Residential
And
Renovation
Engineering

RARE Experience for Well-Done Results

Framing Design
&
Shear Wall (Lateral)

Pascua Yaqui Health Clinic Office Addition
Camino De Oeste & Calle Tetakusim
Pascua Yaqui Indian Reservation, Arizona

for

CDG – Architect

Richard E. Cormier PE
Certification #31571
Expire – 6/30/18

Expires 6/30/2018

Design Assumptions

Code:

IRC 2012
AITC 7-10
Wind speed 90 mph
Soil bearing pressure assumption – 2,000 psf - see Western Technologies report

Roof Dead Load Assumptions:

3-ply membrane roof -	3.0 psf		
½" roof sheathing -	2.0		
Commercial sprinkler system -	5.0		
Insulation & Misc. -	2.0		
½" gypsum ceiling -	2.0		
Total -	14.0 psf	used	15.0 psf

Roof Live Load Assumptions:

LL - 20.0 psf

Wall Load Assumptions: 14.0 psf

Mechanical unit point load – see M1 sheet: 700# x 2} vibration effect = 1400#
[distributed over 3 support members]

Shear-wall Criteria (see drawing for location specifics):

Group/Location	Sheathing	Fasteners	Nailing Edge	Nailing Field
All Exterior Walls	3/8"-Structural Sheathing or OSB	10d	6	12
Interior Wall	½" Gypsum	#6 screws	8	12

Interior gypsum board not included in design

Hold-downs - Simpson (or equivalent) – Htt4 or LSTHD8 Designated - Δ

Drag strut criteria:

East – West {side to side} 250#

North – South {top to bottom} 1,100#

WoodWorks® Shearwalls — SOFTWARE FOR WOOD DESIGN

WoodWorks® Shearwalls 10.42

CDG-Cindy - Pascua Yaqui Clinic Addition
Shear.wsw

May. 26, 2016 14:53:29

Project Information

DESIGN SETTINGS

Design Code	Wind Standard	Seismic Standard
IBC 2012/AWC SDPWS 2008	ASCE 7-10 Directional (All heights)	ASCE 7-10

Load Combinations

For Design (ASD)	For Deflection (Strength)
0.70 Seismic	1.00 Seismic
0.60 Wind	1.00 Wind

Building Code Capacity Modification

Wind	Seismic
1.00	1.00

Service Conditions and Load Duration

Duration Factor	Temperature Range	Moisture Content	
		Fabrication	Service
1.60	T<=100F	19%	10%

Max Shearwall Offset [ft]

Plan (within story)	Elevation (between stories)
0.50	-

Maximum Height-to-width Ratio

Wood panels		Fiberboard	Lumber		Gypsum	
Wind	Seismic		Wind	Seismic	Blocked	Unblocked
3.5	3.5	-	-	-	2.0	1.5

Ignore non-wood-panel shear resistance contribution...

Wind	Seismic
Never	Never

Collector forces based on...

Hold-downs	Applied loads
Drag struts	Applied loads

Shearwall Relative Rigidity: Deflection-based stiffness of wall segments

Design Shearwall Force/Length: Based on wall rigidity/length

SITE INFORMATION

Wind — ASCE 7-10 Directional (All heights)

Design Wind Speed	90mph
Exposure	Exposure C
Enclosure	Partly Enclosed
Min Wind Loads: Walls	16 psf
Roofs	8 psf

Seismic — ASCE 7-10 12.8 Equivalent Lateral Force Procedure

Risk Category	Category II - All others
Structure Type	Regular
Building System	Bearing Wall
Design Category	B
Site Class	D

Topographic Information [ft]

Shape	Height	Length
-	-	-

Site Location: -

Elev: 0ft Avg Air density: 0.0765 lb/cu ft
Rigid building - Static analysis

Spectral Response Acceleration

S1: 0.080g Ss: 0.300g

Fundamental Period	E-W	N-S
T Used	0.137s	0.137s
Approximate Ta	0.137s	0.137s
Maximum T	0.225s	0.225s

Case 2	E-W loads	N-S loads
Eccentricity (%)	15	15
Loaded at	75%	

Response Factor R	2.00	2.00

Fa: 1.56 Fv: 2.40

Structural Data

STORY INFORMATION

	Story Elev [ft]	Floor/Ceiling Depth [in]	Wall Height [ft]	Hold-down Length subject to shrinkage [in]	Hold-down Bolt length [in]
Ceiling	14.83	12.0			
Level 1	1.83	10.0	12.00	13.8	14.5
Foundation	1.00				

BLOCK and ROOF INFORMATION

Block Dimensions [ft]			Roof Panels Face	Type	Slope	Overhang [ft]
Block 1	1 Story	E-W Ridge				
Location X,Y =	0.00	0.00	**North**	Side	0.0	0.00
Extent X,Y =	43.00	22.00	**South**	Side	0.0	0.00
Ridge Y Location, Offset	11.00	0.00	**East**	Gable	0.0	0.00
Ridge Elevation, Height	14.83	0.00	**West**	Gable	0.0	0.00

SHEATHING MATERIALS by WALL GROUP

Grp	Surf	Material	Sheathing Ratng	Thick in	GU in	Ply	Or	Gvtv lbs/in	Fasteners Size	Type	Df	Eg in	Fd in	Bk	Apply Notes
1	Ext	Struct Sh OSB	32/16	3/8	-	3	Horz	83500	10d	Nail	N	6	12	N	3
	Int	Plywood siding	24/0	1/2	-	-	Horz	40000	No. 6	Screw	N	8	12	N	

Legend:
Grp – Wall Design Group number, used to reference wall in other tables
Surf – Exterior or interior surface when applied to exterior wall
Ratng – Span rating, see SDPWS Table C4.2.2.2C
Thick – Nominal panel thickness
GU - Gypsum underlay thickness
Ply – Number of plies (or layers) in construction of plywood sheets
Or – Orientation of longer dimension of sheathing panels
Gvtv – Shear stiffness in lb/in. of depth from SDPWS Tables C4.2.2A-B
Type – Fastener type from SDPWS Tables 4.3A-D: Nail – common wire nail for structural panels and lumber, cooler or gypsum wallboard nail for GWB, plasterboard nail for gypsum lath, galvanised nail for gypsum sheathing; Box - box nail; Casing – casing nail; Roof – roofing nail; Screw – drywall screw
Size - Common, box, and casing nails: refer to SDPWS Table A1 (casing sizes = box sizes).
Gauges: 11 ga = 0.120" x 1-3/4" (gypsum sheathing, 25/32" fiberboard), 1-1/2" (lath & plaster, 1/2" fiberboard); 13 ga plasterboard = 0.92" x 1-1/8".
Cooler or gypsum wallboard nail: 5d = .086" x 1-5/8"; 6d = .092" x 1-7/8"; 8d = .113" x 2-3/8"; 6/8d = 6d base ply, 8d face ply for 2-ply GWB.
Drywall screws: No. 6, 1-1/4" long.
5/8" gypsum sheathing can also use 6d cooler or GWB nail
Df – Deformed nails (threaded or spiral), with increased withdrawal capacity
Eg – Panel edge fastener spacing
Fd – Field spacing interior to panels
Bk – Sheathing is nailed to blocking at all panel edges; Y(es) or N(o)
Apply Notes – Notes below table legend which apply to sheathing side

Notes:
3. Shear capacity for current design has been increased to the value for 15/32" sheathing with same nailing because stud spacing is 16" max. or panel orientation is horizontal. See SDPWS T4.3A Note 2.

FRAMING MATERIALS and STANDARD WALL by WALL GROUP

Wall Grp	Species	Grade	b in	d in	Spcg in	SG	E psi^6	Standard Wall
1	D.Fir-L	Stud	1.50	5.50	16	0.50	1.40	Exterior Perforated

Legend:
Wall Grp – Wall Design Group
b – Stud breadth (thickness)
d – Stud depth (width)
Spcg – Maximum on-centre spacing of studs for design, actual spacing may be less.
SG – Specific gravity
E – Modulus of elasticity
Standard Wall - Standard wall designed as group.

Notes:
Check manufacture requirements for stud size, grade and specific gravity (G) for all shearwall hold-downs.

