APB CONSULTING ENGINEERS, PLLC

23650 N. 84th Place, Scottsdale AZ 85255

602 904 5748 PH 602 916 0975 FAX

Sheet No. Cover
10/26/2022

CLIENT:

Canyon Country Design, Inc.
177 S. Fred Road
Young, Arizona 85554
928 978 2741
cpaige@rnsmte.com

PROJECT:

Russell Gultch
5977 E. Hope Lane
Globe, AZ 85501

22 196

GENERAL INFORMATION:

BUILDING CODE:

2003 IBC

with City of Globe Amendments

EXP 3/31/2025

SOILS DATA:

Soils Report by Western Technologies, Project Number 2122JP123. Soils bearing value = 2000 PSF

APB CONSULTING ENGINEERS, PLLC
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Job Name	Russell Gultch		
Job #	22 196		
By	AB	Date	#########

BASIS FOR DESIGN

Building Code: 2003 IBC
with City of Globe Amendments

Loads: Colateral Roof Dead Load: 5 PSF
Roof Live Load: 20 PSF

Wind Speed = 90 MPH, Exp. C
Internal Pressure Coefficient = +/- 0.18
Component and Cladding Wind Load by Zone (PSF)

1	2	3	4	5
11.37	-17.05	-10.78	-20.81	-23.98

Seismic

Ss =	0.3	S1 =	0.08	Sds =	0.28	Sd1 =	0.128
R =	3.5	Omega =	3	Cd =	3		
V = CsW =		0.08	V =	2.32	kips		

Seismic Design Category **C**
Equivalent Lateral Force Procedure

Foundations: SOILS REPORT BY WESTERN TECHNOLIGIES, INC., PROJECT NUMBER 2122JP123. SPREAD FOOTINGS SHALL BEAR ON FIRM, UNDISTURBED SOIL 1'-6" MINIMUM BELOW ADJACENT FINISHED GRADE. FINISHED GRADE IS DEFINED AS TOP OF SLAB FOR INTERIOR FOOTINGS AND LOWEST ADJACENT GRADE WITHIN 5 FEET FOR PERIMETER FOOTINGS. DESIGN SOIL BEARING VALUE = 2000 PSF. PASSIVE PRESSURE = 250 PSF/FT. COEFFICIENT OF FRICTION = .3. A CONSERVATIVE SPRING CONSTANT OF 50 PSF/FT IS UTILIZED FOR BEARING ON GRADE. STRUCTURAL ENGINEER IS NOT PERMITTED TO VALIDATE SOIL CONDITION.

Concrete: Minimum 28 day strength 3,000 PSI except as follows:

Moisture Sensitive Slab on Grade 3500 PSI (w/o = .4 MAX)
Conventional Slabs on Grade 3000 PSI
Concrete Foundations 2500 PSI
Concrete Piers & Walls 3000 PSI
(Design For foundation based on 2500 PSI)

Masonry: Hollow Concrete Masonry Units: F'm = 2000 PSI
(Design Based on Un-inspected values)

Reinforcing: Bars #4 and Larger: Fy = 60,000 PSI

Structural Steel: Structural Steel: Fy = 36,000 PSI
Wide Flange Steel Sections: Fy = 50,000 PSI
Bolts: A307, A325
Light Guage Structural Steel = 55,000 PSI

Wood: DEFINITION WOOD TYPE

Ledgers ---------- D.F. #2

Top Plates ---------- D.F. #2

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Job Name	Russell Gultch		
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Design Gravity Loads

Collateral Roof Load

Standing Seam Roof (PBR)		1.0			
6" Insulation		1.8			
8" Purlins at 5' OC		0.8			
MEP		1.0			
miscellaneous		0.4			
	DL =	**5.0**	**psf**	Roof	2.2 D
	LL =	**20.0**	**psf**	Ceiling	2.8 D
	SL =	**10.1**	**psf**	(not incl Misc)	

2003 IBC 12' EAVE
13'-8" RIDGE

WESTERN TECHNOLOGIES #2122 JP123

2000 PSF BEARING @ 18" BELOW

PASSIVE 400 PSF/FT SPREAD

250 PSF/FT CONT. FTG

.3 = 1/4

8 - 2 1/2 x 16 GA PURLINS
BRACES AT MIDSPAN OR ABOVE OPENINGS

C8 x 2 1/2 x 16 GA END COLUMNS

COMMERCIAL CODE REVIEW
LANDFILL OFFICE & SCALE HOUSE
GLOBE

Occupancy Type: B (Offices)
Notes: 303.1.1 Small buildings and tenant spaces used for assembly purposes with an occupant load of less than 50 people shall be classed as a B occupancy.

Construction Type: VB

Height and Area Requirements: Chapter 5 (Table 503)

Proposed Remodel and Addition:
Existing (Mtl Bldg Offices) 40' x 30' = 1,200 SQ.FT.
New Addition (Storage) 10' x 30' = 300 SQ.FT.
TOTAL: = 1,500 SQ.FT.
Occupant Load 15 People

Proposed New Scalehouse: 10' x 16' = 160 SQ.FT.
Occupant Load 2 People

Allowable Area Per Bldg: 9,000 SQ.FT.

Proposed Height: 1 STORY Each Bldg
Allowable Height: 2 STORY Each Bldg.

508 Mixed Use: NO
509 Incidental Uses (Table 509): NO

Exterior Wall & Opening Requirements (Chapter 6)

Distance to Property Line: >10' NO Fire Rating required

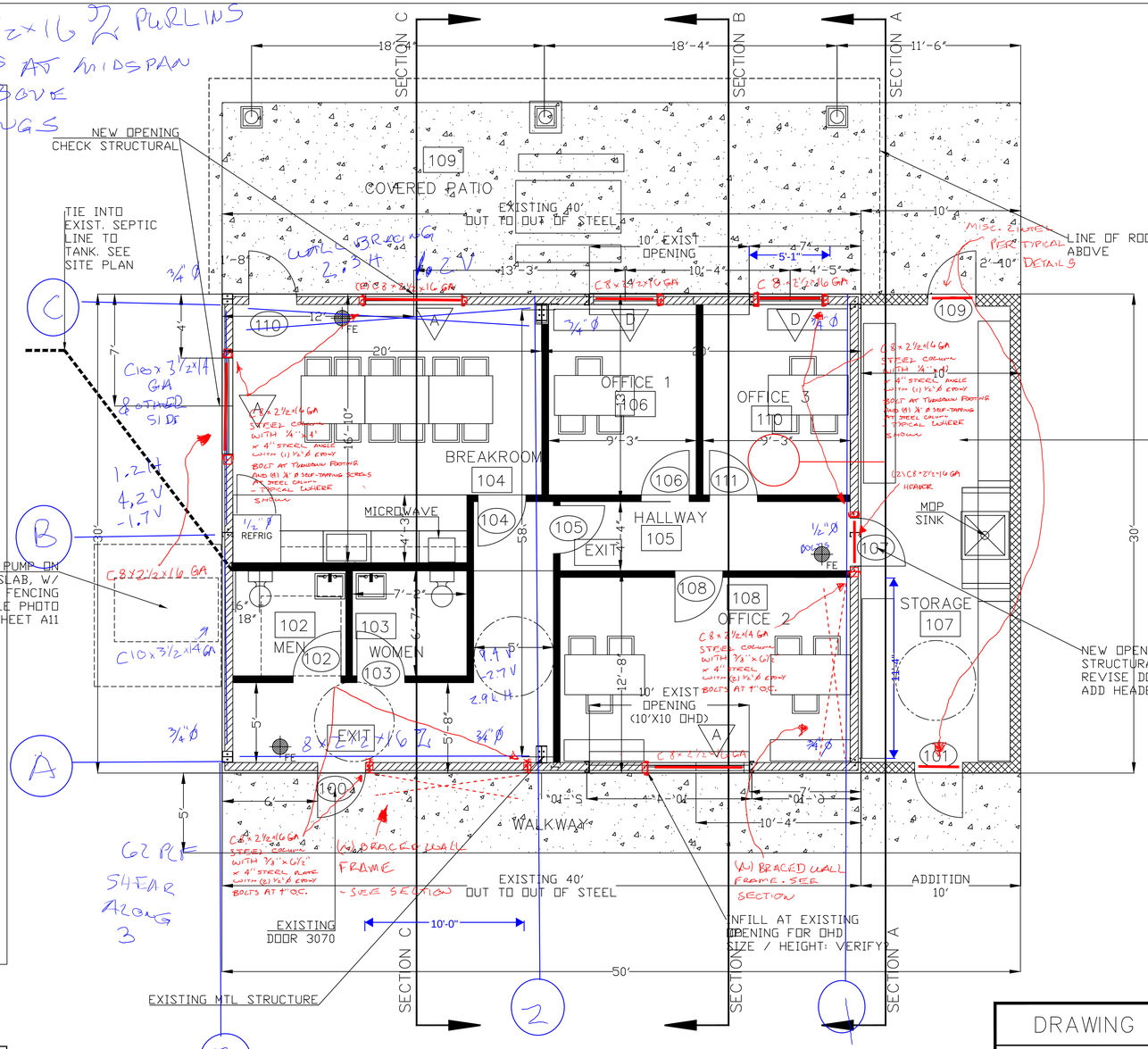
Fire Protection Systems (Chapter 9)

