LW} Ridge (psf)	Length (ft)	Eave (psf)
11.6	54.1	6.1	38.5

Sloped Roof Snow Loads:

a (deg)	C_s $C_t = 1.0$	$C_t = 1.1$	$C_t = 1.2$	p_s (psf)
18.4	1.00	1.00	1.00	38.5

Ice Dams Along Eves[2]:

$$p_s = 2 p_f = \quad 38.5 \text{ psf}$$

Minimum Roof Live Load (Lr): (IBC 1607.11.2.1):

	$R_1 =$	1.0
	$R_2 =$	1
	$F =$	4.0
$L_r = 20 R_1 R_2 =$		20.0 psf
$12 \leq L_r \leq 20$		

Notes: 1. Higher loads may apply were sliding snow or drifting occurs due to aerodynamic shade from higher protions of the building.
2. Applies only to unventilated roofs with less than R-30, and ventilated roofs with less than R-20. No other loads, except dead loads shall be present on the roof when this uniformly distributed load is applied.

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Factory Built Portion

6.4

Lateral Load Analysis (ASCE 7-05)
One-Story Building, Flexible Diaphragm

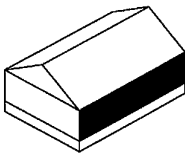**Client:** Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.

Building Geometry:

Ridge Length, B =	26.0 ft
Gable Width, L =	24.0 ft
Module Width =	12.0 ft
Blocking Height, h_b =	18.0 in.
Sidewall/Eve Height, h_e =	130.0 in.
Roof Slope, a =	4.0 /12 pitch
Roof slope, a =	18.4 deg.
Sidewall Overhang, L_{OH} =	12.0 in.
Endwall Overhang, B_{OH} =	12.0 in.

Loading Conditions:

Wind Speed =	100 mph
Exposure Category:	C

Height Above Grade:

Stories Above Grade =	1.0
Sidewall Eave (z) =	12.3 ft
Roof Peak (z) =	16.7 ft
Mean Roof Height (h) =	15.0 ft
Foundation Type:	Raised floor

Seismic Design Parameters:

Seismic Use Group:	II
Importance Category, I_E :	1.00
Site Class:	D
Response Factor, R:	6.5

ASD Adjustment Factor =	0.7
IBC Seismic Design Cat.:	D
IRC Seismic Design Cat.:	C
SD_S =	0.54
C_s =	0.10
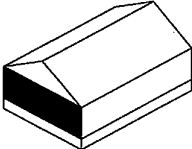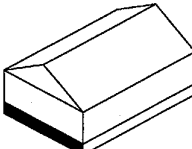
	Ground	Other	Roof
Wall Height, h_w (in.)	108	0	n/a
Wall Dead Weight (psf)	5	0	n/a
Floor/Level Dead Weight (psf)	10	0	20
Bottom Chord Dead Weight (psf)	--	--	10
Seismic Live Load (psf)	0	0	7.7

Transverse Diaphragm Parameters:

Wall Height =	9.0 ft
Vertical Roof Projection =	4.3 ft
Misc. Framing Height =	1.8 ft/level
Blocking Height =	1.5 ft
Endwall Weight =	1340 lbm

Horizontal Wind Pressure (MWFRS)			
	Net Wall	End Zone	25.9
		Interior	17.2
Transverse	**Net Roof**	End Zone	0.0
		Interior	0.0
	Max. Wall	End Zone	14.8
		Interior	11.0
	Max. Roof	End Zone	15.8
		Interior	12.0

MWFRS End Zone, 2a = 6.0 ft

Transverse Lateral Forces		Wind Net	Seismic Weight	Seismic Net
1st of 1 Story	End (plf)	140	--	--
	Interior (plf)	98	--	--
	Diaphragm (plf)	--	732	51
	Endwalls (lbf/wall)	--	670	47
	Force to Endwall Shearwall (lbf)	1523	20380	707
	Level OTM (ft-kip)	13.7	--	6.4
Base of 1 Story	End (plf)	179	--	--
	Interior (plf)	119	--	--
	Diaphragm (plf)	--	308	21
	Endwalls (lbf/wall)	--	670	47
	Force to Endwall Foundation (lbf)	3431	29715	1031
	Base OTM (ft-kip)	20.0		8.3

7.1

Lateral Load Analysis (ASCE 7-05)
One-Story Building, Flexible Diaphragm
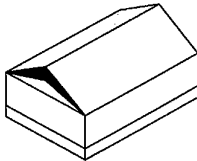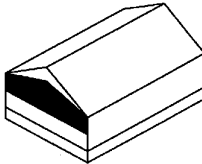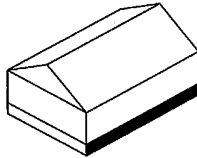
Client: Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.

Longitudinal Diaphragm Parameters:

Wall Height =	9.0 ft
Vertical Roof Projection =	4.3 ft
Misc. Framing Height =	1.8 ft/level
Blocking Height =	1.5 ft
Sidewall Weight =	1170 lbm

Horizontal Wind Pressure (MWFRS)			
	Net Wall	End	19.2
		Interior	12.8
Logitudinal	Net Roof	End	--
		Interior	--
	Max. Wall	End	14.8
		Interior	11.0
	Max. Roof	End	--
		Interior	--

MWFRS End Zone, 2a =   6.0 ft

Longitudinal Lateral Forces	Wind Net	Seismic Weight	Seismic Net
1st of 1 Story			
End Max (plf)	143	--	--
Min (plf)	104	--	--
Interior Max (plf)	124	--	--
Min (plf)	95	--	--
Diaphragm (plf)	--	778	54
Sidewalls (lbf/wall)	--	585	41
Force to Sidewall Shearwall (lbf)	1449	9915	688
Level OTM (ft-lbf)	13.0	--	6.2
Roof Diaphgram Only			
End Max (plf)	19	--	--
Min (plf)	0	--	--
Interior Max (plf)	28	--	--
Min (plf)	13	--	--
Diaphragm (plf)	--	718	50
Force to Sidewall Shearwall (lbf)	173	8615	598
Ceiling Diaphgram Only			
End Max (plf)	123	--	--
Min (plf)	104	--	--
Interior Max (plf)	97	--	--
Min (plf)	82	--	--
Diaphragm (plf)	--	60	4
Force to Sidewall Shearwall (lbf)	1277	715	50
Base of 1 Story			
End Zone (plf)	133	--	--
	--	--	--
Interior (plf)	88	--	--
	--	--	--
Diaphragm (plf)	--	309	21
Sidewalls (lbf/wall)	--	585	41
Force to Sidewall Foundation (lbf)	2777	4290	986
Base OTM (ft-lbf)	18.1	--	8.0

7.2

Transverse Diaphragm Design (ASCE 7-05)

Client: Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.

Building Geometry:

Total Width, L =	24.0 ft
Blocking Height, h_b =	18.0 in.
Sidewall/Eve Height, h_e =	130.0 in.
Roof Slope, a =	4.0 /12 pitch
Roof slope, a =	18.4 deg.
Sidewall Overhang, L_{OH} =	12.0 in.
Endwall Overhang, B_{OH} =	12.0 in.
Vertical Roof Projection =	4.3 ft
Wall Height =	9.0 ft (max.)
Misc. Framing Height =	1.8 ft/level

Wind Loading Conditions:

Wind Speed =	100 mph
Exposure Category:	C
End Zone Length, 2a =	6.00 ft

Height Above Grade:

Stories Above Grade =	1.0
Sidewall Eave (z) =	12.3 ft
Roof Peak (z) =	16.7 ft
Mean Roof Height (h) =	15.0 ft

PFS Corporation Northeast Region APPROVED R Wenner - 1 5/15/14 Approval limited to Factory Built Portion

Seismic Design Parameters:

Seismic Use Group:	II
Importance Category, I_E :	1.00
Site Class:	D
Seismic Resisting System:	A13 Light-frame walls with wood shear panels
Response Factor, R:	6.5
Overstrength Factor, Ω_o:	3.0
Deflection Amp. Factor, C_d:	4.0
Analysis Procedure:	ASCE 7, Section 12.8 Simplified Analysis
ASD Adjustment Factor =	0.7
Seismic Design Cat.:	D
IRC Seismic Design Cat.:	C
S_{DS} =	0.54
C_S =	0.099
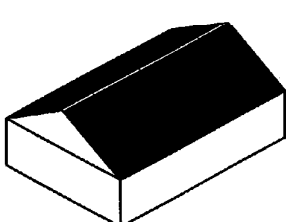
	Ground	Other	Roof
Wall Height, h_w (in.)	108	0	n/a
Wall Dead Weight (psf)	5	0	n/a
Floor/Level Dead Weight (psf)	10	0	20
Seismic Live Load (psf)	0	0	7.7

Effective Seismic Weight at Roof Level =	732 plf
Effective Seismic Weight at Floor Level =	375 plf
Additional Endwall Dead Weight =	1080 lbm

NET Horizontal Wind Loads (MWFRS)

Transverse	Wall	End Zone	25.9
		Interior	17.2
	Roof	End Zone	0.0
		Interior	0.0
Logitudinal	Wall	End Zone	19.2
		Interior	12.8
	Roof	End Zone	--
		Interior	--

Diaphgram Loads

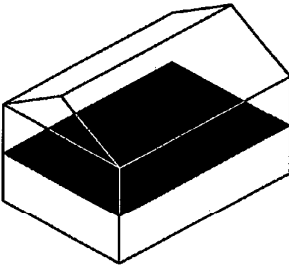|	Zone	Wind	Seismic
Roof Diaphgram	End (plf)	140	--
	Interior (plf)	98	51
	Endwall Surcharge (lbf)	--	75
Above Ground Floor Diaphgram	End Zone (plf)	280	--
	Interior (plf)	187	26
	Endwall Surcharge (lbf)	--	75
Ground Level Floor Diaphgram	End Zone (plf)	140	--
	Interior (plf)	93	13
	Endwall Surcharge (lbf)	--	37

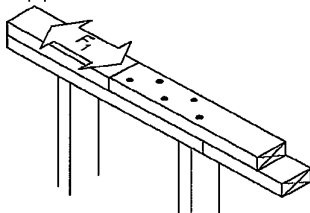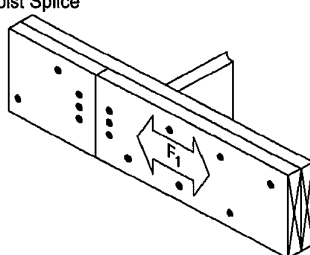## Transverse Diaphragm Design (ASCE 7-05)

Roof Diaphragm
(Case 1, No Unblocked Edges or Continuous Joints Parallel to Load)

Sheathing Configuration: 7/16" Sheathing (Case 1)
Framing Species: SPF

Fastener: 0.131"x2.5" Nails

Type	Ratio	Boundary	Edge	Field	Wind	Seismic	Max. Module Length (ft)
Unblocked	3	6	6	12	296	212	72
Blocked	4	6	6	12	328	235	96
Blocked	4	4	6	12	438	313	96

Fastener: 1.5" x 16 Ga. Staples

Type	Ratio	Boundary	Edge	Field	Wind	Seismic	Max. Module Length (ft)
Unblocked	3	6	6	6	178	127	72
Blocked	3	6	6	6	270	193	72

Fastener: 1.5" x 15 Ga. Staples

Type	Ratio	Boundary	Edge	Field	Wind	Seismic	Max. Module Length (ft)
Unblocked	3	6	6	12	224	160	72
Blocked	4	6	6	12	333	238	96

8.1

Transverse Diaphragm Design (ASCE 7-05)

Above Grade Floor Diaphragm (Case 1, No Unblocked Edges or Continuous Joints Parallel to Load)

Sheathing Configuration: 19/32" Sheathing (Case 1)
Framing Species: SPF

Fastener: 0.131"x2.5" Nails

Type	Ratio	Boundary	Edge	Field	Wind	Seismic	Max. Module Length (ft)
Unblocked	3	6	6	12	309	221	72
Blocked	4	6	6	12	348	248	83
Blocked	4	4	6	12	464	331	96

Fastener: 1.5" x 16 Ga. Staples

Type	Ratio	Boundary	Edge	Field	Wind	Seismic	Max. Module Length (ft)
Unblocked	3	6	6	6	178	127	39
Blocked	3	6	6	6	270	193	63

Fastener: 1.5" x 15 Ga. Staples

Type	Ratio	Boundary	Edge	Field	Wind	Seismic	Max. Module Length (ft)
Unblocked	3	6	6	12	224	160	51
Blocked	4	6	6	12	333	238	79

Grade Level Floor Diaphragm (Case 1, No Unblocked Edges or Continuous Joints Parallel to Load)

Sheathing Configuration: 19/32" Sheathing (Case 1)
Framing Species: SPF

Fastener: 0.131"x2.5" Nails

Type	Ratio	Boundary	Edge	Field	Wind	Seismic	Max. Module Length (ft)
Unblocked	3	6	6	12	309	221	72
Blocked	4	6	6	12	348	248	96
Blocked	4	4	6	12	464	331	96

Fastener: 1.5" x 16 Ga. Staples

Type	Ratio	Boundary	Edge	Field	Wind	Seismic	Max. Module Length (ft)
Unblocked	3	6	6	6	178	127	72
Blocked	3	6	6	6	270	193	72

Fastener: 1.5" x 15 Ga. Staples

Type	Ratio	Boundary	Edge	Field	Wind	Seismic	Max. Module Length (ft)
Unblocked	3	6	6	12	224	160	72
Blocked	4	6	6	12	333	238	96

Connection (fastener size and position exaggerated for illustration purposes)	Module Length (ft)	Chord Force (F_1) (lbf)	Quantity Each Side of Joint	
			Fastener: 0.131" x 3" Nails	Fastener: 2.5" x 15 Ga Staples
Double top plate	40	822	12	12
	45	1041	12	15
	50	1285	12	18
	60	1851	15	26
	70	2519	20	35
	80	3290	25	46
4-ft minimum lap. Fasteners at 2" on center in multiple rows 2" (min.) apart				
Rim Joist Splice	40	1575	12	22
	45	1993	16	28
	50	2461	19	35
	60	3544	27	50
	70	4824	37	67
	80	6300	48	88
4-ft minimum lap. Fasteners at 2" on center in multiple rows 2" (min.) apart				

9.2

Shearwall Design (ASCE 7-05)

Client: Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.
Wall Line: Bracing 1st Story, Longitudinal Wall Line A

Design Parameters:

	Shear	OTM
Wind Shear =	1449 lbf	13.0 ft-kip
Seismic Shear =	688 lbf	6.2 ft-kip
Response Factor, R:	6.5	
IBC Seismic Design Cat.:	D	

26'-0" Length, 16'-8" O/A Height
100 mph (Exp C), SDC D
Bracing 1st Story

Overall Wall Geometry:

Wall Height =	9.0 ft
Overall Wall Length =	26.0 ft
Wind Exposure:	Exterior
Items Supported:	Sidewall
	Roof Only
Top of Openings =	80.0 in. AFF
Dimensioning Method:	Center

Opening Definitions:

	Mark	Rough Opening Width	Rough Opening Height	Type
1	SJ	32	86	Door
2	A2416-3	95	21	Window
3				
4				
5				
6				
7				
8				

Opening Locations:

	Mark	Location (ft)	Location (in.)
1	A2416-3	6.0	0
2	SJ	17.0	0
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

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Approval limited to
Factory Built Portion**

Note: Field fastners spaced at 6" oc for 3/8" and 7/16" panels on studs 24" oc. For 16" oc studs or other panel thicknesses, space fasteners at 12" oc.