SHEARLINE, WALL and OPENING DIMENSIONS

North-south Shearlines	Type	Wall Group	Location X [ft]	Extent [ft] Start	Extent [ft] End	Length [ft]	FHS [ft] Wind	FHS [ft] Seismic	Height [ft]
Line 1									
Level 1									
Line 1	Prf	1	0.00	0.00	22.00	22.00	14.00	14.00	12.00
Wall 1-1	Prf	1	0.00	0.00	22.00	22.00	14.00	14.00	-
Opening 1		-	-	14.00	16.50	2.50	-	-	1.50
Line 2									
Level 1									
Line 2	Prf	1	43.00	0.00	22.00	22.00	0.00	0.00	12.00
Wall 2-1	Prf	1	43.00	0.00	22.00	22.00	0.00	0.00	-
Opening 1		-	-	3.00	5.50	2.50	-	-	1.50
Opening 2		-	-	12.00	13.50	1.50	-	-	1.50
Opening 3		-	-	18.00	19.50	1.50	-	-	2.50

East-west Shearlines	Type	Wall Group	Location Y [ft]	Extent [ft] Start	Extent [ft] End	Length [ft]	FHS [ft] Wind	FHS [ft] Seismic	Height [ft]
Line A									
Level 1									
Line A	Prf	1	0.00	0.00	43.00	43.00	23.00	23.00	12.00
Wall A-1	Prf	1	0.00	0.00	43.00	43.00	23.00	23.00	-
Opening 1		-	-	6.00	9.50	3.50	-	-	2.00
Opening 2		-	-	11.50	13.50	2.00	-	-	3.50
Opening 3		-	-	21.50	24.00	2.50	-	-	1.50
Opening 4		-	-	26.50	28.00	1.50	-	-	1.50
Line B									
Level 1									
Line B	Prf	1	22.00	0.00	43.00	43.00	43.00	43.00	12.00
Wall B-1	Prf	1	22.00	0.00	43.00	43.00	43.00	43.00	-

Legend:
Type - Seg = segmented, Prf = perforated, NSW = non-shearwall
Location - dimension perpendicular to wall
FHS - length of full-height sheathing used to resist shear force
Wall Group - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall

Loads

WIND SHEAR LOADS (as entered or generated)

Level 1 Block	F	Element	Load Case	Wnd Dir	Surf Dir	Prof	Location [ft] Start	Location [ft] End	Magnitude [lbs,plf,psf] Start	Magnitude [lbs,plf,psf] End	Trib Ht [ft]
Block 1	W	Wall	Min	W->E	Wind	Line	0.00	22.00	56.0		
Block 1	W	Wall	1	W->E	Wind	Line	0.00	22.00	71.2		
Block 1	E	Wall	Min	W->E	Lee	Line	0.00	22.00	56.0		
Block 1	E	Wall	1	W->E	Lee	Line	0.00	22.00	27.5		
Block 1	W	Wall	1	E->W	Lee	Line	0.00	22.00	27.5		
Block 1	W	Wall	Min	E->W	Lee	Line	0.00	22.00	56.0		
Block 1	E	Wall	1	E->W	Wind	Line	0.00	22.00	71.2		
Block 1	E	Wall	Min	E->W	Wind	Line	0.00	22.00	56.0		
Block 1	S	Wall	Min	S->N	Wind	Line	0.00	43.00	56.0		
Block 1	S	Wall	1	S->N	Wind	Line	0.00	43.00	71.2		
Block 1	N	Wall	1	S->N	Lee	Line	0.00	43.00	44.5		
Block 1	N	Wall	Min	S->N	Lee	Line	0.00	43.00	56.0		
Block 1	S	Wall	1	N->S	Lee	Line	0.00	43.00	44.5		
Block 1	S	Wall	Min	N->S	Lee	Line	0.00	43.00	56.0		
Block 1	N	Wall	1	N->S	Wind	Line	0.00	43.00	71.2		
Block 1	N	Wall	Min	N->S	Wind	Line	0.00	43.00	56.0		

Legend:
Block - Block used in load generation
Accum. = loads from one block combined with another
Manual = user-entered loads (so no block)
F - Building face (north, south, east or west)
Element - Building surface on which loads generated or entered
Load Case - One of the following:
ASCE 7 All Heights: Case 1 or 2 from Fig 27.4-8 or minimum loads from 27.1.5
ASCE 7 Low-rise: Reference corner and Case A or B from Fig 28.4-1 or minimum loads from 28.4.4
Wind Dir - Direction of wind for loads with positive magnitude, also direction of MWFRS.
Surf Dir - Windward or leeward side of the building for loads in given direction
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 trap load
Trib Ht - Tributary height of area loads only

Notes:
All loads entered by the user or generated by program are specified (unfactored) loads.The program applies a load factor of 0.60 to wind loads before distributing them to the shearlines.

WIND C&C LOADS

Block	Building Face	Wind Direction	Level	Magnitude [psf] Interior	Magnitude [psf] End Zone
Block 1	West	Windward	1	23.0	27.1
Block 1	East	Leeward	1	23.0	27.1
Block 1	West	Leeward	1	23.0	27.1
Block 1	East	Windward	1	23.0	27.1
Block 1	South	Windward	1	23.0	27.1
Block 1	North	Leeward	1	23.0	27.1
Block 1	South	Leeward	1	23.0	27.1
Block 1	North	Windward	1	23.0	27.1

BUILDING MASSES

Level 1 Force Dir	Building Element	Block	Wall Line	Profile	Location [ft] Start	Location [ft] End	Magnitude [lbs,plf,psf] Start	Magnitude [lbs,plf,psf] End	Trib Width [ft]
E-W	Roof F1	n/a	1	Line	0.00	22.00	215.0	215.0	
E-W	Roof F1	n/a	2	Line	0.00	22.00	215.0	215.0	
N-S	Roof F1	n/a	A	Line	0.00	43.00	110.0	110.0	
N-S	Roof F1	n/a	B	Line	0.00	43.00	110.0	110.0	
Both	Wall 1-1	n/a	1	Line	0.00	22.00	60.0	60.0	
Both	Wall 2-1	n/a	2	Line	0.00	22.00	60.0	60.0	
Both	Wall A-1	n/a	A	Line	0.00	43.00	60.0	60.0	
Both	Wall B-1	n/a	B	Line	0.00	43.00	60.0	60.0	

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 1

Force Dir	Profile	Location [ft] Start	Location [ft] End	Mag [lbs,plf,psf] Start	Mag [lbs,plf,psf] End
E-W	Point	0.00	0.00	402	402
E-W	Line	0.00	22.00	85.8	85.8
E-W	Point	22.00	22.00	402	402
N-S	Point	0.00	0.00	206	206
N-S	Line	0.00	43.00	53.0	53.0
N-S	Point	43.00	43.00	206	206

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

Notes:
All loads entered by the user or generated by program are specified (unfactored) loads.The program applies a load factor of 0.70 and redundancy factor to seismic loads before distributing them to the shearlines.

Design Summary

SHEARWALL DESIGN

Wind Shear Loads, Flexible Diaphragm
All shearwalls have sufficient design capacity.

Wind Shear Loads, Rigid Diaphragm
All shearwalls have sufficient design capacity.

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.

Seismic Loads, Rigid Diaphragm
All shearwalls have sufficient design capacity.

HOLDDOWN 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.

This Design Summary does not include failures that occur due to excessive story drift (NBC 4.1.8.13 (3)).
Refer to Story Drift table in this report to verify this design criterion. Refer to the Deflection table for possible issues regarding fastener slippage (SDPWS Table C4.2.2D).

Flexible Diaphragm Wind Design
ASCE 7 Directional (All Heights) Loads

SHEAR RESULTS

N-S Shearlines	W Gp	For Dir	H/W-Cub Int	H/W-Cub Ext	ASD Shear Force [plf] V [lbs]	ASD Shear Force [plf] vmax	ASD Shear Force [plf] v	Allowable Shear [plf] Int	Ext	Co	C	Total	V [lbs]	Crit. Resp.
Line 1														
Level 1														
Ln1, Lev1	1	Both	1.0	.60	2986	213.3	213.3	60	218	1.00	A	278	3898	0.77S
E-W Shearlines	**W Gp**	**For Dir**	**H/W-Cub Int**	**H/W-Cub Ext**	**ASD Shear Force [plf] V [lbs]**	**ASD Shear Force [plf] vmax**	**ASD Shear Force [plf] v**	**Allowable Shear [plf] Int**	**Ext**	**Co**	**C**	**Total**	**V [lbs]**	**Crit. Resp.**
Line A														
Level 1														
LnA, Lev1	1	Both	1.0	.60	739	32.1	32.1	60	218	1.00	A	278	6403	0.12S
Line B														
LnB, Lev1	1	Both	1.0	.60	739	17.2	17.2	60	218	1.00	A	278	11971	0.06S