903 Fire Sprinkler System: NOT required for B occupancy
904 Alternative Fire Extinguishing System: NOT required
906 Portable Fire Extinguisher: (1) Required,
(3) Provided at Offices
(1) Provided at Scalehouse

907 Fire Alarm / Detection System: Not Required <500 PEOPLE, one story at grade

Means of Egress (Chapter 10)
1,500 SQ.FT./100 SQ.FT. PER PERSON
Occupant Load: 15 Total
 # Exits Required: 1 (one story), Provided: 3
Travel Distance Allowable: 75', Provided: <75'

Restroom Requirements (Chapter 29)
Occupant Load: 15 Offices, 2 Scalehouse = 17 People
WC: 1 per 25 people, 1 required
Provided: 1 Male, 1 Female
LAV: 1 per 40 people, 1 required
Provided: 1 Male, 1 Female
Mop Sink: 1 required, 1 provided
Drinking Fountain: ? Bottled water, or cups, in Breakroom area?



FLOOR PLAN

SCALE: 1/4" = 1' - 0"

SYMBOL LEGEND

- NEW WINDOW: SEE WINDOW SCH. A3
- NEW DOOR: SEE DOOR SCH. A3
- ROOM NUMBER: SEE ROOM FINISH SCHEDULE: SHT. A3
- FE — 2 ABC FIRE EXTINGUISHER MAX 75' TRAVEL DISTANCE TO WALL MTD. +36"–48" A.F.F.
- ADA 5' TURNING RADIUS

SEE TECHNICAL STDS FOR ADA DETAILS

WALL LEGEND

- NEW 2X6X10' HT INTERIOR WALL
- NEW 8" CMU EXTERIOR WALL
- NEW 2X6 EXT. WALL @ EXISTING MTL FRAME
- 4" CONC. SLAB EXPOSED (EXTERIOR)

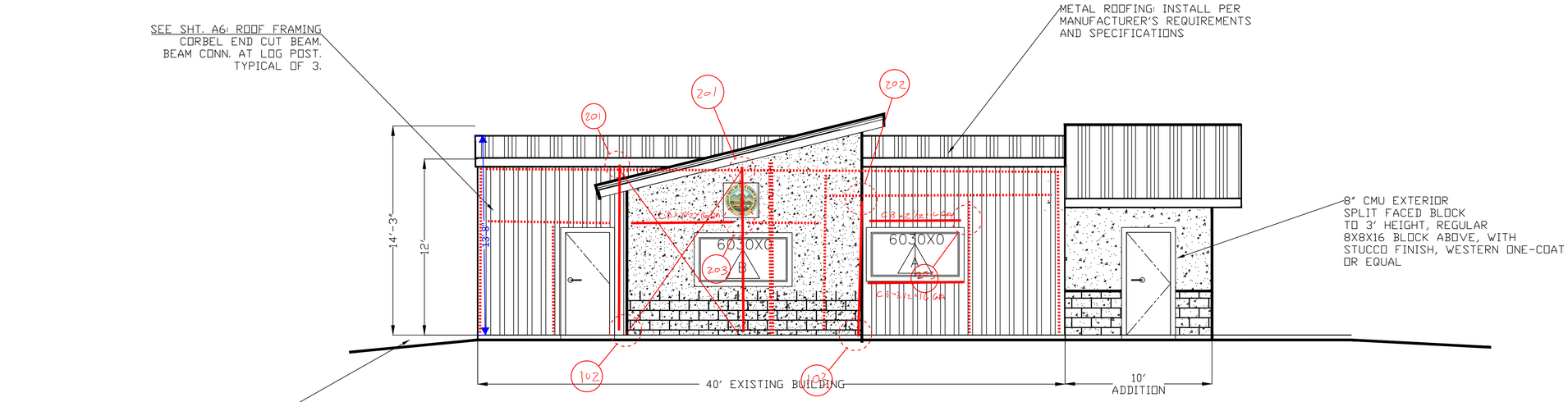
DRAWING SHEET INDEX

CARYN J. PAIGE, ARCHITECT
CANYON COUNTRY DESIGN INC.
YOUNG, AZ

RUSSELL GULCH LANDFILL
OFFICES / SCALES

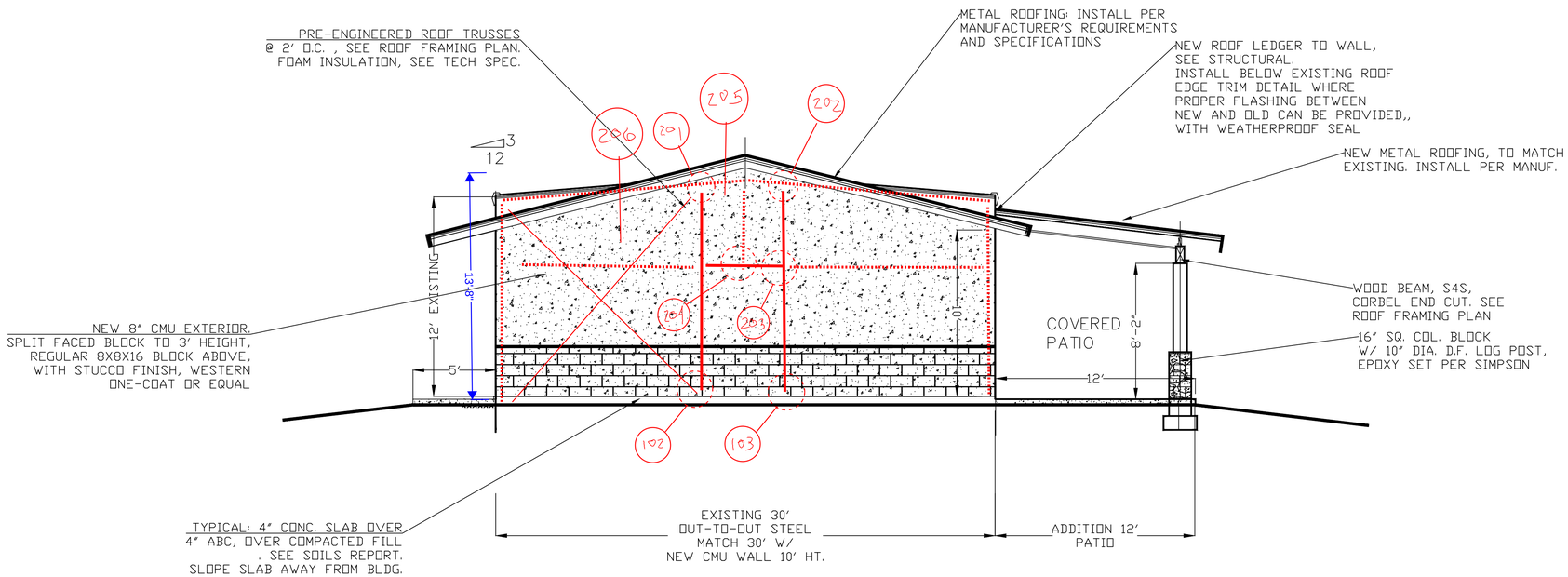
NEW DESIGN
CD PHASE
10/11/22

A2



FRONT ELEVATION

SCALE: 1/4" = 1' – 0"