Shearwall Sheathing Design:

Perforated Method

Perf. Wall Length =	16.0 ft
Shear Panel Length =	13.4 ft
Max. Opening Height =	7.1 ft
Perf. Wall Factor =	0.81
Wind Shear =	108 plf
Seismic Shear =	51 plf

Wall Sheathing: 7/16" Structural Sheathing, 0.131"x2.5" Nail 6/12
Back Panel: None
Panel Edge Framing: 1.5-in. edge framing
Min. Framing SG: SPF

Anhorage:

Uplift Force =	-133 plf
Chord Force =	1198 lbf
Wall Start:	9'-11"
Wall End:	26'-0"

Segmented Method

	Wind	Seismic
Cumulative Length (ft)	13.4	13.4
Design Shear (plf)	108.3	51.5

Wall Sheathing: 7/16" Structural Sheathing, 0.131"x2.5" Nail 6/12
Back Panel: None
Panel Edge Framing: 1.5-in. edge framing
Min. Framing SG: SPF

Segment Layout: (w.r.t reference end of wall)

No.	Start	End	No.	Start	End
1	9'-11"	15'-8"	6		
2	18'-4"	26'-0"	7		
3			8		
4			9		
5			10		

Chord Force = 1198 lbf each end of each segment

Shearwall Connection Forces Summary:

Shear Forces:

Out-of-Plane Pressure =	11.7 psf (MWFRS)
	26.4 psf (C&C End)
Out-of-Plane Shear =	52 plf (MWFRS)
	119 psf (C&C)
In-Plane Shear =	108 plf (MWFRS)

Tension/Uplift Forces: (- Upward/+ Downward)

Wind Zone	End	
Top-of-Wall	-96	plf
0.6 x Wall DL	27	plf
Perf. SW Uplift	-133	plf
Bottom of Wall	-203	plf

Chord Force, P = 1198 lbf

9.1
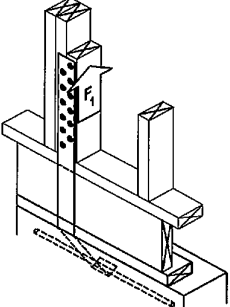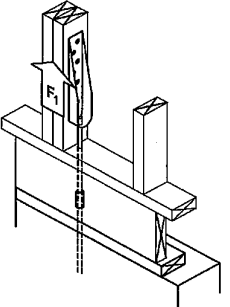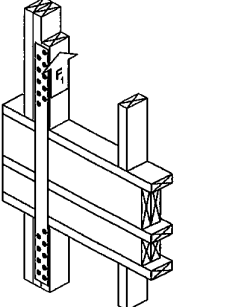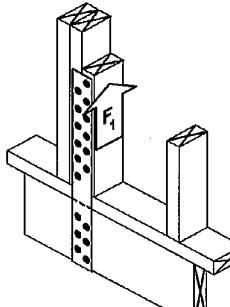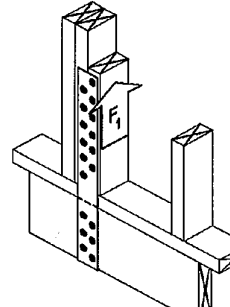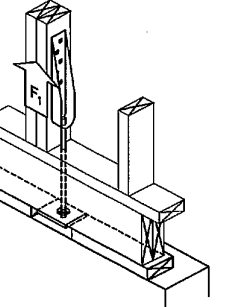
Shearwall Design (cont.)
Wall Line: Bracing 1st Story, Longitudinal Wall Line A

Compression Chord Member Strength:

Chord Force, P = 1198 lbf

			Tabulated	\multicolumn{4}{c}{Stress Adjustment Factors}	\multicolumn{2}{c}{Allowable}
Grade:	STUD								
Species:	SPF		Stress	C_F	C_D	C_r	C_p	Stress	Load
width (b) =	1.5 in.	$F_c =$	725	1.00	1.60	--	0.61	712	5873
depth (d)=	5.5 in.	$F_t =$	350	1.00	1.60	--	--	560	4620
c =	0.8	$F_{c\perp} =$	425	--	--	--	--	425	3506
$l_e/d =$	19.6	$E_{min} =$	440000	--	--	--	--	440000	
$F_{cE} =$	938								

Site-Installed Holdown Options

Concrete Embedded Strap Holdown

Connector: Simpson STHD14RJ
Fasteners: (38) 0.148"x3.25" Nails
Strap Width = 3.0 in.
End Length = 39.6 in.
Chord Studs = 2 Qty Min.
Concrete f'c = 2500 psi min.
End Distance = 1.5 in. min.

Preformed Holdown

Holdown: Simpson HDU2-SDS2.5
Threadrod Dia. = 0.625 in.
Chord Studs = 2 Qty Min.

Strap-Type Holdown (Story-to-Story)

Strap: (1) Simpson CS18
Fasteners: (12) 0.131"x2.5" Nails Each End
Strap Width = 1.25 in.
End Length = 14 in.
Chord Studs = 1 Qty Min.

Plant-Installed Holdown Options

Conventional Strap Holdown

Strap: (1) Simpson CS18
Fasteners: (12) 0.131"x2.5" Nails Each End
Strap Width = 1.25 in.
End Length = 14 in.
Chord Studs = 1 Qty Min.

Pre-Bent Strap Holdown

Connector: Simpson MSTC66B3
Fasteners: (12) 0.148" x 3" Nails
Strap Width = 3 in.
End Length = in.
Chord Studs = 2 Qty Min.

Preformed Holdown

Holdown: Simpson HDU2-SDS2.5
Threadrod Dia. = 0.625 in.
Chord Studs = 2 Qty Min.

Plate Washer Size		
Width	Length	Thk.
3.00	3.0	0.26

Notes: 1. Inset all straps 1.5" from ends of wall or edges of openings by adding framing members to permit installation of sheathing and Cladding fasteners.

2. Couple thread rods using heavy hex couplers rated for chord force.

3. Plant installed, strap-type holdowns must be bent around rim joist and secure to bottom of rim joist with not less than 4 fasteners, or the lowest fastener on the strap must be installed within 1" of the bottom of the rim joist.

9.2

Shearwall Design (cont.)

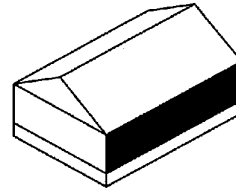**Wall Line: Bracing 1st Story, Longitudinal Wall Line A**

Connection (fastener size and position exaggerated for illustration purposes)	Parameters/Loads	Fastener (minimum length and diameter or staple size)	Quantity per Connection or Spacing
SW Top Plate-to-Truss or Blocking (fastened through 5/8" gypsum)	Stud Spacing = 16 in. oc F_1 = 0 lbf/bay F_2 = 158 lbf/bay F_R = 158 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
	Stud Spacing = 24 in. oc F_1 = 0 lbf/bay F_2 = 238 lbf/bay F_R = 238 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	4 per bay 3 per bay 4 per bay
SW Bottom Plate-to-Rim Joist or Blocking	Stud Spacing = 16 in. oc F_1 = 0 lbf/bay F_2 = 158 lbf/bay F_R = 158 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
	Stud Spacing = 24 in. oc F_1 = 0 lbf/bay F_2 = 238 lbf/bay F_R = 238 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
Sheathing-to-Roof/Ceiling Rail (direct uplift carried by continuous sheathing lapped across joint)	Sheathing Type: OSB Sheathing Thick.: 3/8-in. Tensile Strength: 960 plf Shear Strength: 2951 plf Panel CSI = 0.25 **OK** Min. Panel Width: 8.0 in. F_1 = 108 plf F_2 = 203 plf F_R = 230 plf	0.099"x2" Nail 0.113"x2.5" Nail 0.131"x2.5" Nail 7/16"x2.5"x15 Ga. Staple 7/16"x1.5"x16 Ga. Staple	3-in. oc 4-in. oc 6-in. oc 4-in. oc 3-in. oc
Sheathing-to-Floor Rim Joist (direct uplift carried by continuous sheathing lapped across joint)	Sheathing Type: OSB Sheathing Thick.: 3/8-in. Tensile Strength: 960 plf Shear Strength: 2951.04 plf Panel CSI = 0.25 **OK** Min. Panel Width: 8.0 in. F_1 = 108 plf F_2 = -203 plf F_R = 230 plf	0.099"x2" Nail 0.113"x2.5" Nail 0.131"x2.5" Nail 7/16"x2.5"x15 Ga. Staple 7/16"x1.5"x16 Ga. Staple	3-in. oc 4-in. oc 6-in. oc 4-in. oc 3-in. oc

9.3

Shearwall Design (ASCE 7-05)

Client: Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.
Wall Line: Bracing 1st Story, Longitudinal Wall Line B

26'-0" Length, 16'-8" O/A Height
100 mph (Exp C), SDC D
Bracing 1st Story

Design Parameters:

	Shear	OTM
Wind Shear =	1449 lbf	13.0 ft-kip
Seismic Shear =	688 lbf	6.2 ft-kip
Response Factor, R:	6.5	
IBC Seismic Design Cat.:	D	

Overall Wall Geometry:

Wall Height =	9.0 ft
Overall Wall Length =	26.0 ft
Wind Exposure:	Exterior
Items Supported:	Sidewall
	Roof Only
Top of Openings =	80.0 in. AFF
Dimensioning Method:	Center

Opening Definitions:

	Mark	Rough Opening Width	Rough Opening Height	Type
1	36	36	83	Door
2	A2424	29	29	Window
3				
4				
5				
6				
7				
8				

Opening Locations:

	Mark	Location (ft)	Location (in.)
1	36	17.0	3
2	A2424	23.0	0
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

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> **5/15/14**
> **Approval limited to**
> **Factory Built Portion**

Note: Field fastners spaced at 6" oc for 3/8" and 7/16" panels on studs 24" oc. For 16" oc studs or other panel thicknesses, space fasteners at 12" oc.