Legend:
Unless otherwise noted, the value in the table for a shearline is the one for wall on the line with the critical design response.
W Gp - Wall design group defined in Sheathing and Framing Materials tables, where it shows associated Standard Wall. "^" means that this wall is critical for all walls in the Standard Wall group.
For Dir - Direction of wind force along shearline.
H/W-Cub – Fibreboard height-to-width factor from SDPWS table 4.3.4 note 3, or Unblocked structural wood panel factor Cub from SDPWS 4.3.3.2 for critical segment on wall.
V - ASD factored shear force. For shearline: total shearline force. For wall: force taken by total of all segments on wall.
vmax - Base shear = ASD factored shear force per unit full height sheathing, divided by perforation factor Co as per SDPWS eqn. 4.3-8 = V/FHS/Co.
v - Design shear force = ASD factored shear force per unit full height sheathing. For wall, it is the largest force on any segment.
Int - Unit shear capacity of interior sheathing; Ext - Unit shear capacity of exterior sheathing. Includes Cub and height-to-width factors.
Co - Perforation factor from SDPWS Table 4.3.3.5.
C - Sheathing combination rule, A = Add capacities, S = Strongest side only, X = Strongest side or twice weakest.
Total - Combined int. and ext. unit shear capacity inc. perforation factor.
V – For wall: Sum of combined shear capacities for all segments on wall. For shearline: sum of all wall capacities on line.
Crit Resp – Critical response = v/Total = design shear force/unit shear capacity for critical segment on wall or shearline.
"S" indicates that the seismic design criterion was critical in selecting wall.

Notes:
Refer to Elevation View diagrams for individual level for uplift anchorage force t for perforated walls given by SDPWS 4.3.6.4.2,4.

HOLD-DOWN DESIGN (flexible wind design)

Level 1 Line-Wall	Posit'n	Location [ft] X	Location [ft] Y	Load Case	Tensile ASD Holddown Force [lbs] Shear	Dead	Uplift	Cmb'd	Hold-down	Cap [lbs]	Crit Resp.
Line 1											
1-1	L End	0.00	0.12	1	2606			2606	HTT4 10d x	3610	0.72
1-1	R End	0.00	13.88	1	2606			2606	HTT4 10d x	3610	0.72
Line A											
A-1	L End	13.63	0.00	Min	390			390	HTT4 10d x	3610	0.11
A-1	R End	42.88	0.00	Min	390			390	HTT4 10d x	3610	0.11
Line B											
B-1	L End	0.12	22.00	Min	207			207	HTT4 10d x	3610	0.06
B-1	R End	42.88	22.00	Min	207			207	HTT4 10d x	3610	0.06

Legend:
Line-Wall:
At wall or opening – Shearline and wall number At vertical element - Shearline
Posit'n - Position of 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
Load Case - Results are for critical load case:
ASCE 7 All Heights: Case 1 or 2 from Fig. 27.4-8
ASCE 7 Low-rise: Windward corner(s) and Case A or B from Fig. 28.4-1
ASCE 7 Minimum loads (27.1.5 / 28.4.4)
Hold-down Forces:
Shear – Wind shear overturning component, based on shearline force, includes perforation factor Co, factored for ASD by 0.60
Dead – Dead load resisting component, factored for ASD by 0.60
Uplift - Uplift wind load component, factored for ASD by 0.60
Cmb'd - Sum of ASD factored overturning, dead and uplift forces. May also include the uplift force t for perforated walls from SDPWS 4.3.6.2.1 when openings are staggered.
Hold-down – Device used from hold-down database
Cap – Allowable ASD tension load
Crit. Resp. - Critical Response = Combined ASD force / Allowable ASD tension load

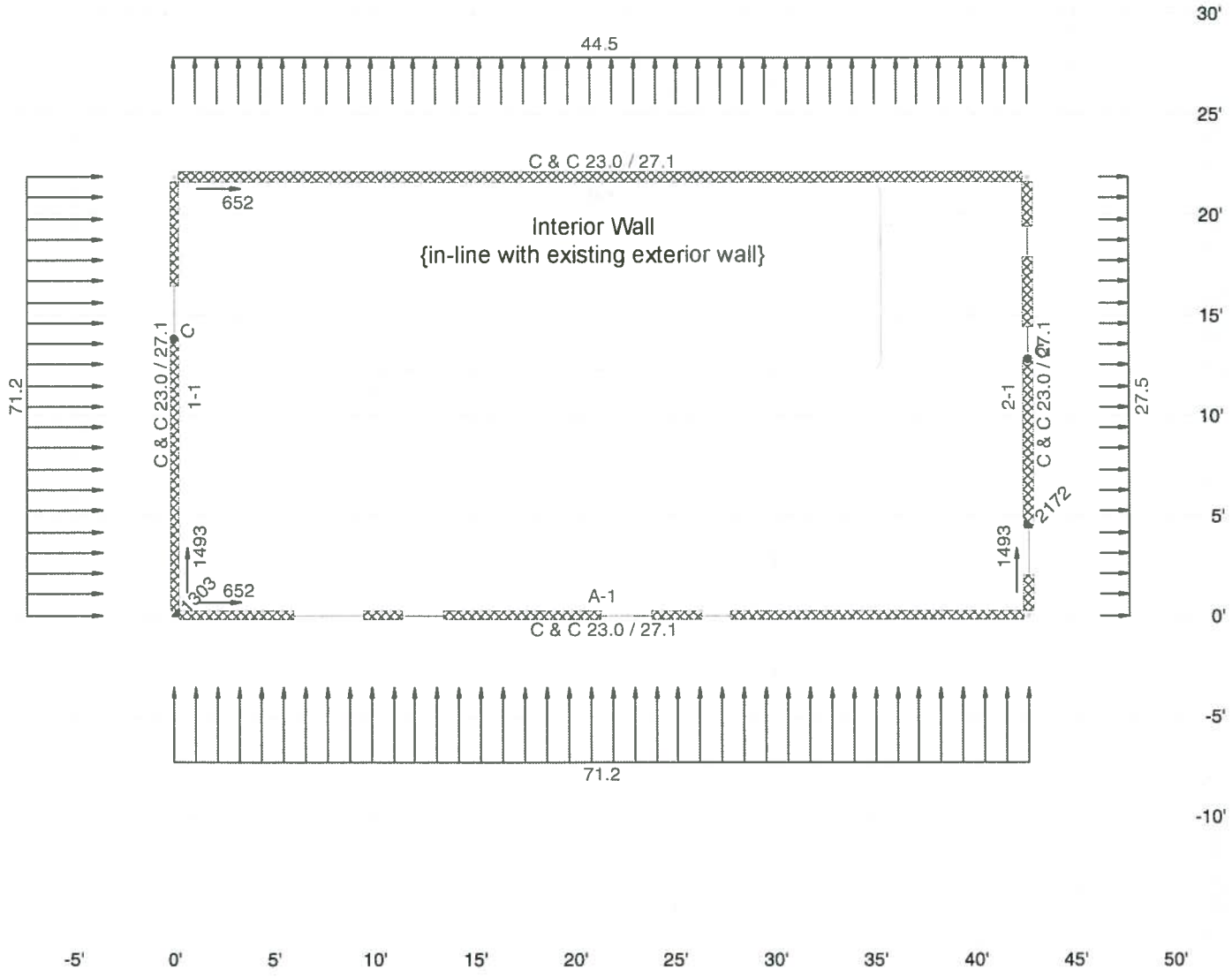
Notes:
Refer to Shear Results table for perforation factors Co.