STORAGE RM ADDITION

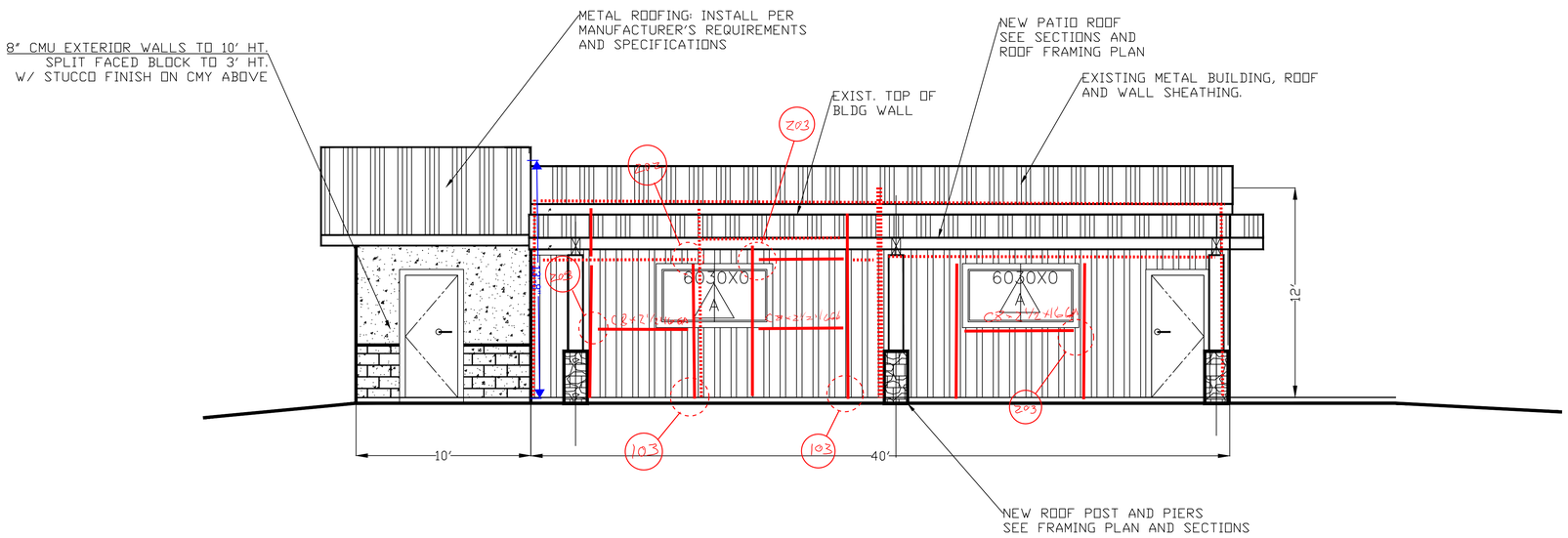
SCALE: 1/4" = 1' – 0"

CARYN J. PAIGE, ARCHITECT
CANYON COUNTRY DESIGN INC.
YOUNG, AZ

RUSSELL GULCH LANDFILL
OFFICES/SCALEHOUSE

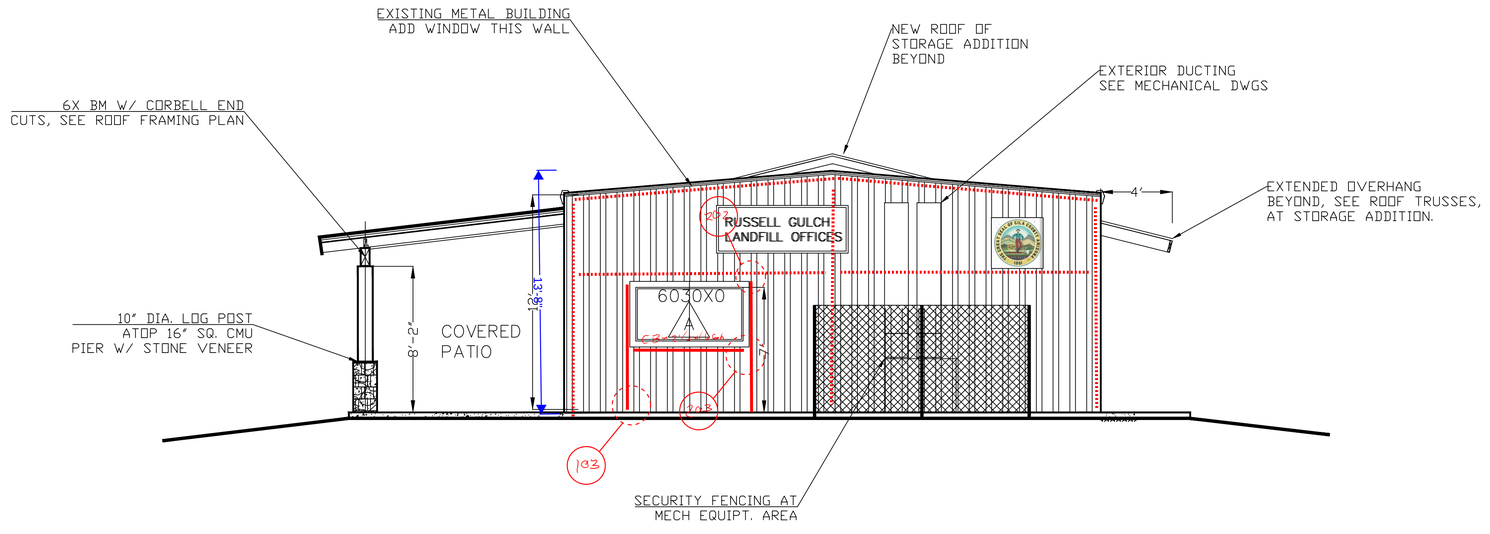
CD PHASE
10/27/22

A3



REAR ELEVATION

SCALE: 1/4" = 1' – 0"



PARKING AREA ELEV.

SCALE: 1/4" = 1' – 0"

CARYN J. PAIGE, ARCHITECT
CANYON COUNTRY DESIGN INC.
YOUNG, AZ

RUSSELL GULCH LANDFILL
OFFICES / SCALES

CD PHASE
10/27/22

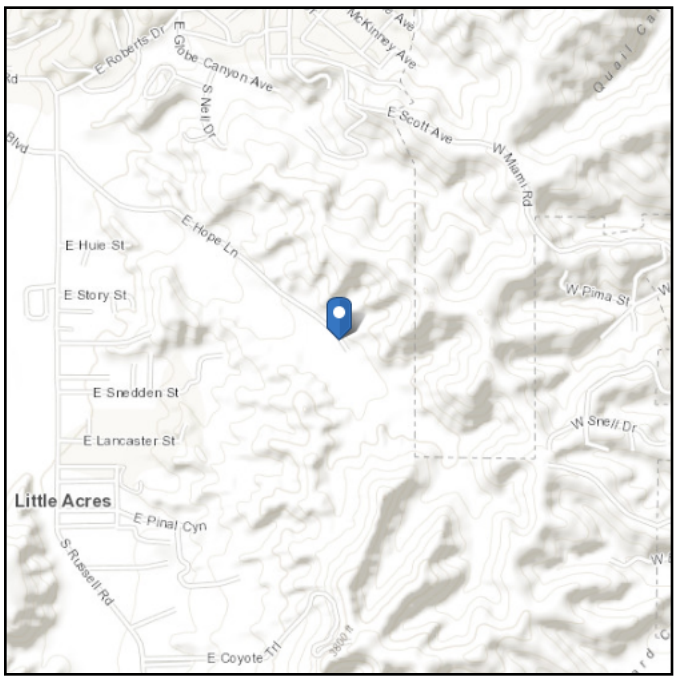
A4

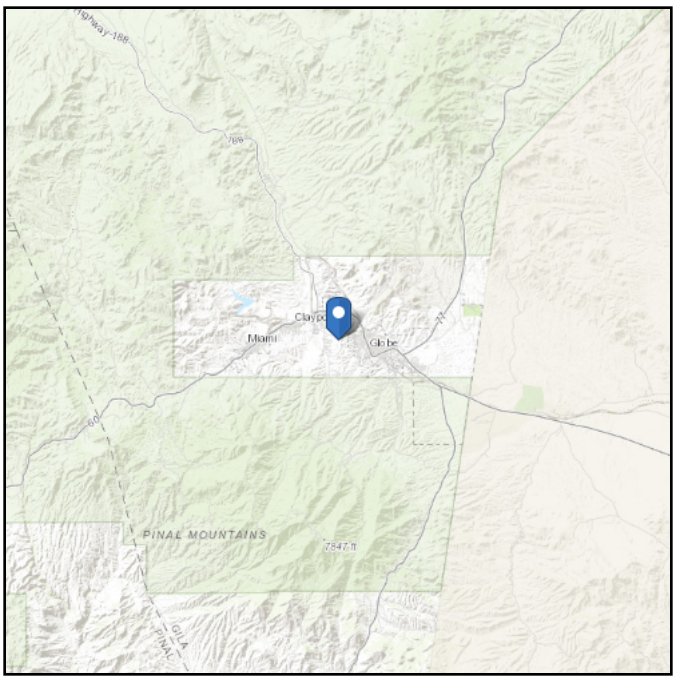
ASCE 7 Hazards Report

Address:
5977 E Hope Ln
Globe, Arizona
85501

Standard: ASCE/SEI 7-22
Risk Category: II
Soil Class: C - Very Dense Soil and Soft Rock

Elevation: 3542.96 ft (NAVD 88)
Latitude: 33.400596
Longitude: -110.81127





Wind

Results:

Wind Speed	103 Vmph
10-year MRI	72 Vmph
25-year MRI	78 Vmph
50-year MRI	83 Vmph
100-year MRI	88 Vmph
10,000-year MRI	123 Vmph
100,000-year MRI	140 Vmph
1,000,000-year MRI	158 Vmph

Data Source: ASCE/SEI 7-22, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Tue Oct 25 2022

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-22 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years). Values for 10-year MRI, 25-year MRI, 50-year MRI and 100-year MRI are Service Level wind speeds, all other wind speeds are Ultimate wind speeds.