Shearwall Sheathing Design:

Perforated Method

Perf. Wall Length =	21.8 ft
Shear Panel Length =	18.8 ft
Max. Opening Height =	6.9 ft
Perf. Wall Factor =	0.85
Wind Shear =	77 plf
Seismic Shear =	37 plf

Wall Sheathing: 7/16" Structural Sheathing, 0.131"x2.5" Nail 6/12
Back Panel: None
Panel Edge Framing: 1.5-in. edge framing
Min. Framing SG: SPF

Anhorage:
Uplift Force =	-91 plf
Chord Force =	818 lbf
Wall Start:	0'- 0"
Wall End:	21'-9"

Segmented Method

	Wind	Seismic
Cumulative Length (ft)	18.8	18.8
Design Shear (plf)	77.1	36.6

Wall Sheathing: 7/16" Structural Sheathing, 0.131"x2.5" Nail 6/12
Back Panel: None
Panel Edge Framing: 1.5-in. edge framing
Min. Framing SG: SPF

Segment Layout: (w.r.t reference end of wall)

No.	Start	End	No.	Start	End
1	0'- 0"	15'-9"	6		
2	18'-9"	21'-9"	7		
3			8		
4			9		
5			10		

Chord Force = 818 lbf each end of each segment

Shearwall Connection Forces Summary:

Shear Forces:

Out-of-Plane Pressure =	11.7 psf (MWFRS)
	26.4 psf (C&C End)
Out-of-Plane Shear =	52 plf (MWFRS)
	119 psf (C&C)
In-Plane Shear =	77 plf (MWFRS)

Tension/Uplift Forces: (- Upward/+ Downward)

Wind Zone	End	
Top-of-Wall	-96	plf
0.6 x Wall DL	27	plf
Perf. SW Uplift	-91	plf
Bottom of Wall	-160	plf

Chord Force, P = 818 lbf

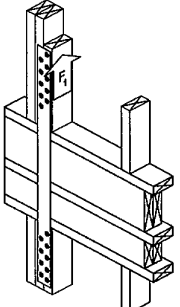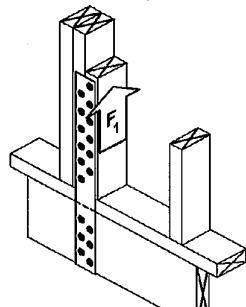9.4

Shearwall Design (cont.)
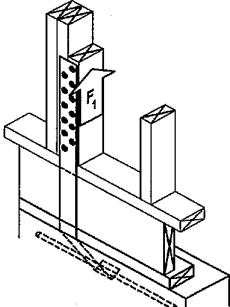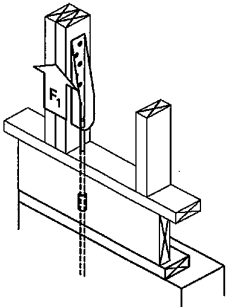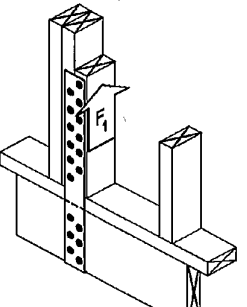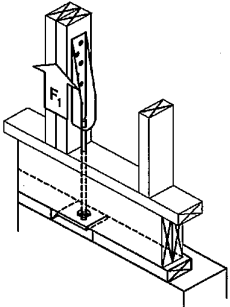
Wall Line: Bracing 1st Story, Longitudinal Wall Line B

Compression Chord Member Strength:

Chord Force, P = 818 lbf

			Tabulated	Stress Adjustment Factors				Allowable	
			Stress	C_F	C_D	C_r	C_p	Stress	Load
Grade:	STUD								
Species:	SPF								
width (b) =	1.5 in.	F_c =	725	1.00	1.60	--	0.61	712	5873
depth (d)=	5.5 in.	F_t =	350	1.00	1.60	--	--	560	4620
c =	0.8	$F_{c\perp}$ =	425	--	--	--	--	425	3506
l_e/d =	19.6	E_{min} =	440000	--	--	--	--	440000	
F_{cE} =	938								

Site-Installed Holdown Options

Concrete Embedded Strap Holdown

Connector: Simpson STHD14RJ
Fasteners: (38) 0.148"x3.25" Nails
Strap Width = 3.0 in.
End Length = 39.6 in.
Chord Studs = 2 Qty Min.
Concrete f'c = 2500 psi min.
End Distance = 1.5 in. min.

Preformed Holdown

Holdown: Simpson HDU2-SDS2.5
Threadrod Dia. = 0.625 in.
Chord Studs = 2 Qty Min.

Strap-Type Holdown (Story-to-Story)

Strap: (1) Simpson CS22
Fasteners: (8) 0.131"x2.5" Nails Each End
Strap Width = 1.25 in.
End Length = 10 in.
Chord Studs = 1 Qty Min.

Plant-Installed Holdown Options

Conventional Strap Holdown

Strap: (1) Simpson CS22
Fasteners: (8) 0.131"x2.5" Nails Each End
Strap Width = 1.25 in.
End Length = 10 in.
Chord Studs = 1 Qty Min.

Pre-Bent Strap Holdown

Connector: Simpson MSTC66B3
Fasteners: (9) 0.148" x 3" Nails
Strap Width = 3 in.
End Length = in.
Chord Studs = 2 Qty Min.

Preformed Holdown

Holdown: Simpson HDU2-SDS2.5
Threadrod Dia. = 0.625 in.
Chord Studs = 2 Qty Min.

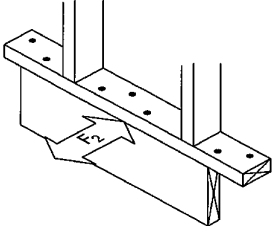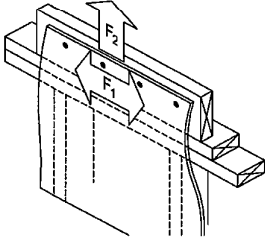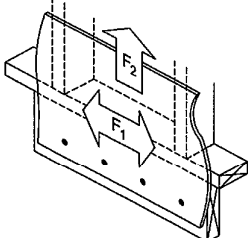| Plate Washer Size		
Width	Length	Thk.
3.00	3.0	0.26

Notes: 1. Inset all straps 1.5" from ends of wall or edges of openings by adding framing members to permit installation of sheathing and Cladding fasteners.
2. Couple thread rods using heavy hex couplers rated for chord force.
3. Plant installed, strap-type holdowns must be bent around rim joist and secure to bottom of rim joist with not less than 4 fasteners, or the lowest fastener on the strap must be installed within 1" of the bottom of the rim joist.

9.5

Shearwall Design (cont.)

