

**** DESIGN OF WALL STUD NUMBER 2 ****

2 in. x 4 in. single stud at 16 in. spacing
Stud height is 7.625 feet--located in end zone
Spruce--Pine--Fir lumber--Number 1--Number 2 grade
Sheathing is 7/16 inch rated OSB, span rating 24/16
Exterior finish is

Total outward force on stud = 343 pounds
Stud moment = 326 ft-lb.

Composite bending stresses in vertical stud-sheathing combination:

Stud inside face	: Actual = 797 psi	Allowable = 2415 psi (adjusted)
Sheathing exterior:	Actual = 175 psi	Allowable = 661 psi (adjusted)
Stud tensile stress:	Actual = 42 psi	Allowable = 1020 psi (adjusted)
Interaction bending and tension actual/allowable stress ratio total = .3711972		
Sheathing stress horiz:	Actual = 188 psi	Allowable = 222 psi (adjusted)
Deflections:		
Stud	: Actual = .1326 in.	Allowable = .5083 in.

*** Summary of Design ***

Wood wall studs COMPLY with Code requirements.

**** ANALYSIS OF PORCH COLUMN ANCHORAGE TO FOUNDATION ***

Columns are 4 in. x 4 in. x 8 ft. at 82 inches average spacing
Simpson Strong-Tie Model ABU44----16 ga. base----12 ga. strap----12-16d nails
Southern Pine framing lumber for columns

Top of column:

Uniform wind uplift = 162.2872 plf
Total wind uplift to column = 1108 pounds

Uniform roof dead load = 28.7234 plf
Total roof dead load to column = 196.2766 pounds
Weight of column = 23 pounds

Total dead load at anchorage = 219 pounds
Anchorage dead load times 2/3 = 146 pounds
Net uplift force at anchorage = 962 pounds

Bottom of column anchorage:

Net uplift force = 962 pounds
Allowable tension load = 2200 pounds (increased by 60 percent)

*** Summary of Analysis ***

Connections COMPLY with Code requirements.

**** ANALYSIS OF FOUNDATION ANCHORAGE ****

Reinforced concrete foundation, strength 2500 psi
Anchor bolts are 1/2 inch A307, with 2 inch round washer at 48 inches

Total uniform wind uplift on foundation = 477 plf

Uniform dead loads in plf:

Roof = 235.6168

Wall = 53.01051

Total = 288.6273 plf

Total uniform dead load times 2/3 = 192 plf

Net uplift force on foundation = 285 plf

Total uplift force on each anchor bolt = 1140 pounds

Safe tension value of each anchor bolt = 1634 pounds (increased for wind)

Anchor bolt tension value is governed by governed by washer failure

*** Summary of Analysis ***

Foundation anchorage COMPLIES with Code requirements.

**** ANALYSIS OF CORNER HOLD-DOWN REQUIREMENTS ****

Length of shearwall segment = 144 inches

Hold-down is 1/2" anchor bolts w/ 2" washers

Normal anchor bolt spacing = 48 inches

Distance from corner to hold-down device = 6.5 inches

Distance from corner to first interior anchor bolt = 24 inches

Net uplift force on foundation = 285 pounds per linear foot

Tributary distance to corner device = 1.270833 feet

Net uplift on corner hold-down device = 362 pounds

Uplift tension due to shearwall action in a transverse shearwall segment:

Distance from corner to hold-down device = 4.5 inches

Distance from corner to first interior anchor bolt = 24 inches

Total shear from shearwall segment = 1055 pounds

Height of wall = 8 feet

Uniform dead load times 2/3 = 35 pounds per linear foot

Shearwall moment at bottom of wall = 8445 foot-pounds

Additional tension at corner device = 509 pounds

Total uplift tension on corner hold-down devices = 871 pounds

Allowable tension on corner hold-down devices = 2614 pounds

*** Summary of Analysis ***

Corner hold-down device COMPLIES with Code.