DRAG STRUT FORCES (flexible wind design)

Level 1 Line-Wall	Position on Wall or Opening	Location [ft] X	Y	Load Case	Drag Strut Force [lbs] --->	<---
Line 1						
1-1	Left Opening 1	0.00	14.00	1	1086	1086
Line A						
A-1	Right Opening 2	13.50	0.00	1	232	232
A-1	Left Opening 3	21.50	0.00	1	112	112
A-1	Right Opening 4	28.00	0.00	1	224	224

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
Load Case - Results are for critical load case:
ASCE 7 All heights Case 1 or 2
ASCE 7 Low-rise corner; Case A or B
Drag strut Force - Axial force in transfer elements at openings and gaps in walls along shearline.
Based on ASD factored shearline force, includes perforation factor Co.
-> Due to shearline force in the west-to-east or south-to-north direction
<- Due to shearline force in the east-to-west or north-to-south direction

Level 1 of 1

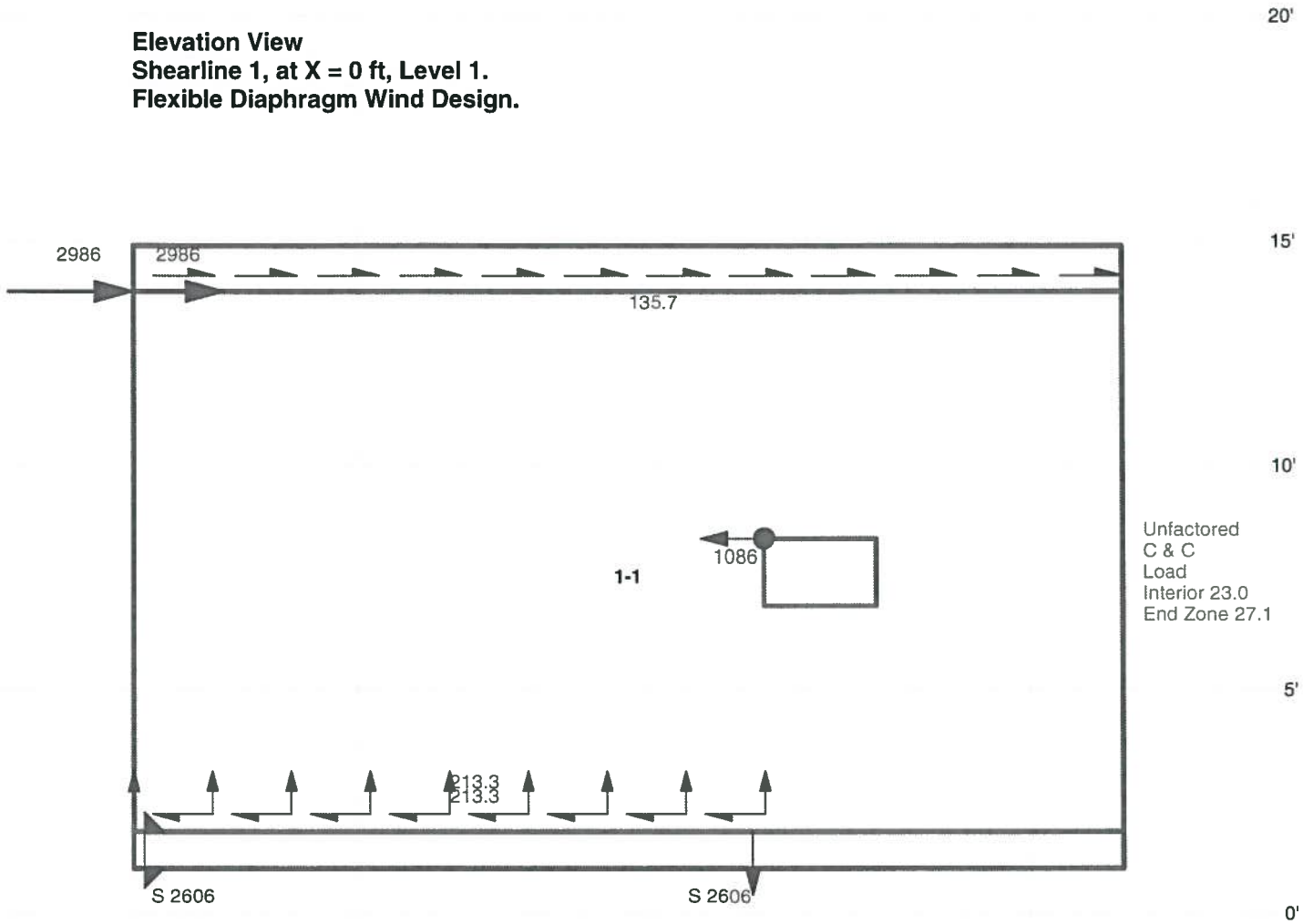


- Factored shearline force (lbs)
- Factored holddown force (lbs)
- C Compression force exists
- Vertical element required
- Unfactored applied shear load (plf)
- Unfactored dead load (plf,lbs)
- Unfactored uplift wind load (plf,lbs)
- Applied point load or discontinuous shearline force (lbs)

Loads Shown: W; Forces: 0.6W + 0.6D.

Orange = Selected wall(s)

Elevation View
Shearline 1, at X = 0 ft, Level 1.
Flexible Diaphragm Wind Design.



Perforated, Co = 1.0

All shearwalls, Design group 1:
Exterior surface:
3/8" Structural sheathing w/ 10d nails @ 6/12"
Shear capacity: 131.0 plf
C&C sheath. load: 13.8 / 16.2 psf; cap. 90.0 psf
Nail withdr. load 21.7 lbs; cap. 151.6 lbs
Interior surface:
1/2" Gypsum WBoard 1-ply w/ No. 6, 1-1/4" screws @ 8/12"
Shear capacity: 60.0 plf
Frame: D.Fir-L @ 16", unblocked
Critical Segment, in Wall 1-1 (cap. includes Co):
Design shear force: 213.3 plf
Combined capacity (added): 278.4 plf

Factored Forces

Vertical
- Holddown force (lbs)
- Compression force (lbs)
- Anchorage force (t) (plf)
- S - Shear overturning (lbs)
- U - Wind uplift (lbs)
- D - Dead (lbs)

Horizontal
- Vs - Shearline force (lbs)
- Vs / diaphragm length / Co (plf)
- V / full height sheathing / Co (plf)
- Drag strut force (lbs)

Factors: S,U = 0.6
D = 0.6 (tens); 1.0 (comp)

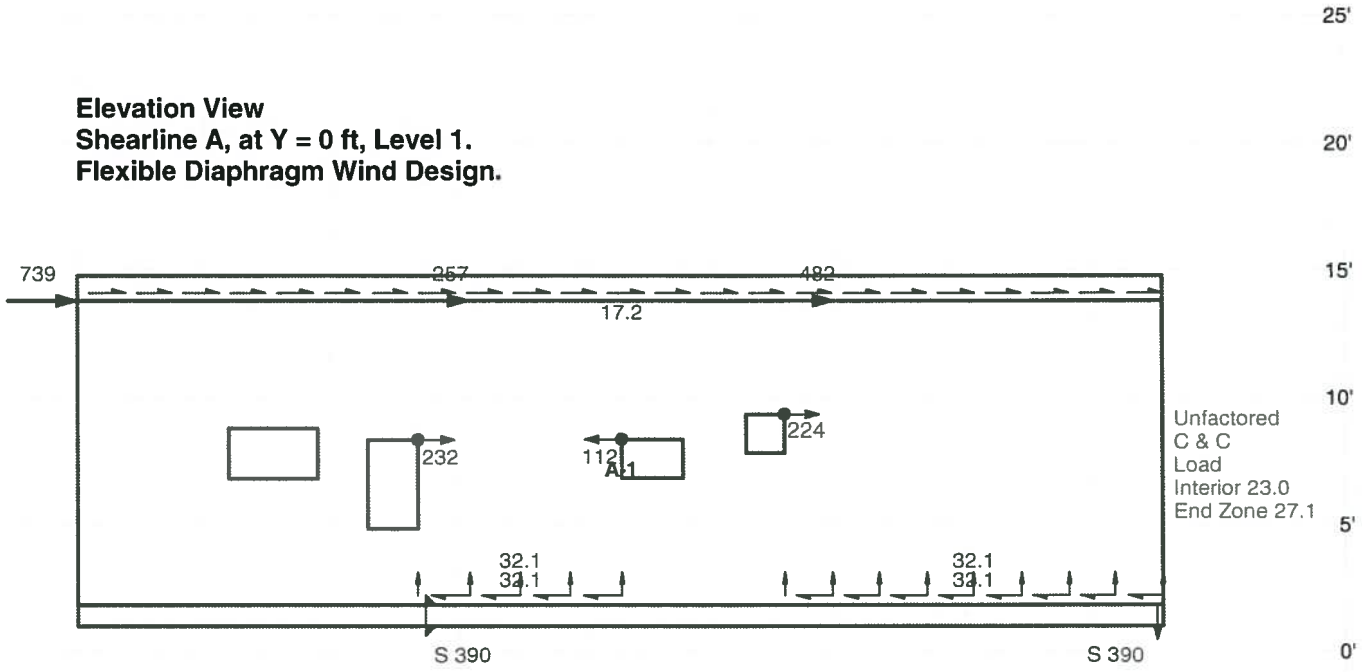
Combined: S - D + U (tens); S + D - U (comp)
S divided by perforation factor Co.

Unfactored Loads
- Dead
- Wind uplift

0' 5' 10' 15' 20' 25'

South **North**

Elevation View
Shearline A, at Y = 0 ft, Level 1.
Flexible Diaphragm Wind Design.