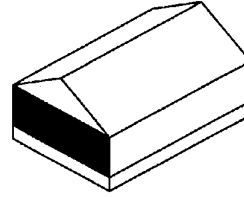### Wall Line: Bracing 1st Story, Longitudinal Wall Line B

Connection (fastener size and position exaggerated for illustration purposes)	Parameters/Loads	Fastener (minimum length and diameter or staple size)	Quantity per Connection or Spacing
SW Top Plate-to-Truss or Blocking (fastened through 5/8" gypsum)	Stud Spacing = 16 in. oc F_1 = 0 lbf/bay F_2 = 158 lbf/bay F_R = 158 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
	Stud Spacing = 24 in. oc F_1 = 0 lbf/bay F_2 = 238 lbf/bay F_R = 238 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	4 per bay 3 per bay 4 per bay
SW Bottom Plate-to-Rim Joist or Blocking	Stud Spacing = 16 in. oc F_1 = 0 lbf/bay F_2 = 158 lbf/bay F_R = 158 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
	Stud Spacing = 24 in. oc F_1 = 0 lbf/bay F_2 = 238 lbf/bay F_R = 238 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
Sheathing-to-Roof/Ceiling Rail (direct uplift carried by continuous sheathing lapped across joint)	Sheathing Type: OSB Sheathing Thick.: 3/8-in. Tensile Strength: 960 plf Shear Strength: 2951 plf Panel CSI = 0.19 **OK** Min. Panel Width: 8.0 in. F_1 = 77 plf F_2 = 160 plf F_R = 178 plf	0.099"x2" Nail 0.113"x2.5" Nail 0.131"x2.5" Nail 7/16"x2.5"x15 Ga. Staple 7/16"x1.5"x16 Ga. Staple	4-in. oc 6-in. oc 6-in. oc 4-in. oc 4-in. oc
Sheathing-to-Floor Rim Joist (direct uplift carried by continuous sheathing lapped across joint)	Sheathing Type: OSB Sheathing Thick.: 3/8-in. Tensile Strength: 960 plf Shear Strength: 2951.04 plf Panel CSI = 0.19 **OK** Min. Panel Width: 8.0 in. F_1 = 77 plf F_2 = -160 plf F_R = 178 plf	0.099"x2" Nail 0.113"x2.5" Nail 0.131"x2.5" Nail 7/16"x2.5"x15 Ga. Staple 7/16"x1.5"x16 Ga. Staple	4-in. oc 6-in. oc 6-in. oc 4-in. oc 4-in. oc

9.6

PFS Corporation
Northeast Region
APPROVED
R Wenner - 1
5/15/14
Approval limited to
Factory Built Portion

Shearwall Design (ASCE 7-05)

Client: Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.
Wall Line: Bracing 1st Story, Transverse Wall Line 1

Design Parameters:

	Shear	OTM
Wind Shear =	1523 lbf	13.7 ft-kip
Seismic Shear =	707 lbf	6.4 ft-kip
Response Factor, R: 6.5		
IBC Seismic Design Cat.: D		

26'-0" Length, 16'-8" O/A Height
100 mph (Exp C), SDC D
Bracing 1st Story

Overall Wall Geometry:

Wall Height =	9.0 ft
Overall Wall Length =	24.0 ft
Wind Exposure:	Exterior
Items Supported:	Endwall
	Roof Only
Top of Openings =	80.0 in. AFF
Dimensioning Method:	Center

Opening Definitions:

	Mark	Rough Opening Width	Height	Type
1	SGD	72.25	81	Door
2	3456	40.25	67	Window
3				
4				
5				
6				
7				
8				

Opening Locations:

	Mark	Location (ft)	(in.)
1	SGD	6.0	0
2	3456	18.0	0
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

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5/15/14
Approval limited to Factory Built Portion

Note: Field fastners spaced at 6" oc for 3/8" and 7/16" panels on studs 24" oc. For 16" oc studs or other panel thicknesses, space fasteners at 12" oc.

Shearwall Sheathing Design:

Perforated Method

Perf. Wall Length =	21.4 ft
Shear Panel Length =	13.0 ft
Max. Opening Height =	6.7 ft
Perf. Wall Factor =	0.67
Wind Shear =	117 plf
Seismic Shear =	54 plf

Wall Sheathing: 7/16" Structural Sheathing, 0.131"x2.5" Nail 6/12
Back Panel: None
Panel Edge Framing: 1.5-in. edge framing
Min. Framing SG: SPF

Anhorage:		
Uplift Force =	-173 plf
Chord Force =	1559 lbf
Wall Start: 0'- 0"	
Wall End: 24'-0"	

Segmented Method

	Wind	Seismic
Cumulative Length (ft)	14.6	13.0
Design Shear (plf)	104.1	54.3

Wall Sheathing: 7/16" Structural Sheathing, 0.131"x2.5" Nail 6/12
Back Panel: None
Panel Edge Framing: 1.5-in. edge framing
Min. Framing SG: SPF

Segment Layout: (w.r.t reference end of wall)

No.	Start	End	No.	Start	End
1	0'- 0"	2'-11"	6		
2	9'-0"	16'-3"	7		
3	19'-8"	24'-0"	8		
4			9		
5			10		

Chord Force = 1559 lbf each end of each segment

Shearwall Connection Forces Summary:

Shear Forces:

Out-of-Plane Pressure =	11.7 psf (MWFRS)
	26.4 psf (C&C End)
Out-of-Plane Shear =	52 plf (MWFRS)
	119 psf (C&C)
In-Plane Shear =	117 plf (MWFRS)

Tension/Uplift Forces: (- Upward/+ Downward)

Wind Zone	End	
Top-of-Wall	-40	plf
0.6 x Wall DL	27	plf
Perf. SW Uplift	-173	plf
Bottom of Wall	-186	plf

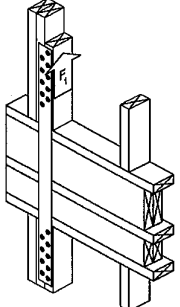Chord Force, P = 1559 lbf

9.7
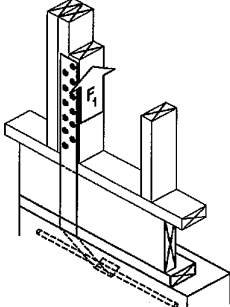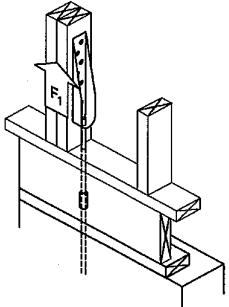
Shearwall Design (cont.)
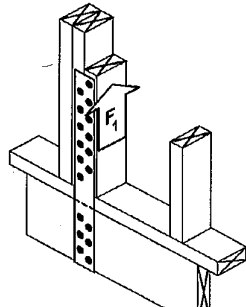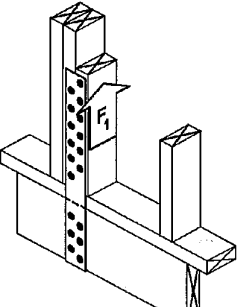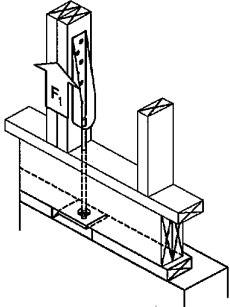### Wall Line: Bracing 1st Story, Transverse Wall Line 1

Compression Chord Member Strength:

Chord Force, P = 1559 lbf

			Tabulated Stress	C_F	C_D	C_r	C_p	Allowable Stress	Load
Grade:	STUD								
Species:	SPF								
width (b) =	1.5 in.	F_c =	725	1.00	1.60	--	0.61	712	5873
depth (d)=	5.5 in.	F_t =	350	1.00	1.60	--	--	560	4620
c =	0.8	$F_{c\perp}$ =	425	--	--	--	--	425	3506
l_e/d =	19.6	E_{min} =	440000	--	--	--	--	440000	
F_{cE} =	938								

Site-Installed Holdown Options

Concrete Embedded Strap Holdown

Connector: Simpson STHD14RJ
Fasteners: (38) 0.148"x3.25" Nails
Strap Width = 3.0 in.
End Length = 39.6 in.
Chord Studs = 2 Qty Min.
Concrete f'_c = 2500 psi min.
End Distance = 1.5 in. min.

Preformed Holdown

Holdown: Simpson HDU2-SDS2.5
Threadrod Dia. = 0.625 in.
Chord Studs = 2 Qty Min.

Strap-Type Holdown (Story-to-Story)

Strap: (1) Simpson CS16
Fasteners: (14) 0.131"x2.5" Nails Each End
Strap Width = 1.25 in.
End Length = 16 in.
Chord Studs = 1 Qty Min.