**** ANALYSIS OF HEADER TO END COLUMN CONNECTORS ***

2 in. x 4 in. studs at 16 in. spacing
Simpson Model A35F----18 gauge----12-8d x 1 1/2 inch nails
Spruce--Pine--Fir framing lumber
Number of studs replaced by header = 6

Total uniform wind uplift in first story at top level = 477 plf

Uniform dead loads per linear foot:

Roof = 235.6168 plf

Total = 235.6168 plf

Total uniform dead load in first story at top level = 235 plf

Net wind uplift in first story at top level = 242 plf

Total uplift force on each connector = 965 pounds

Allowable tension load on connector = 400 pounds (increased by 60 percent)

*** Summary of Analysis ***

Connectors ~~FAIL~~ to comply with Code.

O.K. J. L.

Use Simpson CS18x24

**** ANALYSIS OF STRAP TIES ****

Studs at 16 in. spacing

U-shaped ties

Simpson Model SP4----20 gauge----3-10d x 1 1/2 inch nails each side

Actual number of nails installed = 3 each side of stud

Spruce--Pine--Fir framing lumber

Strap tie spacing is 32 inches

Total uniform wind uplift in first story at top level = 477 plf

Uniform dead loads per linear foot:

Roof = 235.6168 plf

Total = 235.6168 plf

Total uniform dead load in first story at top level = 235 plf

Net wind uplift in first story at top level = 242 plf

Total uplift force on each strap tie = 643 pounds

Allowable tension load on strap tie = 708 pounds (increased by 60 percent)

*** Summary of Analysis ***

Strap ties COMPLY with Code.

SUMMARY OF HURRICANE ANCHOR ANALYSIS

All values of forces are in pounds. Resistances were increased by 60 percent.
End zone width = 8.934 feet

Code: C = Compliance

N = Non-compliance

Simpson Strong-Tie hurricane anchors

Member 1 --Common truss--Span 44.67 feet, at 24 in. oc--in interior zone:

Uplift = 1257 Dead = 471 Net = 786 Model H4 & LTS12, Resistance = 908 C
Model H4--20 gauge anchor, 4-8d nails to truss, 4-8d nails to plate combined

Member 2 --Common truss--Span 44.67 feet, at 24 in. oc--in end zone:

Uplift = 1927 Dead = 471 Net = 1456 Model ~~XXXX~~ ^{HIS-2}, Resistance = 7999 C ^{H10-2}

False anchor--required uplift exceeds all anchor values in computer databank,
Data supplied by operator--not from EDA database

Member 3 --Common truss--Span 21.33 feet, at 24 in. oc--in interior zone:

Uplift = 679 Dead = 234 Net = 445 Model H1, Resistance = 468 C
Model H1--18 gauge anchor, 6--8d x 1(1/2) nails to truss, 4--8d nails to plate

Member 4 --Common truss--Span 21.33 feet, at 24 in. oc--in end zone:

Uplift = 979 Dead = 234 Net = 745 Model H4 & LTS12, Resistance = 908 C
Model H4--20 gauge anchor, 4-8d nails to truss, 4-8d nails to plate combined

**** T R A N S V E R S E S H E A R W A L L A N A L Y S I S ****

Wall framing is 2 in. x 4 in. studs at 16 in. spacing
Wall stud framing lumber is Spruce--Pine--Fir
Shear siding is Oriented Strand Board -- 7/16 inch thick , outside
Wall sheathing has all edges nailed
Fasteners: 8d common nails along edges at 6 in.
Fasteners: 8d common nails in interior at 12 in.

Total lateral force on building = 10850 pounds
Force applied at top of walls = 5425 pounds
Accumulated total shearwall length = 61.66667 feet
Actual unit shear on shearwalls = 87 plf
Allowable unit shear on shearwalls = 214 plf
Shearwall COMPLIES with Code.

**** L O N G I T U D I N A L S H E A R W A L L A N A L Y S I S ****

Wall framing is 2 in. x 4 in. studs at 16 in. spacing
Wall stud framing lumber is Spruce--Pine--Fir
Shear siding is Oriented Strand Board -- 7/16 inch thick , outside
Wall sheathing has all edges nailed
Fasteners: 8d common nails along edges at 6 in.
Fasteners: 8d common nails in interior at 12 in.

Total lateral force on building = 10143 pounds
Force applied at top of walls = 5071 pounds
Accumulated total shearwall length = 37.66667 feet
Actual unit shear on shearwalls = 134 plf
Allowable unit shear on shearwalls = 229 plf
Shearwall COMPLIES with Code.