Perforated, Co = 1.0

All shearwalls, Design group 1:
Exterior surface:
3/8" Structural sheathing w/ 10d nails @ 6/12"
Shear capacity: 131.0 plf
C&C sheath. load: 13.8 / 16.2 psf; cap. 90.0 psf
Nail withdr. load 21.7 lbs; cap. 151.6 lbs
Interior surface:
1/2" Gypsum WBoard 1-ply w/ No. 6, 1-1/4" screws @ 8/12"
Shear capacity: 60.0 plf
Frame: D.Fir-L @ 16", unblocked
Critical Segment, in Wall A-1 (cap. includes Co):
Design shear force: 32.1 plf
Combined capacity (added): 278.4 plf

Factored Forces

Vertical
- Holddown force (lbs)
- Compression force (lbs)
- Anchorage force (t) (plf)
- S - Shear overturning (lbs)
- U - Wind uplift (lbs)
- D - Dead (lbs)

Horizontal
- Vs - Shearline force (lbs)
- Vs / diaphragm length / Co (plf)
- V / full height sheathing / Co (plf)
- Drag strut force (lbs)

Factors: S,U = 0.6
D = 0.6 (tens); 1.0 (comp)

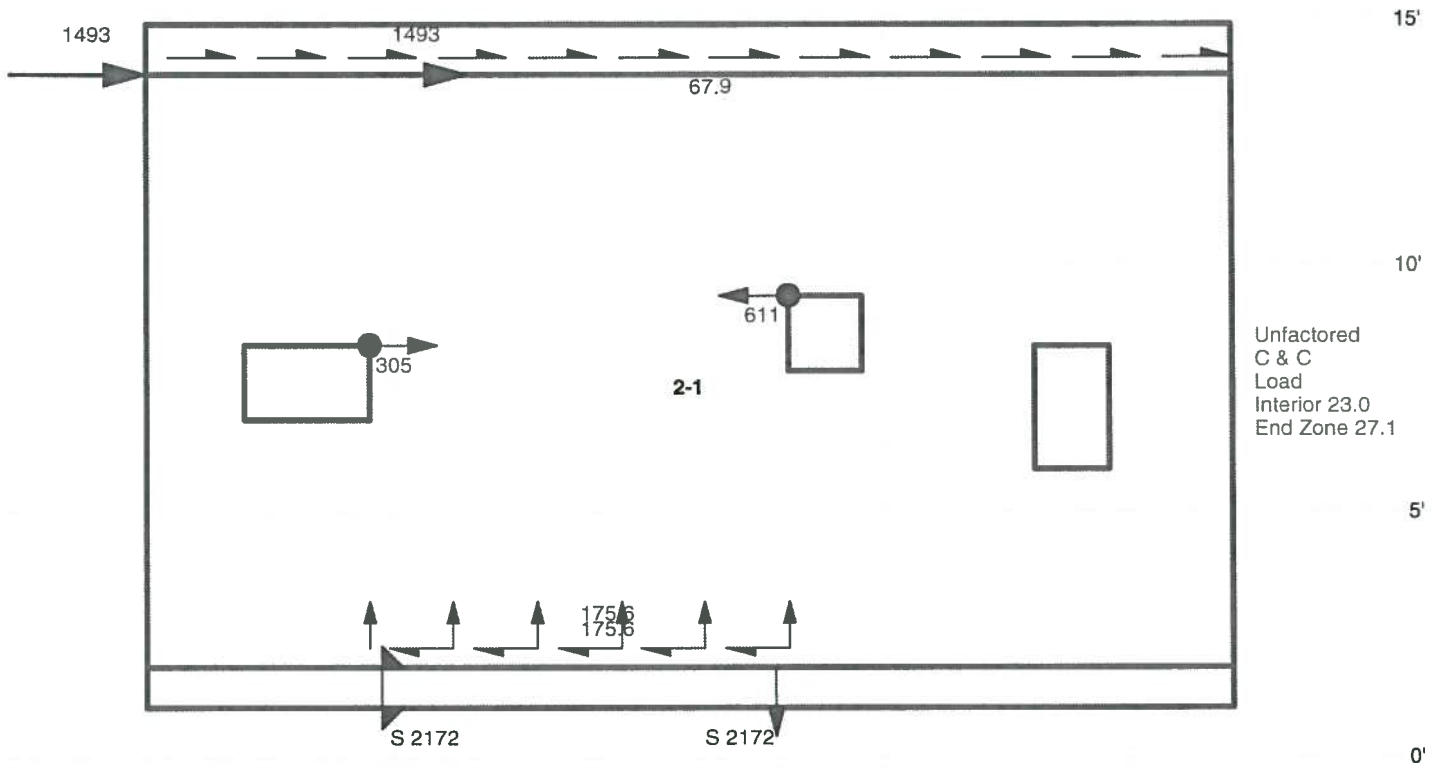
Combined: S - D + U (tens); S + D - U (comp)
S divided by perforation factor Co.

Unfactored Loads
Dead
Wind uplift

0' 5' 10' 15' 20' 25' 30' 35' 40' 45' 50

West **East**

Elevation View
Shearline 2, at X = 43 ft, Level 1.
Flexible Diaphragm Wind Design.



Perforated, Co = 1.0

All shearwalls, Design group 1:
Exterior surface:
5/16" Structural sheathing w/ 10d nails @ 6/12"
Shear capacity: 90.7 plf
C&C sheath. load: 13.8 / 16.2 psf; cap. 46.1 psf
Nail withdr. load 21.7 lbs; cap. 155.3 lbs
Interior surface:
1/2" Gypsum WBoard 1-ply w/ No. 6, 1-1/4" screws @ 8/12"
Shear capacity: 60.0 plf
Frame: D.Fir-L @ 16", unblocked
Critical Segment, in Wall 2-1 (cap. includes Co):
Design shear force: 175.6 plf
Combined capacity (added): 211.2 plf

Factored Forces

Vertical	Horizontal
Holddown force (lbs)	Vs - Shearline force (lbs)
Compression force (lbs)	Vs / diaphragm length / Co (plf)
Anchorage force (t) (plf)	V / full height sheathing / Co (plf)
S - Shear overturning (lbs)	Drag strut force (lbs)
U - Wind uplift (lbs)	Factors: S,U = 0.6
D - Dead (lbs)	D = 0.6 (tens); 1.0 (comp)

Combined: S - D + U (tens); S + D - U (comp)
S divided by perforation factor Co.

Unfactored Loads
Dead Wind uplift

0' 5' 10' 15' 20' 25'

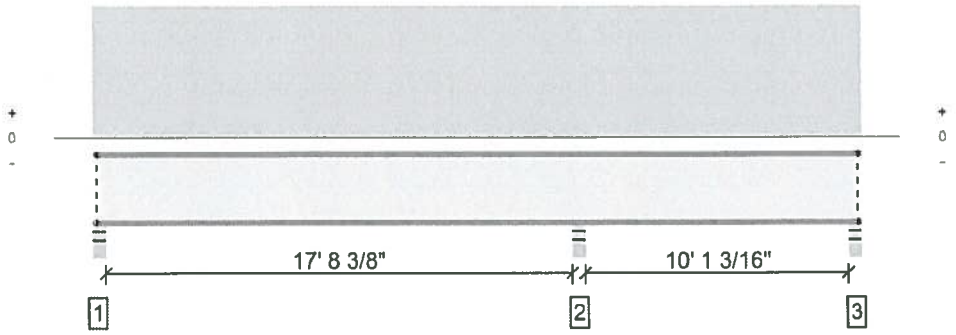
South **North**

FORTE® MEMBER REPORT *Level, Roof: Joist*

1 piece(s) 11 7/8" TJI® 110 @ 16" OC

PASSED

Overall Length: 28' 8 1/8"



All locations are measured from the outside face of left support (or left cantilever end).All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	876 @ 18' 1 5/8"	2419 (3.50")	Passed (36%)	1.25	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	476 @ 17' 11 7/8"	1950	Passed (24%)	1.25	1.0 D + 1.0 Lr (All Spans)
Moment (Ft-lbs)	-1417 @ 18' 1 5/8"	3950	Passed (36%)	1.25	1.0 D + 1.0 Lr (All Spans)
Live Load Defl. (in)	0.156 @ 8' 4 13/16"	0.598	Passed (L/999+)	--	1.0 D + 1.0 Lr (Alt Spans)
Total Load Defl. (in)	0.267 @ 8' 4 5/16"	0.896	Passed (L/807)	--	1.0 D + 1.0 Lr (Alt Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 4' 1 9/16" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.75"	150	203	353	Blocking
2 - Stud wall - SPF	3.50"	3.50"	3.50"	375	500	875	None
3 - Stud wall - SPF	3.50"	3.50"	1.75"	49	98	147	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Spacing	Dead (0.90)	Roof Live (non-snow: 1.25)	Comments
1 - Uniform (PSF)	0 to 28' 8 1/8"	16"	15.0	20.0	Roof
2 - Point (lb)	14' 6"	N/A	-	-	