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-22 Section 26.2.

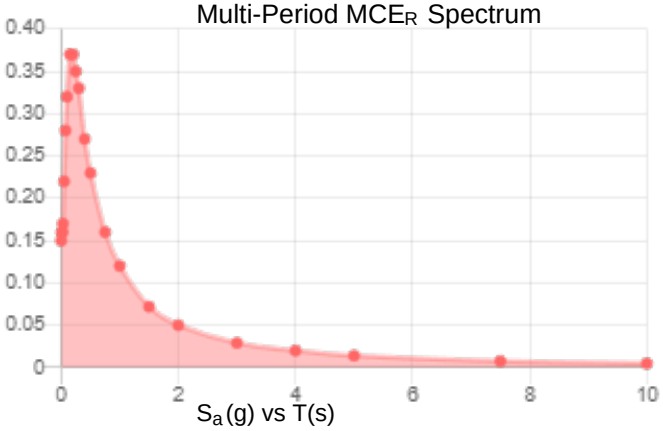
Seismic

Site Soil Class:

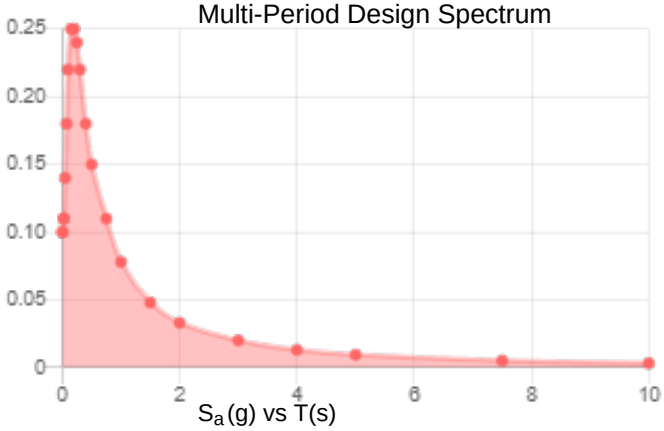
Results:

PGA_M :	0.14	T_L :	6
S_{MS} :	0.34	S_S :	0.3
S_{M1} :	0.12	S_1 :	0.081
S_{DS} :	0.22	S_{DC} :	
S_{D1} :	0.078	V_{S30} :	530

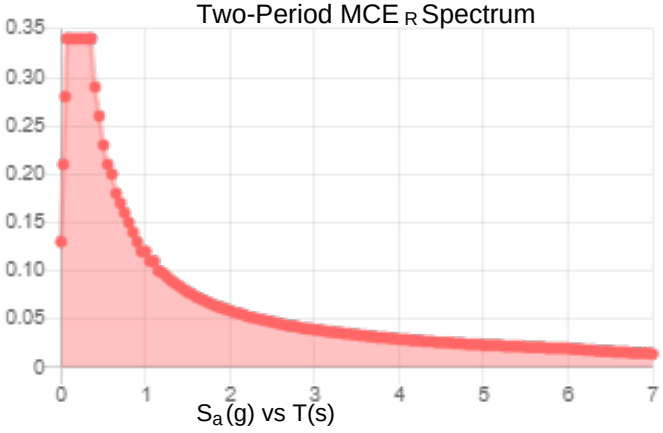
Multi-Period MCE_R Spectrum



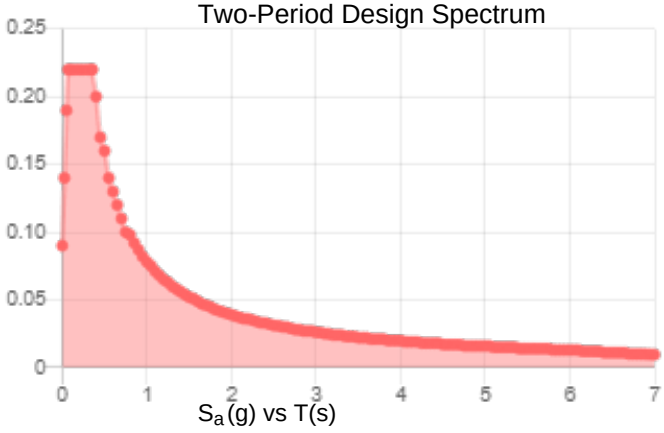
Multi-Period Design Spectrum



Two-Period MCE_R Spectrum



Two-Period Design Spectrum



MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: **Tue Oct 25 2022**

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

Snow

Results:

Ground Snow Load, p_g:	16 lb/ft^2
Allowable Stress Design Ground Snow Load:	11.2 lb/ft^2
20-year MRI Value:	3.67 lb/ft^2
Winter Wind Parameter:	0.25
Elevation:	3543.0 ft
Data Source:	ASCE/SEI 7-22, Figures 7.6-1 and 7.6-2 A-D
Date Accessed:	Tue Oct 25 2022

Values provided are ground snow loads. In areas designated "case study required," extreme local variations in ground snow loads preclude mapping at this scale. Site-specific case studies are required to establish ground snow loads at elevations not covered.

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Job Name
Job # Sheet #
BY AB Date

Seismic Loading Derivation

Soil Site Class D
Wall Type (light frame, other) other
Lateral Resisting system A-ZZ) C.4

Notes: Per USGS, Assume structural components in site class D (conservative)

Risk Category 2 **Importance I =** 1

Ss= 0.3 **S_1=** 0.08

Fa= 1.4 **Fv =** 2.4

Sds= 0.2800 **Sd1=** 0.128

T_a = Ct*hn^x where hn is the height in feet above the base to the highest level of the structure

Ct= 0.02
x= 0.75
hn= 12

Structure	Ct	x
Stl Moment Frames	0.028	0.8
Conc. Moment Frames	0.016	0.9
Eccentric Braced Frames	0.03	0.75
All other Struct. Systems	0.02	0.75

Cs FINAL 0.08
Cs_max= 0.28361
Cs_min = 0
Cs_min= 0.01232
Cs = 0.08
T_a= 0.12895

R = 3.5
Ω = 3
Cd = 3

Out of Plane Anchorage Force 0.112 **Wp**
Collector Element Force 0.672 **Wp**
Steel Collector Element Force 0.9408 **Wp**

Seismic Design Category C

Building Weight = 46210.575 #
V = 3696.846 # in both directions
E = 2640.604286 # in both directions

Roof
Building Weight = 28950 # Roof
V = 2316 # in both directions
E = 1654.285714 # in both directions

Roof
Building Width = 30.00 feet
Building Length = 50.00 feet
Building Height = 12 feet max
Wall Height = 11 feet

Low Roof
Building Weight = 17260.575 # floor
V = 1380.846 # in both directions
E = 986.3185714 # in both directions

Low Roof
Building Width = 26.50 feet
Building Length = 27.34 feet
Building Height = 12.50 feet max
Wall Height = 10.5 feet

Level	E	H	EH	% shear	Shear
Second	986.3185714	10.5	10356.345	0.34284	905.29707 #
Roof	1654.285714	12	19851.42857	0.65716	1735.3072 #
			30207.77357	1	

WIND LOADING ANALYSIS - Main Wind-Force Resisting System

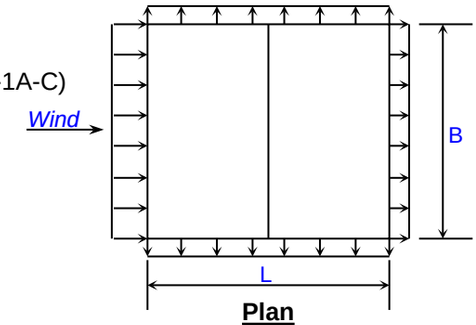
Per ASCE 7-16 Code for Enclosed or Partially Enclosed Buildings

Using Method 2: Analytical Procedure (Section 27 & 28) for Low-Rise Buildings

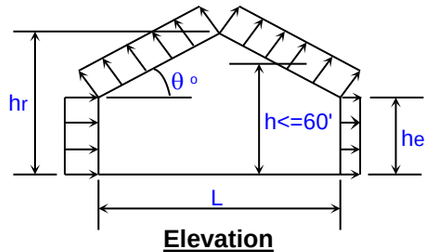
Job Name:		Subject:	Bldg A Roof Wind		
Job Number:		Originator:		Checker:	

Input Data:

Wind Speed, V =	103	mph (Wind Map, Figure 26.5-1A-C)
Bldg. Classification =	II	(Table 1.5-1 Risk Category)
Exposure Category =	C	(Sect. 26.7)
Ridge Height, hr =	13.67	ft. (hr >= he)
Eave Height, he =	12.00	ft. (he <= hr)
Building Width =	30.00	ft. (Normal to Building Ridge)
Building Length =	50.00	ft. (Parallel to Building Ridge)
Roof Type =	Gable	(Gable or Monoslope)
Topo. Factor, Kzt =	1.00	(Sect. 26.8 & Figure 26.8-1)
Direct. Factor, Kd =	0.85	(Table 26.6)
Enclosed? (Y/N)	Y	(Sect. 26.2 & Table 26.11-1)
Hurricane Region?	N	



Plan



Elevation

Resulting Parameters and Coefficients:

Roof Angle, θ =	0.00	deg.
Mean Roof Ht., h =	12.84	ft. (h = he, for angle <=10 deg.)