T R A N S V E R S E D R A G S T R U T N A I L D E S I G N

Top plate is 2 in. x 4 in. lumber
Top plate lumber is Spruce--Pine--Fir
Fasteners are 16d common nails
Approximate nail spacing = 24 inches

Total lateral force on building = 10850 pounds
Force applied at top of walls = 5425 pounds
Total dragstrut length = 128 feet
Shear per unit dragstrut length = 42 pounds per linear foot

Actual shear on each nail = 84 pounds
Allowable shear on each nail = 126 pounds

Dragstrut nailing satisfies Code requirements.

L O N G I T U D I N A L D R A G S T R U T N A I L D E S I G N

Top plate is 2 in. x 4 in. lumber
Top plate lumber is Spruce--Pine--Fir
Fasteners are 16d common nails
Approximate nail spacing = 24 inches

Total lateral force on building = 10143 pounds
Force applied at top of walls = 5071 pounds

**** LONGITUDINAL SHEARWALL DIMENSIONS ***

Longitudinal Shearwall Segment Analysis:

Segment SL1, wall, H = 96 in., L = 44 in., H/L = 2.181 < 3.5
Segment SL2, wall, H = 96 in., L = 40 in., H/L = 2.4 < 3.5
Segment SL3, wall, H = 96 in., L = 40 in., H/L = 2.4 < 3.5
Segment SL4, wall, H = 96 in., L = 48 in., H/L = 2 < 3.5
Segment SL5, wall, H = 96 in., L = 48 in., H/L = 2 < 3.5
Segment SL6, wall, H = 96 in., L = 52 in., H/L = 1.846 < 3.5
Segment SL7, wall, H = 96 in., L = 76 in., H/L = 1.263 < 3.5
Segment SL8, wall, H = 96 in., L = 104 in., H/L = .923 < 3.5

**** ANALYSIS OF ROOF SHEATHING AS SHEAR DIAPHRAGM LONGITUDINAL ****

Shear analysis applies along supporting shearwalls.
Roof trusses are Southern Pine lumber, spaced at 24 in.
Sheathing is Oriented Strand Board, 7/16 inch thick
Sheathing has no intermediate blocking
Fasteners on panel ends are 8d common nails spaced 6 in.
Fasteners in panel interior are 8d common nails spaced 12 in.

Total lateral wind force on building = 10143 pounds
Total force transferred through diaphragm to shearwalls = 5071 pounds
Total length of shearwalls = 37.66667 feet
MINIMUM REQUIRED TOTAL SHEARWALL LENGTH = 24.2 FT.--LOCATE EVENLY THROUGHOUT

Actual diaphragm force per unit length of shearwall = 134 plf
Allowable diaphragm force per unit length of shearwall = 209 plf

*** Summary of Analysis ***

Roof sheathing diaphragm satisfies Code requirements.

EXTERIOR WALL LOADING (pounds per linear foot)

Wood frame wall-- 8 ft. out to out plates

3--2 in. x 4 in. plates	= 2.865625
2 in. x 4 in. studs at 16 in. spacing	= 5.462598
R-13 Insulation	= 1.90625
7/16 in. plywood siding with Hardiplank over	= 26.77604
1/2 in. Gypsum board--Total 1 layer---	= 16
=====	
Total	= 54

Exterior Wall Dead Load = 54 plf

ROOF LOADING--Roof Number 3 (pounds per square foot)

Roof cross slope = 6 inches per foot

Fiberglass shingles 210 # per square and 1 layer of 30 # felt	= 2.4
No insulation	
7/16 in. roof sheathing, 1 layer	= 1.31

Total roof unit weight on slope	= 3.71
Cosine of roof cross slope	= .8944272

Roof unit weight on horizontal	= 4.147906
2 in. x 4 in. wood trusses at 24 in. spacing	= 2.215147
1 layer of 1/2 in. gypsum board ceiling--plain	= 2
Ceiling insulation R-30	= .5
Air-conditioning ductwork	= 1
Full lighting	= .3
Miscellaneous	= 0
=====	
Total	= 10.16305