Plant-Installed Holdown Options

Conventional Strap Holdown

Strap: (1) Simpson CS16
Fasteners: (14) 0.131"x2.5" Nails Each End
Strap Width = 1.25 in.
End Length = 16 in.
Chord Studs = 1 Qty Min.

Pre-Bent Strap Holdown

Connector: Simpson MSTC66B3
Fasteners: (16) 0.148" x 3" Nails
Strap Width = 3 in.
End Length = in.
Chord Studs = 2 Qty Min.

Preformed Holdown

Holdown: Simpson HDU2-SDS2.5
Threadrod Dia. = 0.625 in.
Chord Studs = 2 Qty Min.

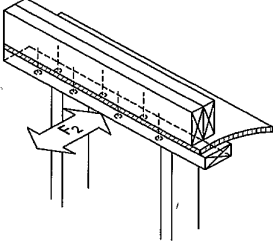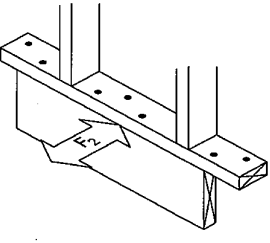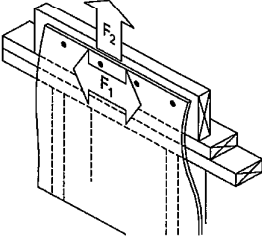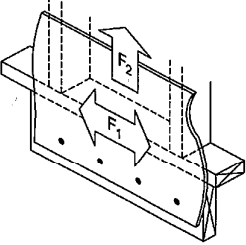| Plate Washer Size		
Width	Length	Thk.
3.00	3.0	0.26

Notes: 1. Inset all straps 1.5" from ends of wall or edges of openings by adding framing members to permit installation of sheathing and Cladding fasteners.
2. Couple thread rods using heavy hex couplers rated for chord force.
3. Plant installed, strap-type holdowns must be bent around rim joist and secure to bottom of rim joist with not less than 4 fasteners, or the lowest fastener on the strap must be installed within 1" of the bottom of the rim joist.

Shearwall Design (cont.)

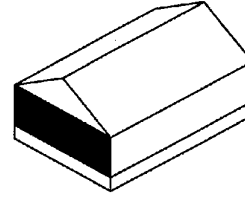**Wall Line: Bracing 1st Story, Transverse Wall Line 1**

Connection (fastener size and position exaggerated for illustration purposes)	Parameters/Loads	Fastener (minimum length and diameter or staple size)	Quantity per Connection or Spacing
SW Top Plate-to-Truss or Blocking (fastened through 5/8" gypsum)	Stud Spacing = 16 in. oc F_1 = 0 lbf/bay F_2 = 158 lbf/bay F_R = 158 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
	Stud Spacing = 24 in. oc F_1 = 0 lbf/bay F_2 = 238 lbf/bay F_R = 238 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	4 per bay 3 per bay 4 per bay
SW Bottom Plate-to-Rim Joist or Blocking	Stud Spacing = 16 in. oc F_1 = 0 lbf/bay F_2 = 158 lbf/bay F_R = 158 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
	Stud Spacing = 24 in. oc F_1 = 0 lbf/bay F_2 = 238 lbf/bay F_R = 238 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
Sheathing-to-Roof/Ceiling Rail (direct uplift carried by continuous sheathing lapped across joint)	Sheathing Type: OSB Sheathing Thick.: 3/8-in. Tensile Strength: 960 plf Shear Strength: 2951 plf Panel CSI = 0.23 **OK** Min. Panel Width: 8.0 in. F_1 = 117 plf F_2 = 186 plf F_R = 220 plf	0.099"x2" Nail 0.113"x2.5" Nail 0.131"x2.5" Nail 7/16"x2.5"x15 Ga. Staple 7/16"x1.5"x16 Ga. Staple	3-in. oc 4-in. oc 6-in. oc 4-in. oc 4-in. oc
Sheathing-to-Floor Rim Joist (direct uplift carried by continuous sheathing lapped across joint)	Sheathing Type: OSB Sheathing Thick.: 3/8-in. Tensile Strength: 960 plf Shear Strength: 2951.04 plf Panel CSI = 0.23 **OK** Min. Panel Width: 8.0 in. F_1 = 117 plf F_2 = -186 plf F_R = 220 plf	0.099"x2" Nail 0.113"x2.5" Nail 0.131"x2.5" Nail 7/16"x2.5"x15 Ga. Staple 7/16"x1.5"x16 Ga. Staple	3-in. oc 4-in. oc 6-in. oc 4-in. oc 4-in. oc

9.9

Shearwall Design (ASCE 7-05)

Client: Excel Homes
Job Number: EXLH042314-42
Description: 31217 Calcs.
Wall Line: Bracing 1st Story, Transverse Wall Line 2

Design Parameters:

	Shear	OTM
Wind Shear =	1523 lbf	13.7 ft-kip
Seismic Shear =	707 lbf	6.4 ft-kip
Response Factor, R:	6.5	
IBC Seismic Design Cat.:	D	

26'-0" Length, 16'-8" O/A Height
100 mph (Exp C), SDC D
Bracing 1st Story

Overall Wall Geometry:

Wall Height =	9.0 ft
Overall Wall Length =	24.0 ft
Wind Exposure:	Exterior
Items Supported:	Endwall
	Roof Only
Top of Openings =	80.0 in. AFF
Dimensioning Method:	Center

Opening Definitions:

		Rough Opening		
	Mark	**Width**	**Height**	**Type**
1	36	36	83	Door
2				
3				
4				
5				
6				
7				
8				

Opening Locations:

		Location	
	Mark	**(ft)**	**(in.)**
1	36	12.0	4
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

PFS Corporation
Northeast Region
APPROVED
R Wenner - 1
5/15/14
Approval limited to
Factory Built Portion

Note: Field fastners spaced at 6" oc for 3/8" and 7/16" panels on studs 24" oc. For 16" oc studs or other panel thicknesses, space fasteners at 12" oc.

Shearwall Sheathing Design:

Perforated Method

Perf. Wall Length =	24.0 ft	
Shear Panel Length =	21.0 ft	
Max. Opening Height =	6.9 ft	
Perf. Wall Factor =	0.86	
Wind Shear =	73 plf	
Seismic Shear =	34 plf	

Wall Sheathing: 7/16" Structural Sheathing, 0.131"x2.5" Nail 6/12
Back Panel: None
Panel Edge Framing: 1.5-in. edge framing
Min. Framing SG: SPF

Anhorage:	Uplift Force =	-84 plf
	Chord Force =	759 lbf
	Wall Start: 0'- 0"	
	Wall End: 24'-0"	

Segmented Method

	Wind	Seismic
Cumulative Length (ft)	21.0	21.0
Design Shear (plf)	72.5	33.7

Wall Sheathing: 7/16" Structural Sheathing, 0.131"x2.5" Nail 6/12
Back Panel: None
Panel Edge Framing: 1.5-in. edge framing
Min. Framing SG: SPF

Segment Layout: (w.r.t reference end of wall)

No.	Start	End	No.	Start	End
1	0'- 0"	10'-10"	6		
2	13'-10"	24'-0"	7		
3			8		
4			9		
5			10		

Chord Force = 759 lbf each end of each segment

Shearwall Connection Forces Summary:

Shear Forces:

Out-of-Plane Pressure =	11.7 psf (MWFRS)
	26.4 psf (C&C End)
Out-of-Plane Shear =	52 plf (MWFRS)
	119 psf (C&C)
In-Plane Shear =	73 plf (MWFRS)

Tension/Uplift Forces: (- Upward/+ Downward)

Wind Zone	End	
Top-of-Wall	-40	plf
0.6 x Wall DL	27	plf
Perf. SW Uplift	-84	plf
Bottom of Wall	-97	plf