Check Criteria for a Low-Rise Building:

1. Is h <= 60' ? Yes, O.K.
2. Is h <= Lesser of L or B? Yes, O.K.

External Pressure Coeff's., GCpf (Fig. 28.4-1):
(For values, see following wind load tabulations.)
Positive & Negative Internal Pressure Coefficients, GCpi (Table 26.11-1):

+GCpi Coef. =	0.18	(positive internal pressure)
-GCpi Coef. =	-0.18	(negative internal pressure)

If h < 15 then: Kh = 2.01*(15/zg)^(2/α) (Table 28.3-1)
If h >= 15 then: Kh = 2.01*(z/zg)^(2/α) (Table 28.3-1)

α =	9.50	(Table 26.9-1)
zg =	900	(Table 26.9-1)
Kh =	0.85	(Kh = Kz evaluated at z = h)

Velocity Pressure: qz = 0.00256*Kz*Kzt*Kd*V^2 (Sect. 28.3.2, Eq. 28.3-1)
qh = 19.60 psf qh = 0.00256*Kh*Kzt*Kd*V^2 (qz evaluated at z = h)
Design Net External Wind Pressures (Sect. 28.4.1):
p = qh*[(GCpf) - (+/-GCpi)] (psf, Eq. 28.4-1)

Wall and Roof End Zone Widths 'a' and '2*a' (Fig. 28.4-1):

a =	3.00	ft.
2*a =	6.00	ft.

Parapet Loading = 48.991617 PSF Mean Para Ht = 0 ft

MWFRS Wind Load for Load Case A				MWFRS Wind Load for Load Case B			
Surface	GCpf	p = Net Pressures (psf)		Surface	*GCpf	p = Net Pressures (psf)	
		(w/ +GCpi)	(w/ -GCpi)			(w/ +GCpi)	(w/ -GCpi)
Zone 1	0.40	4.31	11.37	Zone 1	-0.45	-12.35	-5.29
Zone 2	-0.69	-17.05	-9.99	Zone 2	-0.69	-17.05	-9.99
Zone 3	-0.37	-10.78	-3.72	Zone 3	-0.37	-10.78	-3.72
Zone 4	-0.29	-9.21	-2.16	Zone 4	-0.45	-12.35	-5.29
Zone 5	---	---	---	Zone 5	0.40	4.31	11.37
Zone 6	---	---	---	Zone 6	-0.29	-9.21	-2.16
Zone 1E	0.61	8.43	15.48	Zone 1E	-0.48	-12.93	-5.88
Zone 2E	-1.07	-24.50	-17.44	Zone 2E	-1.07	-24.50	-17.44
Zone 3E	-0.53	-13.91	-6.86	Zone 3E	-0.53	-13.91	-6.86
Zone 4E	-0.43	-11.95	-4.90	Zone 4E	-0.48	-12.93	-5.88
Zone 5E	---	---	---	Zone 5E	0.61	8.43	15.48
Zone 6E	---	---	---	Zone 6E	-0.43	-11.95	-4.90

*Note: Use roof angle θ = 0 degrees for Longitudinal Direction.

For Case A when GCpf is neg. in Zones 2/2E:
Zones 2/2E dist. = 15.00 ft.

For Case B when GCpf is neg. in Zones 2/2E:
Zones 2/2E dist. = 25.00 ft.

Remainder of roof Zones 2/2E extending to ridge line shall use roof Zones 3/3E pressure coefficients.

MWFRS Wind Load for Load Case A, Torsional Case				MWFRS Wind Load for Case B, Torsional Case			
Surface	GCpf	p = Net Pressure (psf)		Surface	GCpf	p = Net Pressure (psf)	
		(w/ +GCpi)	(w/ -GCpi)			(w/ +GCpi)	(w/ -GCpi)
Zone 1T	---	1.08	2.84	Zone 1T	---	-3.09	-1.32
Zone 2T	---	-4.26	-2.50	Zone 2T	---	-4.26	-2.50
Zone 3T	---	-2.69	-0.93	Zone 3T	---	-2.69	-0.93
Zone 4T	---	-2.30	-0.54	Zone 4T	---	-3.09	-1.32
Zone 5T	---	---	---	Zone 5T	---	1.08	2.84
Zone 6T	---	---	---	Zone 6T	---	-2.30	-0.54

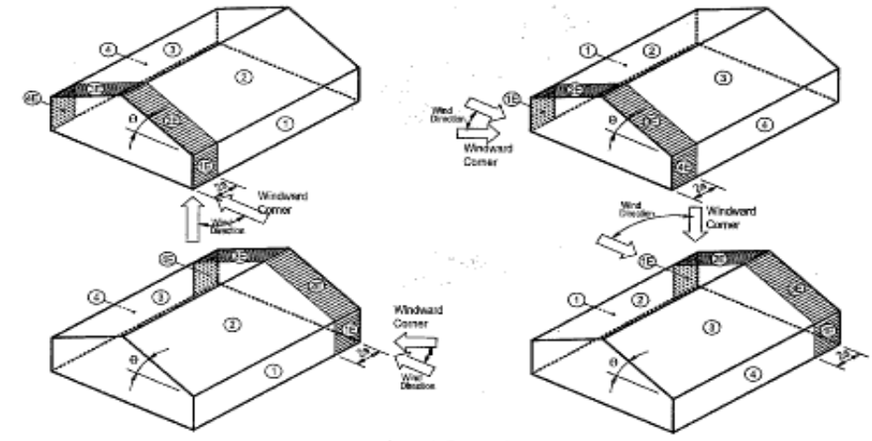
Notes: 1. For Load Case A (Transverse), Load Case B (Longitudinal), and Torsional Cases:

Zone 1 is windward wall for interior zone.	Zone 1E is windward wall for end zone.
Zone 2 is windward roof for interior zone.	Zone 2E is windward roof for end zone.
Zone 3 is leeward roof for interior zone.	Zone 3E is leeward roof for end zone.
Zone 4 is leeward wall for interior zone.	Zone 4E is leeward wall for end zone.
Zones 5 and 6 are sidewalls.	Zone 5E & 6E is sidewalls for end zone.
Zone 1T is windward wall for torsional case	Zone 2T is windward roof for torsional case.
Zone 3T is leeward roof for torsional case	Zone 4T is leeward wall for torsional case.

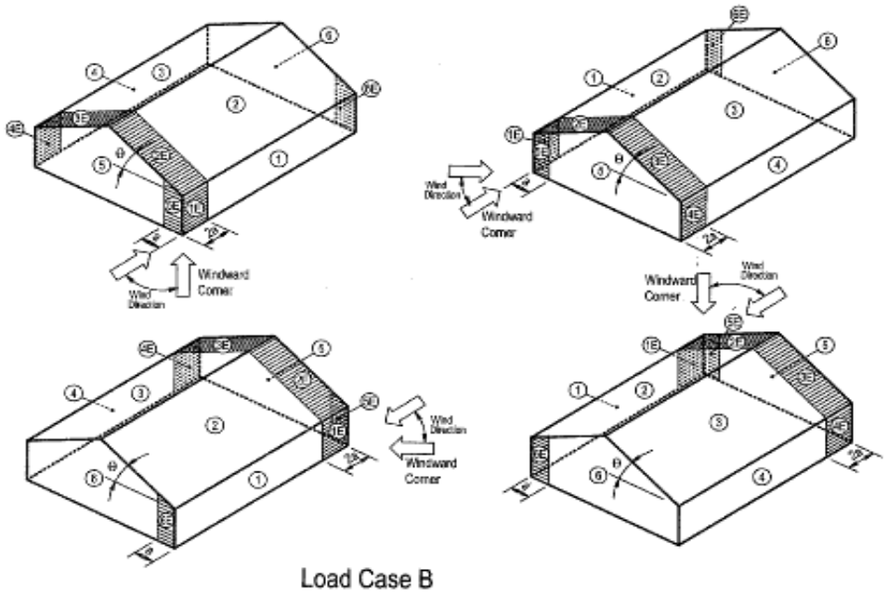
Zones 5T and 6T are sidewalls for torsional case.