Roof Unit Dead Load = 11 psf

Roof dead load supported generally by wall = 235.6168 plf

ROOF LOADING--Roof Number 4 (pounds per square foot)

Roof cross slope = 6 inches per foot

Fiberglass shingles 210 # per square and 1 layer of 30 # felt	= 2.4
No insulation	
7/16 in. roof sheathing, 1 layer	= 1.31

Total roof unit weight on slope	= 3.71
Cosine of roof cross slope	= .8944272

Roof unit weight on horizontal	= 4.147906
2 in. x 4 in. wood trusses at 24 in. spacing	= 2.215147
1 layer of 1/2 in. gypsum board ceiling--plain	= 2
Ceiling insulation R-30	= .5
Air-conditioning ductwork	= 1
Full lighting	= .3
Miscellaneous	= 0
=====	
Total	= 10.16305

Roof Unit Dead Load = 11 psf

Roof dead load supported generally by wall = 235.6168 plf

COEFFICIENTS AND PRESSURES

Wall Components

Actual wind pressure = Velocity pressure x Use factor x Coefficient

Velocity pressure = 22.6 psf Use factor = 1.0

Edge strip width = 4.467 feet

Wall stud number 1 --Stud height 7.625 feet, Spacing 16 inches

Stud located in interior zone: Tributary area = 19.38021 square feet

Coefficient = -1.297 Pressure = -29.313 psf

Outward wind force on stud = 298 pounds

Wall stud number 2 --Stud height 7.625 feet, Spacing 16 inches

Stud located in end zone: Tributary area = 19.38021 square feet

Coefficient = -1.493 Pressure = -33.742 psf

Outward wind force on stud = 343 pounds

TOTAL WIND FORCES ON ENTIRE BUILDING
Main Wind Force Resisting Systems

Forces transverse:

Lateral forces (pounds):

Windward wall = 4253 inward
Leeward wall = 6597 outward

Uplift forces (pounds) :

Windward roof = 20558 upward
Leeward roof = 20558 upward
Windward overhang = 2458 upward

Forces longitudinal:

Lateral forces (pounds):

Windward wall = 8011 inward
Leeward wall = 2132 outward

**** STRUCTURAL FRAMING INPUT DATA ****

*** Roof Structural Data ***

Member number 1

Common truss--supported by exterior walls only
Span length out to out of supports = 44.67 feet
Roof cross slope = 6 /12
Truss spacing = 24 inches
Overhang = 1.5 feet