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The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

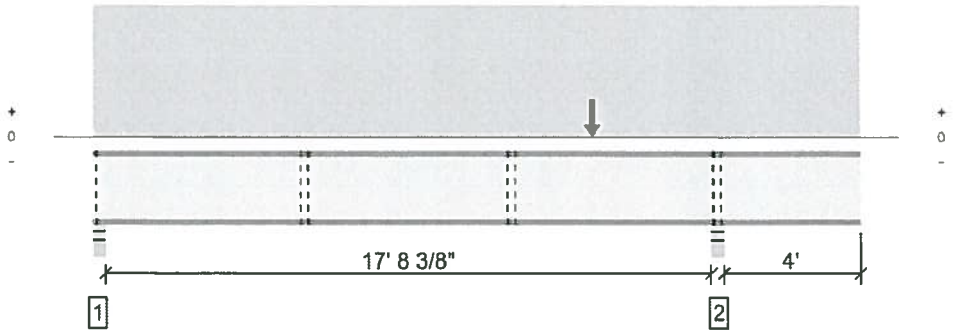
Forte Software Operator	Job Notes
Richard Cormier Residential And Renovation Engineering PLLC (520) 232-3870 richard.cormier@cox.net	

FORTE® MEMBER REPORT *Level, Roof: Joist*

1 piece(s) 11 7/8" TJI® 110 @ 16" OC

PASSED

Overall Length: 22' 3 3/8"



All locations are measured from the outside face of left support (or left cantilever end).All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1192 @ 18' 1 5/8"	2419 (3.50")	Passed (49%)	1.25	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	722 @ 17' 11 7/8"	1404	Passed (51%)	0.90	1.0 D (All Spans)
Moment (Ft-lbs)	2413 @ 14' 6"	2844	Passed (85%)	0.90	1.0 D (All Spans)
Live Load Defl. (in)	0.237 @ 9' 1 1/16"	0.598	Passed (L/909)	--	1.0 D + 1.0 Lr (Alt Spans)
Total Load Defl. (in)	0.742 @ 9' 7 3/8"	0.896	Passed (L/290)	--	1.0 D + 1.0 Lr (Alt Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 2' 9 1/8" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
- Permanent bracing at third points in the back span or a direct applied ceiling over the entire back span length is required at the right end of the member. See literature detail (PB1) for clarification.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.75"	316	238	554	Blocking
2 - Stud wall - SPF	3.50"	3.50"	3.50"	830	362	1192	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Spacing	Dead (0.90)	Roof Live (non-snow: 1.25)	Comments
1 - Uniform (PSF)	0 to 22' 3 3/8"	16"	15.0	20.0	Roof
2 - Point (lb)	14' 6"	N/A	700	-	

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The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Richard Cormier Residential And Renovation Engineering PLLC (520) 232-3870 richard.cormier@cox.net	

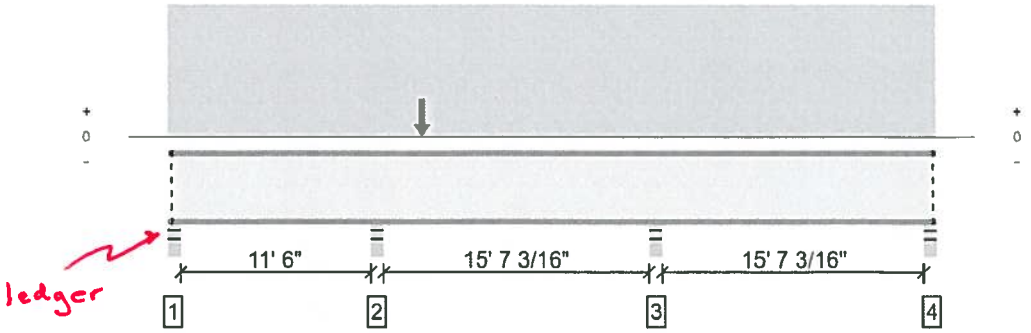
FORTE

MEMBER REPORT *Level, Roof: Joist*

1 piece(s) 11 7/8" TJI® 110 @ 16" OC

PASSED

Overall Length: 43' 10 3/8"



All locations are measured from the outside face of left support (or left cantilever end).All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1389 @ 11' 11 1/4"	2419 (3.50")	Passed (57%)	1.25	1.0 D + 1.0 Lr (Adj Spans)
Shear (lbs)	738 @ 12' 1"	1404	Passed (53%)	0.90	1.0 D (All Spans)
Moment (Ft-lbs)	-1612 @ 11' 11 1/4"	3950	Passed (41%)	1.25	1.0 D + 1.0 Lr (Adj Spans)
Live Load Defl. (in)	0.100 @ 36' 4 5/8"	0.528	Passed (L/999+)	--	1.0 D + 1.0 Lr (Alt Spans)
Total Load Defl. (in)	0.186 @ 18' 11 1/2"	0.795	Passed (L/999+)	--	1.0 D + 1.0 Lr (Alt Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2012
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Bracing (Lu): All compression edges (top and bottom) must be braced at 3' 10 1/2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Roof Live	Total	
1 - Stud wall - SPF	3.50"	3.50"	1.75"	30	138	168	Blocking
2 - Stud wall - SPF	3.50"	3.50"	3.50"	973	417	1390	None
3 - Stud wall - SPF	3.50"	3.50"	3.50"	463	494	957	None
4 - Stud wall - SPF	3.50"	3.50"	1.75"	112	181	293	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Spacing	Dead (0.90)	Roof Live (non-snow: 1.25)	Comments
1 - Uniform (PSF)	0 to 43' 10 3/8"	16"	15.0	20.0	Roof
2 - Point (lb)	14' 6"	N/A	700	-	

Weyerhaeuser Notes

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SUSTAINABLE FORESTRY INITIATIVE

Forte Software Operator	Job Notes
Richard Cormier Residential And Renovation Engineering PLLC (520) 232-3870 richard.cormier@cox.net	

One wood member bolted to a concrete wall

(Stabilized adobe)

Connection Data:
Ledger board:
Lumber-soft D.Fir-L No.2 dry seasoned 1.50 x 11.25" (2 x 12")

Length of member overlap is continuous.

Temperature (T) : T <= 100 deg F

Loads:
Along main member: 100.0 plf permanent duration in tension.

Connector Design:
Fasteners:
Bolt diameter: 3/8"
1 bolts per row
Row Spacing: 27.938"
Penetration depth: 3"

Design Results using CSA O86-14:
Factored load: Q = 100.0 plf
Lateral capacity: Z' = 100.2 plf Ratio: 1.00

!!

WARNING - Designer is responsible for checking the shear capacity of the member

Connection capacity and connector spacing based only on the wood member. Concrete design MUST be checked. Connection only valid for concrete with Fe = 7500 psi and fc' = 2500 psi and bolt embedment in concrete of 3.0 in. or greater.