2. (+) and (-) signs signify wind pressures acting toward & away from respective surfaces.
3. Building must be designed for all wind directions using the 8 load cases shown below. The load cases are applied to each building corner in turn as the reference corner.
4. Wind loads for torsional cases are 25% of respective transverse or longitudinal zone load values. Torsional loading shall apply to all 8 basic load cases applied at each reference corner.
   Exception: One-story buildings with "h" <= 30', buildings <= 2 stories framed with light frame construction, and buildings <=2 stories designed with flexible diaphragms need not be designed for torsional load cases.
5. Per Code Section 28.4.4, the minimum wind load for MWFRS shall not be less than 16 psf.

Low-Rise Buildings h <= 60'

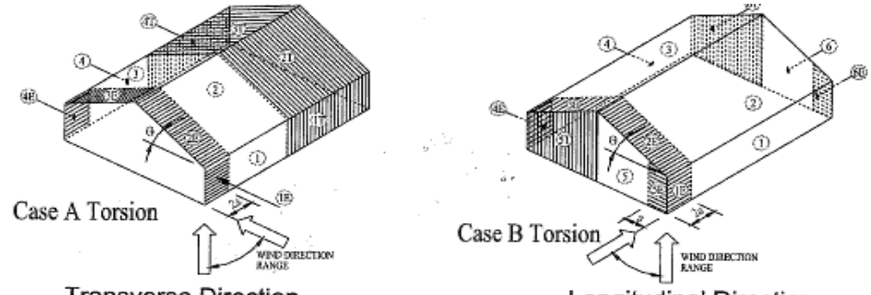


Load Case A



Load Case B

Basic Load Cases



Transverse Direction

Longitudinal Direction

Torsional Load Cases

WIND LOADING ANALYSIS - Wall Components and Cladding

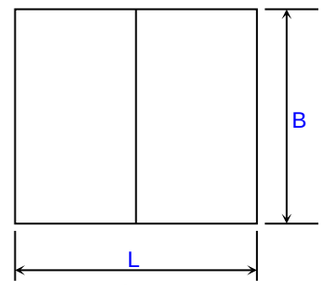
Per ASCE 7-10 Code for Buildings of Any Height

Using Part 1 & 3: Analytical Procedure (Section 30.4 & 30.6)

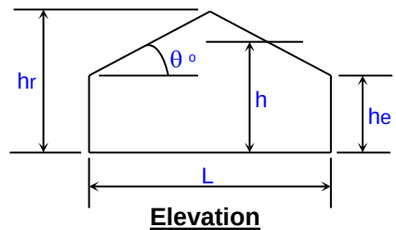
Job Name:		Subject:			
Job Number:		Originator:		Checker:	

Input Data:

Wind Speed, V =	103	mph (Wind Map, Figure 26.5-1A-C)
Bldg. Classification =	II	(Table 1.5-1 Risk Category)
Exposure Category =	C	(Sect. 26.7)
Ridge Height, hr =	13.67	ft. (hr >= he)
Eave Height, he =	12.00	ft. (he <= hr)
Building Width =	30.00	ft. (Normal to Building Ridge)
Building Length =	50.00	ft. (Parallel to Building Ridge)
Roof Type =	Gable	(Gable or Monoslope)
Topo. Factor, Kzt =	1.00	(Sect. 26.8 & Figure 26.8-1)
Direct. Factor, Kd =	0.85	(Table 26.6)
Enclosed? (Y/N)	Y	(Sect. 28.6-1 & Figure 26.11-1)
Hurricane Region?	N	
Component Name =	Wall	(Girt, Siding, Wall, or Fastener)
Effective Area, Ae =	48	ft.^2 (Area Tributary to C&C)



Plan



Elevation

Resulting Parameters and Coefficients:

Roof Angle, θ =	6.35	deg.
Mean Roof Ht., h =	12.00	ft. (h = he, for roof angle <=10 deg.)

Wall External Pressure Coefficients, GCp:

GCp Zone 4 Pos. =	0.79	(Fig. 30.4-1, GCp is reduced by 10% for roof angle <=10 deg.)
GCp Zone 5 Pos. =	0.79	(Fig. 30.4-1, GCp is reduced by 10% for roof angle <=10 deg.)
GCp Zone 4 Neg. =	-0.88	(Fig. 30.4-1, GCp is reduced by 10% for roof angle <=10 deg.)
GCp Zone 5 Neg. =	-1.04	(Fig. 30.4-1, GCp is reduced by 10% for roof angle <=10 deg.)

Positive & Negative Internal Pressure Coefficients, GCpi (Figure 26.11-1):

+GCpi Coef. =	0.18	(positive internal pressure)
-GCpi Coef. =	-0.18	(negative internal pressure)

If z <= 15 then: Kz = 2.01*(15/zg)^(2/α) , If z > 15 then: Kz = 2.01*(z/zg)^(2/α) (Table 30.3-1)

α =	9.50	(Table 26.9-1)
zg =	900	(Table 26.9-1)
Kh =	0.85	(Kh = Kz evaluated at z = h)

Velocity Pressure: qz = 0.00256*Kz*Kzt*Kd*V^2 (Sect. 30.3.2, Eq. 30.3-1)

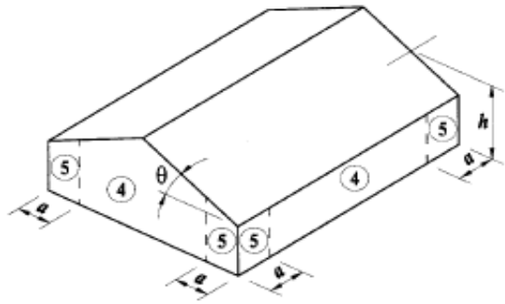
qh = 19.60 psf qh = 0.00256*Kh*Kzt*Kd*V^2 (qz evaluated at z = h)

Design Net External Wind Pressures (Sect. 30.4 & 30.6):
For h <= 60 ft.: p = qh*((GCp) - (+/-GCpi)) (psf)
For h > 60 ft.: p = q*(GCp) - qi*(+/-GCpi) (psf)
where: q = qz for windward walls, q = qh for leeward walls and side walls
qi = qh for all walls (conservatively assumed per Sect. 30.6)

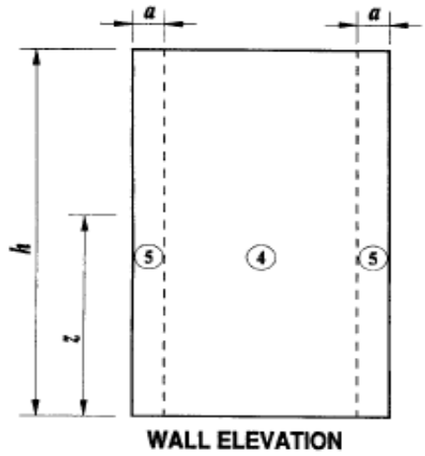
Wind Load Tabulation for Wall Components & Cladding							
Component	z (ft.)	Kh	qh (psf)	p = Net Design Pressures (psf)			
				Zone 4 (+)	Zone 4 (-)	Zone 5 (+)	Zone 5 (-)
Wall	0	0.85	19.60	19.04	-20.81	19.04	-23.98
For z = hr:	13.67	0.85	19.60	19.04	-20.81	19.04	-23.98
For z = he:	12.00	0.85	19.60	19.04	-20.81	19.04	-23.98
For z = h:	12.00	0.85	19.60	19.04	-20.81	19.04	-23.98

Notes: 1. (+) and (-) signs signify wind pressures acting toward & away from respective surfaces.
2. Width of Zone 5 (end zones), 'a' = 3.00 ft.
3. Per Code Section 30.2.2, the minimum wind load for C&C shall not be less than 16 psf.
4. References : a. ASCE 7-10, "Minimum Design Loads for Buildings and Other Structures".
b. "Guide to the Use of the Wind Load Provisions of ASCE 7-02"
by: Kishor C. Mehta and James M. Delahay (2004).

Wall Components and Cladding:



Wall Zones for Buildings with h <= 60 ft.



Wall Zones for Buildings with h > 60 ft.