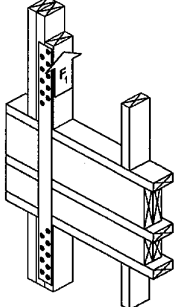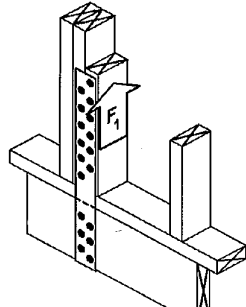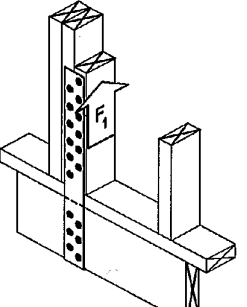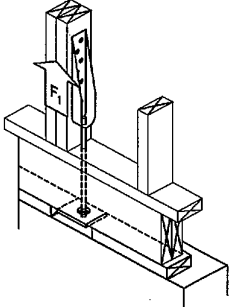Chord Force, P = 759 lbf

9, 10
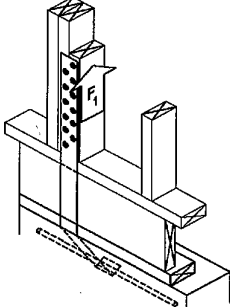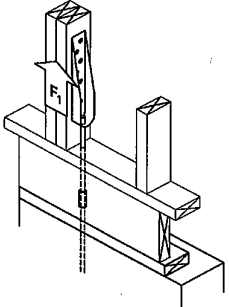
Shearwall Design (cont.)
Wall Line: Bracing 1st Story, Transverse Wall Line 2

Compression Chord Member Strength:

Chord Force, P = 759 lbf

			Tabulated	Stress Adjustment Factors				Allowable	
			Stress	C_F	C_D	C_r	C_p	Stress	Load
Grade:	STUD								
Species:	SPF								
width (b) =	1.5 in.	F_c =	725	1.00	1.60	--	0.61	712	5873
depth (d)=	5.5 in.	F_t =	350	1.00	1.60	--	--	560	4620
c =	0.8	$F_{c\perp}$ =	425	--	--	--	--	425	3506
l_e/d =	19.6	E_{min} =	440000	--	--	--	--	440000	
F_{cE} =	938								

Site-Installed Holdown Options

Concrete Embedded Strap Holdown

Connector: Simpson STHD14RJ
Fasteners: (38) 0.148"x3.25" Nails
Strap Width = 3.0 in.
End Length = 39.6 in.
Chord Studs = 2 Qty Min.
Concrete f'$_c$ = 2500 psi min.
End Distance = 1.5 in. min.

Preformed Holdown

Holdown: Simpson HDU2-SDS2.5
Threadrod Dia. = 0.625 in.
Chord Studs = 2 Qty Min.

Strap-Type Holdown (Story-to-Story)

Strap: (1) Simpson CS22
Fasteners: (8) 0.131"x2.5" Nails Each End
Strap Width = 1.25 in.
End Length = 10 in.
Chord Studs = 1 Qty Min.

Plant-Installed Holdown Options

Conventional Strap Holdown

Strap: (1) Simpson CS22
Fasteners: (8) 0.131"x2.5" Nails Each End
Strap Width = 1.25 in.
End Length = 10 in.
Chord Studs = 1 Qty Min.

Pre-Bent Strap Holdown

Connector: Simpson MSTC66B3
Fasteners: (8) 0.148" x 3" Nails
Strap Width = 3 in.
End Length = in.
Chord Studs = 2 Qty Min.

Preformed Holdown

Holdown: Simpson HDU2-SDS2.5
Threadrod Dia. = 0.625 in.
Chord Studs = 2 Qty Min.

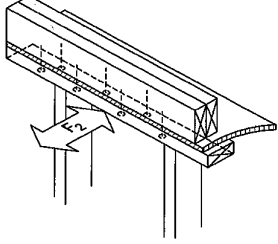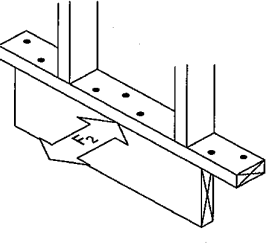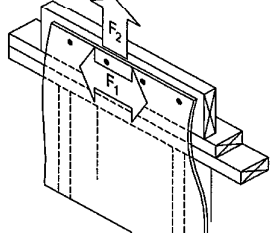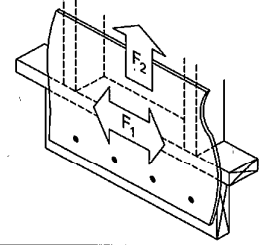| Plate Washer Size		
Width	Length	Thk.
3.00	3.0	0.26

Notes: 1. Inset all straps 1.5" from ends of wall or edges of openings by adding framing members to permit installation of sheathing and Cladding fasteners.
2. Couple thread rods using heavy hex couplers rated for chord force.
3. Plant installed, strap-type holdowns must be bent around rim joist and secure to bottom of rim joist with not less than 4 fasteners, or the lowest fastener on the strap must be installed within 1" of the bottom of the rim joist.
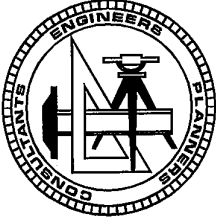
9.11

Shearwall Design (cont.)

Wall Line: Bracing 1st Story, Transverse Wall Line 2

Connection (fastener size and position exaggerated for illustration purposes)	Parameters/Loads	Fastener (minimum length and diameter or staple size)	Quantity per Connection or Spacing
SW Top Plate-to-Truss or Blocking (fastened through 5/8" gypsum)	Stud Spacing = 16 in. oc F_1 = 0 lbf/bay F_2 = 158 lbf/bay F_R = 158 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
	Stud Spacing = 24 in. oc F_1 = 0 lbf/bay F_2 = 238 lbf/bay F_R = 238 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	4 per bay 3 per bay 4 per bay
SW Bottom Plate-to-Rim Joist or Blocking	Stud Spacing = 16 in. oc F_1 = 0 lbf/bay F_2 = 158 lbf/bay F_R = 158 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
	Stud Spacing = 24 in. oc F_1 = 0 lbf/bay F_2 = 238 lbf/bay F_R = 238 lbf/bay	#8 x 3" Screw #10x3" Screw 3"x0.131" Nail	3 per bay 3 per bay 3 per bay
Sheathing-to-Roof/Ceiling Rail (direct uplift carried by continuous sheathing lapped across joint)	Sheathing Type: OSB Sheathing Thick.: 3/8-in. Tensile Strength: 960 plf Shear Strength: 2951 plf Panel CSI = 0.13 **OK** Min. Panel Width: 8.0 in. F_1 = 73 plf F_2 = 97 plf F_R = 121 plf	0.099"x2" Nail 0.113"x2.5" Nail 0.131"x2.5" Nail 7/16"x2.5"x15 Ga. Staple 7/16"x1.5"x16 Ga. Staple	6-in. oc 6-in. oc 6-in. oc 4-in. oc 4-in. oc
Sheathing-to-Floor Rim Joist (direct uplift carried by continuous sheathing lapped across joint)	Sheathing Type: OSB Sheathing Thick.: 3/8-in. Tensile Strength: 960 plf Shear Strength: 2951.04 plf Panel CSI = 0.13 **OK** Min. Panel Width: 8.0 in. F_1 = 73 plf F_2 = -97 plf F_R = 121 plf	0.099"x2" Nail 0.113"x2.5" Nail 0.131"x2.5" Nail 7/16"x2.5"x15 Ga. Staple 7/16"x1.5"x16 Ga. Staple	6-in. oc 6-in. oc 6-in. oc 4-in. oc 4-in. oc

9.12

NTA
Simply Certified.

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PHONE: 574-773-7975 • FAX: 574-773-2732 • WEB: WWW.NTAINC.COM

SLIDING CONNECTIONS

RIM TO SILL:

SIDEWALL A = $\dfrac{2777 \, lbf}{11.5 \, ft}$ = 242 plf   LAPPED SHEATHING WITH 0.131×3" NAILS AT 4" O.C.

SIDEWALL B = $\dfrac{2777 \, lbf}{26 \, ft}$ = 107 plf

ENDWALLS = $\dfrac{3431 \, lbf}{24 \, ft}$ = 143 plf   } LAPPED SHEATHING WITH 0.131×3" NAILS AT 6" O.C.