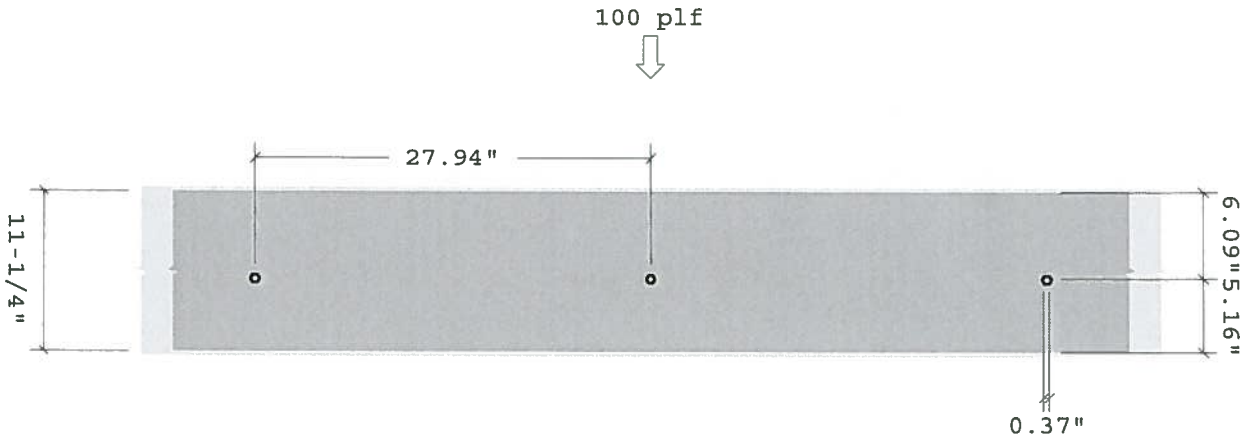
Suggested Design Only, Designer Must Ensure that the Design is Appropriate for Intended Use

Additional Data:
Adjustment factors:

CD	CM	Ct	Cg	Cdelta	Cd	Cst	Cft
0.90	1.00	1.00	1.00	1.00	-	-	1.00

Yield Limit Values (plf):

Im	Is	II	IIIm	IIIs	IV
724.8	176.2	232.6	272.2	111.3	129.5


100 plf
27.94"
11-1/4"
6.09"5.16"
0.37"

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
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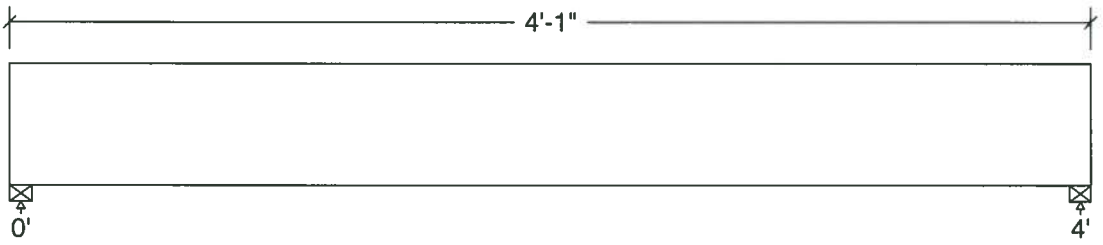
Design Check Calculation Sheet

WoodWorks Sizer 10.42

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Point		0.00		973		lbs
Load2	Dead	Point		1.33		973		lbs
Load3	Dead	Point		2.66		973		lbs
Load4	Dead	Point		3.99		973		lbs
Load5	Roof live	Point		0.00		417		lbs
Load6	Roof live	Point		1.33		417		lbs
Load7	Roof live	Point		2.66		417		lbs
Load8	Roof live	Point		3.99		417		lbs
Self-weight	Dead	Full UDL				5.9		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	1995		1920
Roof Live	850		818
Factored:			
Total	2846		2738
Bearing:			
Capacity			
Beam	2846		2738
Support	3083		2966
Anal/Des			
Beam	1.00		1.00
Support	0.92		0.92
Load comb	#2		#2
Length	1.01		0.97
Min req'd	1.01		0.97
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.08		1.08
Fcp sup	625		625

Pascue Yaqui Door & Window Header

Lumber n-ply, D.Fir-L, No.2, 2x6, 3-ply (4-1/2"x5-1/2")

Supports: All - Timber-soft Beam, D.Fir-L No.2

Total length: 4'-1.0"; volume = 0.7 cu.ft.;

Lateral support: top= at supports, bottom= at supports; Repetitive factor: applied where permitted (refer to online help);

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 88	Fv' = 180	psi	fv/Fv' = 0.49
Bending(+)	fb = 1025	Fb' = 1345	psi	fb/Fb' = 0.76
Live Defl'n	0.02 = <L/999	0.13 = L/360	in	0.13
Total Defl'n	0.08 = L/630	0.20 = L/240	in	0.38

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	180	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	900	1.00	1.00	1.00	1.000	1.300	1.00	1.15	1.00	1.00	-	2
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+Lr, V = 1452, V design = 1452 lbs

Bending(+): LC #2 = D+Lr, M = 1938 lbs-ft

Deflection: LC #2 = D+Lr (live)

LC #2 = D+Lr (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2012

CALCULATIONS:

Deflection: EI = 33.3e06 lb-in2/ply

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
4. BUILT-UP BEAMS: it is assumed that each ply is a single continuous member (that is, no butt joints are present) fastened together securely at intervals not exceeding 4 times the depth and that each ply is equally top-loaded. Where beams are side-loaded, special fastening details may be required.
5. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	June 3, 2016 07:55	CDG-Cindy - Pascua Yaqui Clinic Header

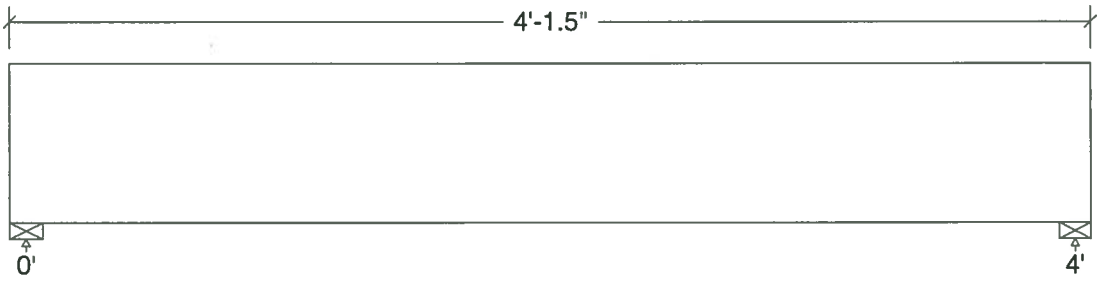
Design Check Calculation Sheet

WoodWorks Sizer 10.42

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Point		0.00		973		lbs
Load2	Dead	Point		1.33		973		lbs
Load3	Dead	Point		2.66		973		lbs
Load4	Dead	Point		3.99		973		lbs
Load5	Roof live	Point		0.00		417		lbs
Load6	Roof live	Point		1.33		417		lbs
Load7	Roof live	Point		2.66		417		lbs
Load8	Roof live	Point		3.99		417		lbs
Self-weight	Dead	Full UDL				5.2		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	2010		1902
Roof Live	857		811
Factored:			
Total	2868		2713
Bearing:			
Capacity			
Beam	2868		2713
Support	3226		3052
Anal/Des			
Beam	1.00		1.00
Support	0.89		0.89
Load comb	#2		#2
Length	1.53		1.45
Min req'd	1.53		1.45
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.13		1.13
Fcp sup	625		625

Pascue Yaqui Door & Window Header

Lumber n-ply, D.Fir-L, No.2, 2x8, 2-ply (3"x7-1/4")

Supports: All - Timber-soft Beam, D.Fir-L No.2

Total length: 4'-1.5"; volume = 0.6 cu.ft.;

Lateral support: top= at supports, bottom= at supports;

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 102	Fv' = 180	psi	fv/Fv' = 0.56
Bending(+)	fb = 897	Fb' = 1072	psi	fb/Fb' = 0.84
Live Defl'n	0.01 = <L/999	0.13 = L/360	in	0.08
Total Defl'n	0.05 = L/955	0.20 = L/240	in	0.25

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	180	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	900	1.00	1.00	1.00	0.993	1.200	1.00	1.00	1.00	1.00	-	2
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.58 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

```
Shear      : LC #2  = D+Lr, V =   1473, V design =   1473 lbs
Bending(+): LC #2  = D+Lr, M =   1965 lbs-ft
Deflection: LC #2  = D+Lr  (live)
            LC #2  = D+Lr  (total)
D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake
All LC's are listed in the Analysis output
Load combinations: ASCE 7-10 / IBC 2012
```

CALCULATIONS:

```
Deflection:  EI =   76.2e06 lb-in2/ply
"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)
Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.
Lateral stability (+): Lu = 4'  Le = 8'-2.88"  RB =    8.92
```

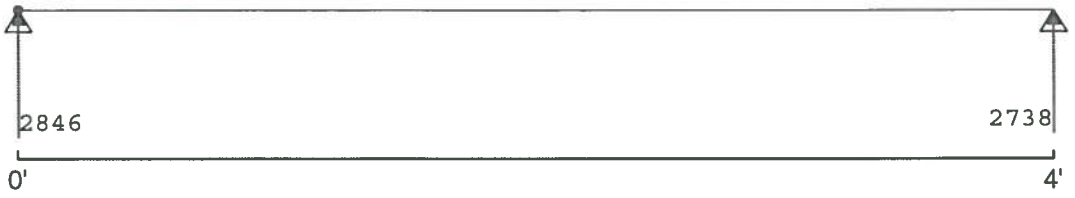
Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
4. BUILT-UP BEAMS: it is assumed that each ply is a single continuous member (that is, no butt joints are present) fastened together securely at intervals not exceeding 4 times the depth and that each ply is equally top-loaded. Where beams are side-loaded, special fastening details may be required.
5. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