WIND LOADING ANALYSIS - Roof Components and Cladding

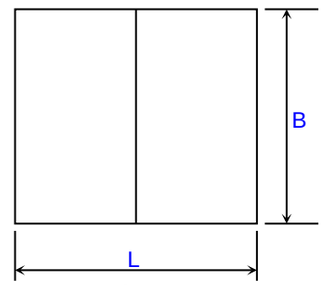
Per ASCE 7-10 Code for Bldgs. of Any Height with Gable Roof θ <= 45° or Monoslope Roof θ <= 3°

Using Part 1 & 3: Analytical Procedure (Section 30.4 & 30.6)

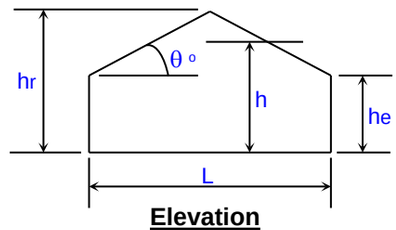
Job Name:		Subject:			
Job Number:		Originator:		Checker:	

Input Data:

Wind Speed, V =	103	mph (Wind Map, Figure 26.5-1A-C)
Bldg. Classification =	II	(Table 1.5-1 Risk Category)
Exposure Category =	C	(Sect. 26.7)
Ridge Height, hr =	13.67	ft. (hr >= he)
Eave Height, he =	12.00	ft. (he <= hr)
Building Width =	30.00	ft. (Normal to Building Ridge)
Building Length =	50.00	ft. (Parallel to Building Ridge)
Roof Type =	Gable	(Gable or Monoslope)
Topo. Factor, Kzt =	1.00	(Sect. 26.8 & Figure 26.8-1)
Direct. Factor, Kd =	0.85	(Table 26.6)
Enclosed? (Y/N)	Y	(Sect. 28.6-1 & Figure 26.11-1)
Hurricane Region?	N	
Component Name =	Joist	(Purlin, Joist, Decking, or Fastener)
Effective Area, Ae =	60	ft.^2 (Area Tributary to C&C)
Overhangs? (Y/N)	N	(if used, overhangs on all sides)



Plan



Elevation

Resulting Parameters and Coefficients:

Roof Angle, θ =	6.35	deg.
Mean Roof Ht., h =	12.00	ft. (h = he, for roof angle <=10 deg.)

Roof External Pressure Coefficients, GCp:

GCp Zone 1-3 Pos. =	0.22	(Fig. 30.4-2A, 30.4-2B, and 30.4-2C)
GCp Zone 1 Neg. =	-0.92	(Fig. 30.4-2A, 30.4-2B, and 30.4-2C)
GCp Zone 2 Neg. =	-1.26	(Fig. 30.4-2A, 30.4-2B, and 30.4-2C)
GCp Zone 3 Neg. =	-1.48	(Fig. 30.4-2A, 30.4-2B, and 30.4-2C)

Positive & Negative Internal Pressure Coefficients, GCpi (Figure 26.11-1):

+GCpi Coef. =	0.18	(positive internal pressure)
-GCpi Coef. =	-0.18	(negative internal pressure)

If z <= 15 then: Kz = 2.01*(15/zg)^(2/α) , If z > 15 then: Kz = 2.01*(z/zg)^(2/α) (Table 30.3-1)

α =	9.50	(Table 26.9-1)
zg =	900	(Table 26.9-1)
Kh =	0.85	(Kh = Kz evaluated at z = h)

Velocity Pressure: qz = 0.00256*Kz*Kzt*Kd*V^2 (Sect. 30.3.2, Eq. 30.3-1)

qh = 19.60 psf qh = 0.00256*Kh*Kzt*Kd*V^2 (qz evaluated at z = h)

Design Net External Wind Pressures (Sect. 30.4 & 30.6):

For h <= 60 ft.: p = qh*((GCp) - (+/-GCpi)) (psf)

For h > 60 ft.: p = q*(GCp) - qi*(+/-GCpi) (psf)

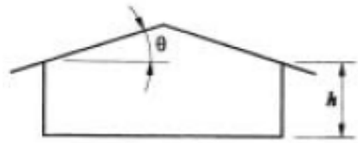
where: q = qh for roof

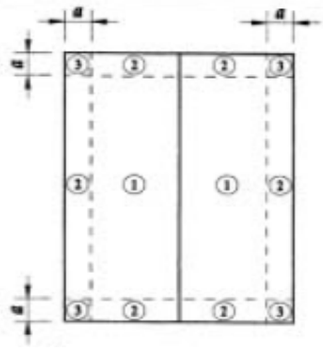
qi = qh for roof (conservatively assumed per Sect. 30.6)

Wind Load Tabulation for Roof Components & Cladding							
Component	z (ft.)	Kh	qh (psf)	p = Net Design Pressures (psf)			
				Zone 1,2,3 (+)	Zone 1 (-)	Zone 2 (-)	Zone 3 (-)
Joist	0	0.85	19.60	7.88	-21.60	-28.13	-32.47
For z = hr:	13.67	0.85	19.60	7.88	-21.60	-28.13	-32.47
For z = he:	12.00	0.85	19.60	7.88	-21.60	-28.13	-32.47
For z = h:	12.00	0.85	19.60	7.88	-21.60	-28.13	-32.47

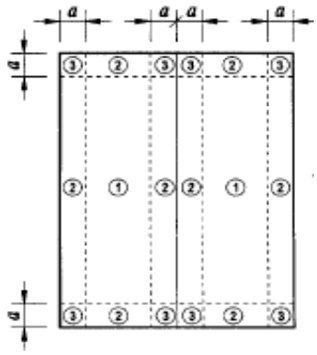
Notes:
1. (+) and (-) signs signify wind pressures acting toward & away from respective surfaces.
2. Width of Zone 2 (edge), 'a' = 3.00 ft.
3. Width of Zone 3 (corner), 'a' = 3.00 ft.
4. For monoslope roofs with θ <= 3 degrees, use Fig. 30.4-2A for 'GCp' values with 'qh'.
5. For buildings with h > 60' and θ > 10 degrees, use Fig. 30.6-1 for 'GCpi' values with 'qh'.
6. For all buildings with overhangs, use Fig. 30.4-2B for 'GCp' values per Sect. 30.10.
7. If a parapet >= 3' in height is provided around perimeter of roof with θ <= 10 degrees, Zone 3 shall be treated as Zone 2.
8. Per Code Section 30.2.2, the minimum wind load for C&C shall not be less than 16 psf.
9. References : a. ASCE 7-02, "Minimum Design Loads for Buildings and Other Structures".
   b. "Guide to the Use of the Wind Load Provisions of ASCE 7-02" by: Kishor C. Mehta and James M. Delahay (2004).

Roof Components and Cladding:

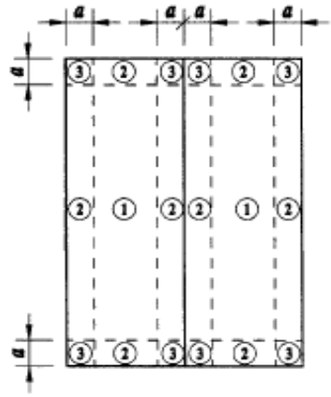




θ <= 7 deg.

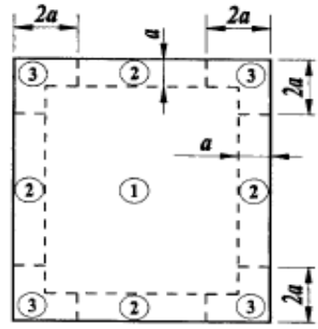


7 deg. < θ <= 27 deg.



27 deg. < θ <= 45 deg.

Roof Zones for Buildings with h <= 60 ft.
(for Gable Roofs <= 45° and Monoslope Roofs <= 3°)



ROOF PLAN

Roof Zones for Buildings with h > 60 ft.
(for Gable Roofs <= 10° and Monoslope Roofs <= 3°)

APB CONSULTING ENGINEERS, PLLC
23650 N. 84th Place, Scottsdale AZ 85255
602 904 5748 PH 602 916 0975 FAX

Job Name
Job # Sheet #
BY AB Date

Wind Values

High Wind

2a =	6.00 feet	q =	19.60	psf	H =	12	ft
MFRS		Parapet	48.99162	psf	Roof =	1.67	ft
		Par Ht =	0.00	ft	Wall Ht =	10	ft
		W =	30.00	ft	L =	50.00	ft

ZONE	1	1A	2	2A	Press	Roof or Parapet		A Cond	Int Cond
Press.	11.37	15.48	-9.99	-17.44		-29.1265	-16.6905	122.0146	84.8868
Total						plf	plf	plf	plf

High C&C Loading Wall Loading = -23.98 Roof Loading = -21.60

Loading at Roof Level = 2769.371 # Long Direction
4467.107 # Short Direction

APB CONSULTING ENGINEERS, PLLC
23650 N. 84th Place, Scottsdale AZ 85255
602 904 5748 PH 602 916 0975 FAX

Job Name
Job # Sheet #
BY AB Date 10/26/2022

Roof Overhand is approximately 4 ft Eave = 12 ft Ridge 13.67 ft
Frame Length 30 ft not including the overhang at one end
Frame Trib = 40 ft bays
Load on the Frames = 200 D 800 Lr plf