Member number 2

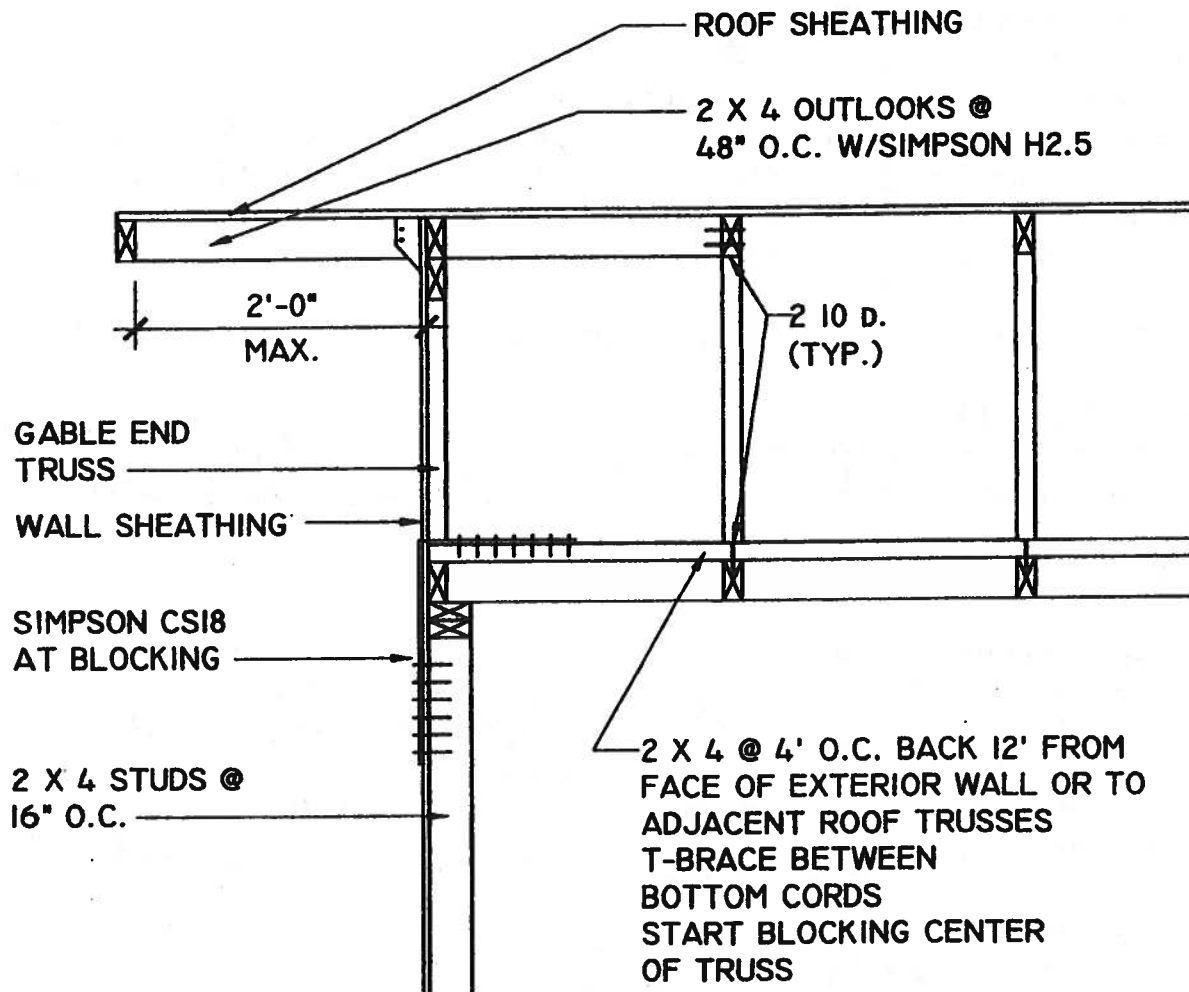
Common truss--supported by exterior walls only
Span length out to out of supports = 21.33 feet
Roof cross slope = 6 /12
Truss spacing = 24 inches
Overhang = 1.5 feet

*** Wall Structural Data ***

Spacing of wall studs = 16 inches
Total thickness of plates = .375 feet
Wall stud number 1 is 8 feet high out to out of plates

juris luzins architect

AR 0007907



GABLE END ROOF DETAIL

$\frac{3}{4}" = 1' - 0"$ FOR GABLE END W/ GABLE TRUSSES

Summary of Requirements

Roof Sheathing: 7/16" OSB Plywood
Fasteners: @Edges 8d Type Common spacing 6"
@Interior 8d Type " spacing 12"

Truss Anchors: Manufacturer Sumptm or equal
Truss #1 Length Model # H15-2 **No. Req.** 1 **Uplift** 1130 **Horiz.** 410
Truss #2 Length Model # H10 **No. Req.** 1 **Uplift** 850 **Horiz.** 450
Truss #3 Length Model # H2.5 **No. Req.** 1 **Uplift** 385 **Horiz.** 130
Truss #4 Length Model # **No. Req.** **Uplift** **Horiz.**
Truss #5 Length Model # **No. Req.** **Uplift** **Horiz.**

Verify uplift and horizontal forces with truss manufacturer

Wall Construction:

Frame Construction ☒

Masonry Construction ☐

Wall Bracing:

Balloon Framing ☐

Ceiling Diaphragm T-Bracing

Hip Roof ☒

Gable End on Masonry Wall ☐

Wood Studs:

Stud #1 ; Type SPF No1-No2 **Height** 8' **Spacing** 16" 2x4
Stud #2 ; Type **Height** **Spacing**
Stud #3 ; Type **Height** **Spacing**
Stud #4 ; Type **Height** **Spacing**
Stud #5 ; Type **Height** **Spacing**

Masonry:

Description

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