SILL TO FOUNDATION:

ON-SITE FOR SAME LOADS AS RIM TO SILL

* 0.131×3" NAIL = 108 lbf (WOOD → LAPPED SHEATHING)
** 0.131×3" NAIL = 132 lbf (WOOD → WOOD)

CORNER STUD CONNECTION

$\dfrac{132 \, lbf}{(6/12)}$ = (264 plf)(8 ft) = 2112 lbf → 0.131×3" NAILS AT 6" O.C. FOR FULL HEIGHT OF WALL

10.1

Client: Excel Homes
Job Number: EXLH042314-42
Description: Shear Joist

Member Properties:

LVL Trade Name: Microllam	b =	1.5 in.
LVL MOE (E) = 2000000 psi	d =	9.25 in.
Volume effect (e) = 0.136	A =	27.8 in.²
plies = 2	Ix =	197.9 in.⁴
	Sx =	42.8 in.⁵

Material Properties:

	Tabulated	C_D	C_{Fb}	Allowable	
F_b =	2750	1.60	1.04	4559	psi
F_v =	285	1.60	--	456	psi
$F_{c\perp}$ =	750	--	--	750	psi
E =	2000000	--	--	2000000	psi

Concentrated Loads:

Case	Magnitude	Position
LL	5010 lbf	5'-2"
LL	-5010 lbf	10'-3"
LL	5010 lbf	13'-8"

Uniform Loads:

Case	Magnitude	Position

L Deflection Limit: L / 120
L+ 0.5D Deflection Limit: L / 120

Beam Diagram:

Load Case	0'- 0"		15'-0"
LL	-2144		-2869
DL + LL	-2144		-2869
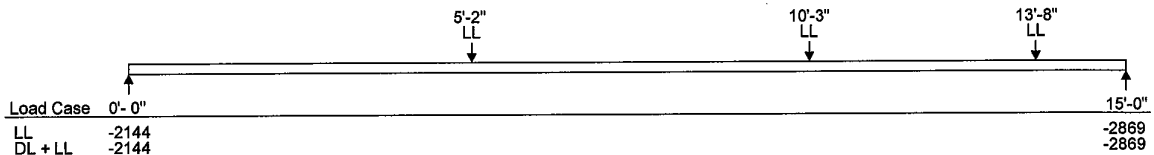
Flexural Strength:

Mu = 132956 in.-lbs
Mn = 195020 in.-lbs
Mu/Mn = 0.68 **OK**

Shear Strength:

Vu = 2869 lbs
Vn = 8436 lbs
Vu/Vn = 0.34 **OK**

Deflection Limits:

LL Deflection: L/ 333 **OK**
LL + 0.5DL Deflection: L/ 333 **OK**

Minimum Bearing at Supports:

Pu = 2869 lbs
Bearing Width, b = 3 in.
Min. Length = 1.3 in.

Notes: 1. Multiple members must be equally loaded or interconnected to transfer load sufficiently between individual members.
2. Restraint against lateral moment and rotation must be provided at all support locations.

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Northeast Region
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5/15/14
Approval limited to
Factory Built Portion**

Client: Excel Homes
Job Number: EXLH042314-42
Description: Shear Joist

Member Properties:

LVL Trade Name: Microllam		$b =$	1.5 in.
LVL MOE (E) =	2000000 psi	$d =$	9.25 in.
Volume effect (e) =	0.136	$A =$	27.8 in.^{2}
plies =	2	$Ix =$	197.9 in.^{4}
		$Sx =$	42.8 in.^{v}

Material Properties:

|	Tabulated	C_D	C_{Fb}	Allowable	
$F_b =$	2750	1.60	1.04	4559	psi
$F_v =$	285	1.60	--	456	psi
$F_{c\perp} =$	750	--	--	750	psi
$E =$	2000000	--	--	2000000	psi

Concentrated Loads:

Case	Magnitude	Position
LL	5010 lbf	3'-3"

Uniform Loads:

Case	Magnitude	Position

L Deflection Limit: L / 120
L+ 0.5D Deflection Limit: L / 120

Beam Diagram:

```
                           3'-3"
                            LL
                            ↓
```

Load Case	0'- 0"		8'-6"
LL	-3096		-1917
DL + LL	-3096		-1917
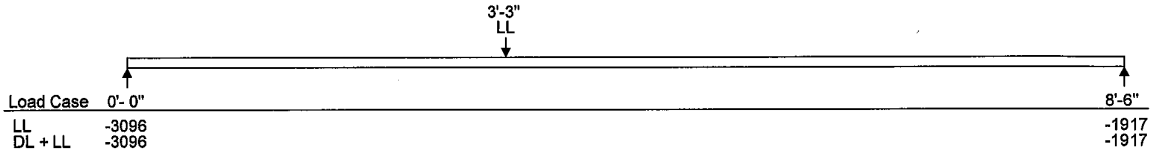
Flexural Strength:

Mu =	120754 in.-lbs	
Mn =	195020 in.-lbs	
Mu/Mn =	0.62	**OK**

Shear Strength:

Vu =	3096 lbs	
Vn =	8436 lbs	
Vu/Vn =	0.37	**OK**

Deflection Limits:

LL Deflection: L/ 392	**OK**	
LL + 0.5DL Deflection: L/ 392	**OK**	

Minimum Bearing at Supports:

Pu =	3096 lbs	
Bearing Width, b =	3 in.	
Min. Length =	1.4 in.	

Notes: 1. Multiple members must be equally loaded or interconnected to transfer load sufficiently between individual members.
2. Restraint against lateral moment and rotation must be provided at all support locations.

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11.2
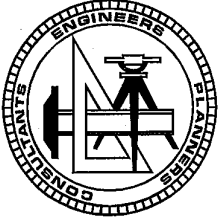
NTA **Simply Certified.**

Truss Connections (16" spacing)

0.131" x 3" nail :
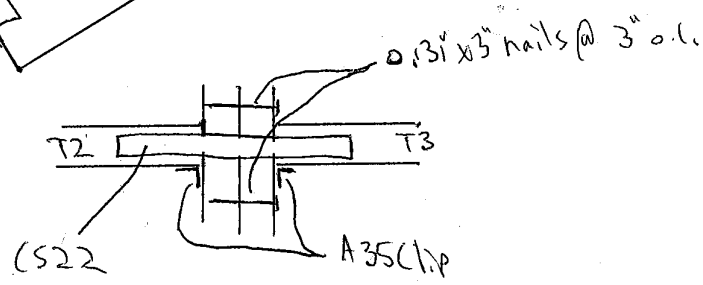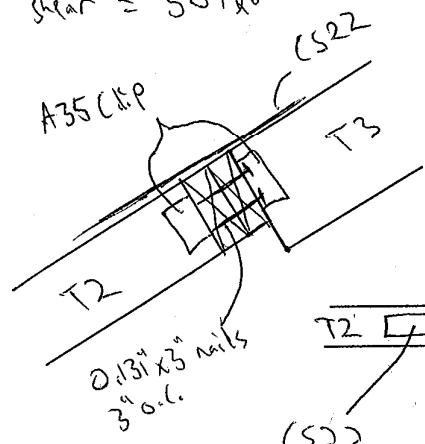shear = 95 lb
End grain shear = 64 lb
Withdrawal = 36 lb

A35 Clip
shear = 564 lb

CS22 strap
Tension = 845 lb

Node 5

Tension = 8 lb
shear = 507 lb
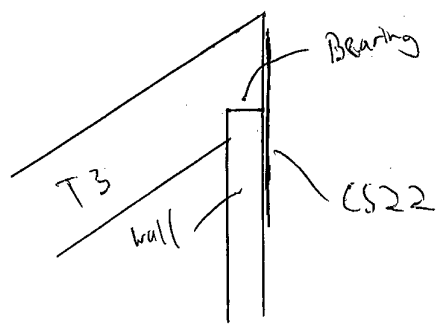
- Attach rails together with 0.131" x 3" nails @ 3" o.c.

- Attach rail to top chord/flip with A35 clip.
- Strap top chord to flip with CS22

0.131" x 3" nails @ 3" o.c.

A35 Clip
CS22
T3
T2
0.131" x 3" nails 3" o.c.

T2 — T3
CS22 — A35 Clip

Node 6
Gravity = 588 lb
Uplift = 129 lb

=> Flip to be bearing on wall
=> Strap flip to wall with CS22 strap

Bearing
T3
Wall
CS22

12.1