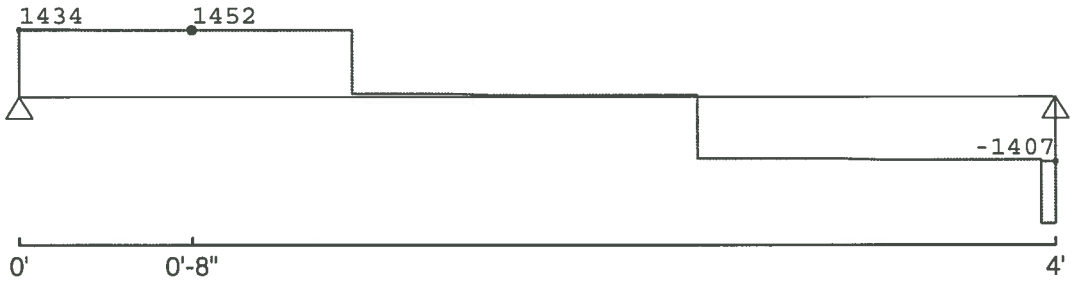
CDG-Cindy - Pascua Yaqui Clinic Header **WoodWorks® Sizer 10.42** **June 3, 2016 07:54:36**
Critical Results

ANALYSIS DIAGRAMS (known section - includes self-weight)

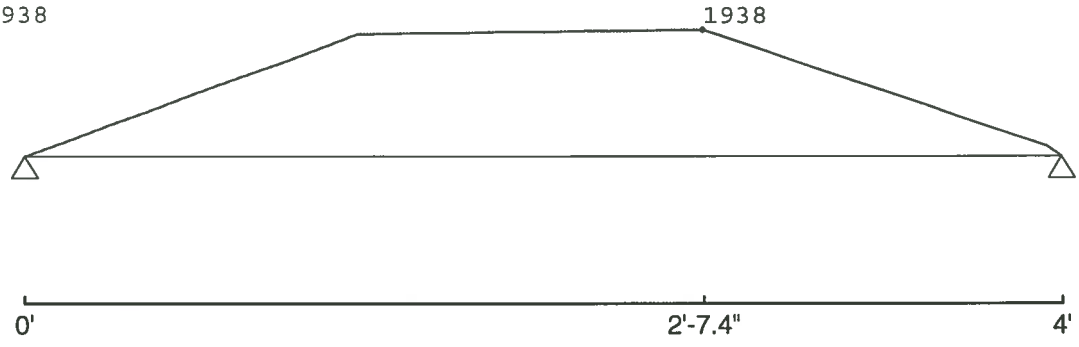
REACTION [lbs]
Maximum...
Uplift: 0
Bearing: 2846



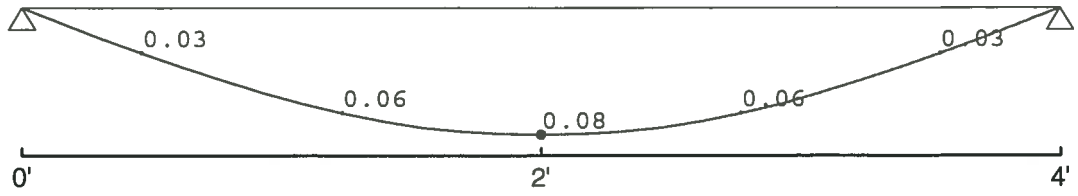
SHEAR [lbs]
Load Combination #2: D+Lr
+V max: 1456
-V max: -2738



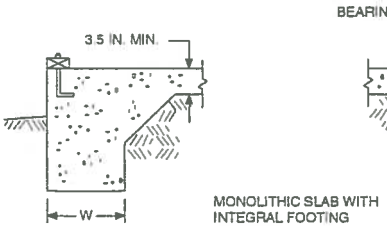
BENDING [lbs-ft]
Load Combination #2: D+Lr
+M max: 1938



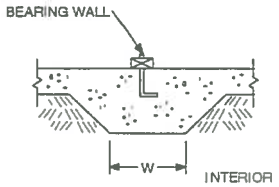
TOTAL DEFLECTION [in]
Load Combination #2: D+Lr
Total = 1.50 x Dead + Live (all others)
Critical Live: 0.02
Critical Total: 0.08

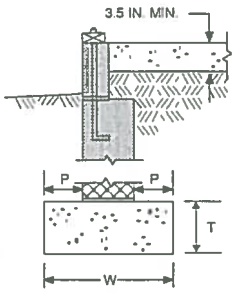


Footings & Grade Beams

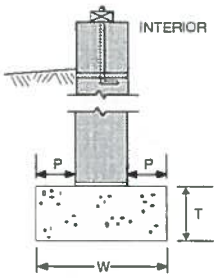


MONOLITHIC SLAB WITH INTEGRAL FOOTING

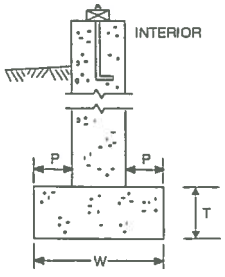




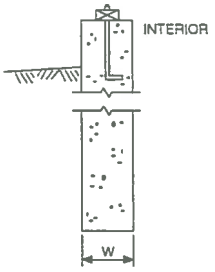
GROUND SUPPORT SLAB WITH MASONRY WALL AND SPREAD FOOTING



BASEMENT OR CRAWL SPACE WITH MASONRY WALL AND SPREAD FOOTING



BASEMENT OR CRAWL SPACE WITH CONCRETE WALL AND SPREAD FOOTING



BASEMENT OR CRAWL SPACE WITH FOUNDATION WALL BEARING DIRECTLY ON SOIL

TABLE R403.1
MINIMUM WIDTH OF CONCRETE OR MASONRY FOOTINGS
(inches)[a]

	LOAD-BEARING VALUE OF SOIL (psf)			
	1,500	2,000	3,000	≥4,000
Conventional light–frame construction				
1-story	12	12	12	12
2-story	15	12	12	12
3-story	23	17	12	12
4-inch brick veneer over light frame or 8-inch hollow concrete masonry				
1-story	12	12	12	12
2-story	21	16	12	12
3-story	32	24	16	12
8-inch solid or fully grouted masonry				
1-story	16	12	12	12
2-story	29	21	14	12
3-story	42	32	21	16

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Where minimum footing width is 12 inches, use of a single wythe of solid or fully grouted 12-inch nominal concrete masonry units is permitted.

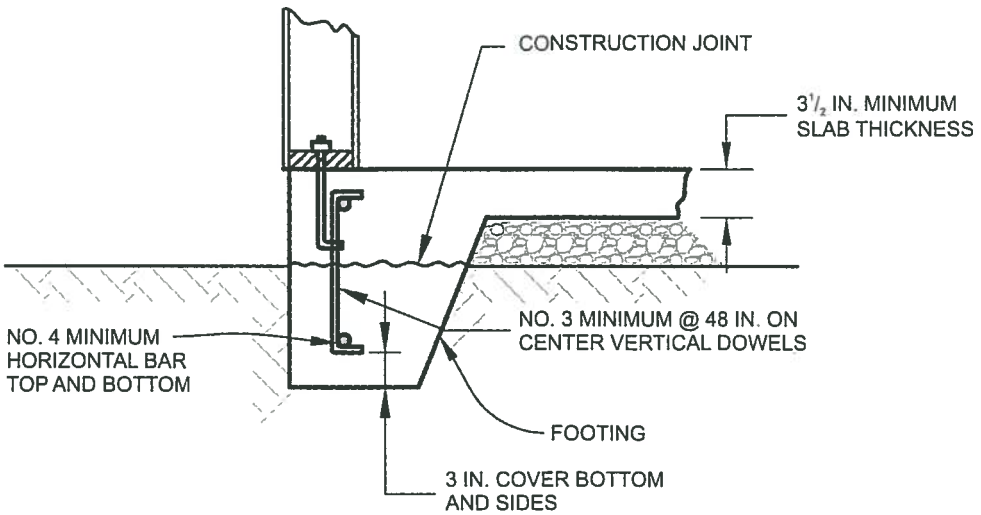


FIGURE R403.1.3.2
DOWELS FOR SLABS-ON-GROUND WITH TURNED-DOWN FOOTINGS