Wind Zones	1	2	3	4
Zone Description	Front wall	Front Roof	Back Roof	Back Wall
Wind Pressure by Zone =	11.37	-17.05	-10.78	-9.21
Wind Load on frame	2727.8532	-681.963	-431.126	-2210.5
Units/Description	# at 10' above grd	plf	plf	# at 10' above grd

Additional uplift at the overhang Columns = 2400 #

Braced Frame Forces

Downforce	0	D	0	Lr	0	W	0	TL Factored k
Uplift	0	D	0	Lr	0	W	0	TL Factored k
Horizontal Kick	0	D	0	Lr	3.83333	W	2.3	TL Factored k

Narrowest Braced Frame = 10 ft Angle = 63.07 degrees

Vertical Load = 2.76 # Horizontal Load = 1.15 #
Factored Load = 4.416 # 1.84 #

Header Design Span = 5 feet Trib = 150 square feet Lr = 1.05

P =	750	D	3000	Lr	1512.75	S	-3239.87	W k
WL^2/8 = PL/4 -->		weff =	1500	plf				

(2) C8x 2 1/2" x 16 GA

Structural (S) Section Properties

Section	Design Thickness (in)	Fy (ksi)	Gross Properties							Effective Properties						Torsional Properties						Lu (in)
			Area (in^2)	Weight (lb/ft)	Ix (in^4)	Sx (in^3)	Rx (in)	Iy (in^4)	Ry (in)	Ixe (in^4)	Sxe (in^3)	Mal (in-k)	Mad (in-k)	Vag (lb)	Vanet (lb)	Jx1000 (in^4)	Cw (in^6)	Xo (in)	m (in)	Ro (in)	ß	
800S162-68	0.0713	50	0.836	2.84	7.089	1.772	2.913	0.235	0.530	7.070	1.663	49.80	45.11	4221	3367	1.416	3.093	-0.899	0.586	3.094	0.916	31.9
800S162-97	0.1017	33	1.169	3.98	9.713	2.428	2.883	0.305	0.510	9.713	2.428	58.27 [2]	58.27	8843	4824	4.030	4.114	-0.866	0.568	3.053	0.919	35.1
800S162-97	0.1017	50	1.169	3.98	9.713	2.428	2.883	0.305	0.510	9.713	2.428	72.70	71.93	10885	5938	4.030	4.114	-0.866	0.568	3.053	0.919	31.4
800S162-118	0.1242	33	1.407	4.79	11.504	2.876	2.860	0.345	0.496	11.504	2.876	71.47 [2]	71.47	11341	4971	7.234	4.766	-0.842	0.556	3.022	0.922	34.1
800S162-118	0.1242	50	1.407	4.79	11.504	2.876	2.860	0.345	0.496	11.504	2.876	105.23 [2]	105.23	16235	7115	7.234	4.766	-0.842	0.556	3.022	0.922	28.0
800S200-33 [1]	0.0346	33	0.448	1.52	4.096	1.024	3.023	0.227	0.712	4.096	0.816	16.12	14.52	474	474	0.179	2.971	-1.288	0.817	3.363	0.853	50.6
800S200-43	0.0451	33	0.582	1.98	5.302	1.325	3.018	0.292	0.708	5.302	1.293	25.54	20.99	1051	1051	0.395	3.797	-1.277	0.811	3.353	0.855	50.3
800S200-54	0.0566	33	0.726	2.47	6.573	1.643	3.009	0.357	0.701	6.573	1.643	35.75 [2]	30.37	2091	2091	0.775	4.663	-1.265	0.804	3.338	0.856	47.8
800S200-54	0.0566	50	0.726	2.47	6.573	1.643	3.009	0.357	0.701	6.573	1.499	44.87	37.37	2091	2091	0.775	4.663	-1.265	0.804	3.338	0.856	40.7
800S200-68	0.0713	33	0.907	3.09	8.140	2.035	2.996	0.435	0.692	8.140	2.035	45.29 [2]	41.79	4221	3367	1.537	5.712	-1.248	0.796	3.319	0.859	47.0
800S200-68	0.0713	50	0.907	3.09	8.140	2.035	2.996	0.435	0.692	8.140	1.964	65.21 [2]	54.70	4221	3367	1.537	5.712	-1.248	0.796	3.319	0.859	38.4
800S200-97	0.1017	33	1.271	4.32	11.203	2.801	2.969	0.576	0.673	11.203	2.801	65.12 [2]	65.12	8843	4824	4.381	7.684	-1.214	0.777	3.278	0.863	45.5
800S200-97	0.1017	50	1.271	4.32	11.203	2.801	2.969	0.576	0.673	11.203	2.801	96.63 [2]	89.76	10885	5938	4.381	7.684	-1.214	0.777	3.278	0.863	37.2
800S200-118	0.1242	33	1.531	5.21	13.316	3.329	2.949	0.665	0.659	13.316	3.329	79.78 [2]	79.78	11341	4971	7.872	8.981	-1.188	0.764	3.247	0.866	44.6
800S200-118	0.1242	50	1.531	5.21	13.316	3.329	2.949	0.665	0.659	13.316	3.329	117.95 [2]	117.55	16235	7115	7.872	8.981	-1.188	0.764	3.247	0.866	36.5
800S250-43	0.0451	33	0.627	2.13	6.015	1.504	3.097	0.500	0.893	6.015	1.313	25.95	22.06	1051	1051	0.425	6.374	-1.675	1.043	3.632	0.787	61.5
800S250-54	0.0566	33	0.783	2.66	7.465	1.866	3.088	0.614	0.886	7.465	1.712	33.82	30.07	2091	2091	0.836	7.850	-1.661	1.036	3.617	0.789	61.4
800S250-54	0.0566	50	0.783	2.66	7.465	1.866	3.088	0.614	0.886	7.378	1.525	45.66	39.13	2091	2091	0.836	7.850	-1.661	1.036	3.617	0.789	49.8
800S250-68	0.0713	33	0.978	3.33	9.261	2.315	3.077	0.752	0.877	9.261	2.220	48.33 [2]	43.63	4221	3367	1.658	9.652	-1.644	1.027	3.597	0.791	58.2
800S250-68	0.0713	50	0.978	3.33	9.261	2.315	3.077	0.752	0.877	9.240	2.059	61.65	53.75	4221	3367	1.658	9.652	-1.644	1.027	3.597	0.791	49.6
800S250-97	0.1017	33	1.372	4.67	12.789	3.197	3.053	1.009	0.857	12.789	3.191	72.07 [2]	70.72	8843	4824	4.731	13.091	-1.607	1.008	3.555	0.796	56.8
800S250-97	0.1017	50	1.372	4.67	12.789	3.197	3.053	1.009	0.857	12.789	3.054	102.70 [2]	93.42	10885	5938	4.731	13.091	-1.607	1.008	3.555	0.796	46.4
800S250-118	0.1242	33	1.655	5.63	15.242	3.810	3.035	1.175	0.843	15.242	3.810	88.31 [2]	88.31	11341	4971	8.511	15.395	-1.580	0.994	3.524	0.799	55.9
800S250-118	0.1242	50	1.655	5.63	15.242	3.810	3.035	1.175	0.843	15.242	3.707	127.51 [2]	122.92	16235	7115	8.511	15.395	-1.580	0.994	3.524	0.799	45.6
800S300-54	0.0566	33	0.839	2.86	8.358	2.090	3.156	0.960	1.069	8.249	1.785	35.28	31.13	2091	2091	0.896	12.076	-2.073	1.271	3.924	0.721	72.2
800S300-54	0.0566	50	0.839	2.86	8.358	2.090	3.156	0.960	1.069	7.862	1.535	45.96	40.22	2091	2091	0.896	12.076	-2.073	1.271	3.924	0.721	58.6
800S300-68	0.0713	33	1.050	3.57	10.382	2.595	3.145	1.179	1.060	10.351	2.321	45.86	42.54	4221	3367	1.779	14.888	-2.055	1.262	3.903	0.723	72.0
800S300-68	0.0713	50	1.050	3.57	10.382	2.595	3.145	1.179	1.060	10.082	2.145	64.21	55.47	4221	3367	1.779	14.888	-2.055	1.262	3.903	0.723	58.4
800S300-97	0.1017	33	1.474	5.02	14.375	3.594	3.123	1.595	1.040	14.375	3.443	76.21 [2]	73.25	8843	4824	5.082	20.304	-2.017	1.243	3.860	0.727	67.7
800S300-97	0.1017	50	1.474	5.02	14.375	3.594	3.123	1.595	1.040	14.170	3.304	98.92	89.89	10885	5938	5.082	20.304	-2.017	1.243	3.860	0.727	58.1
800S300-118	0.1242	33	1.779	6.05	17.167	4.292	3.106	1.871	1.025	17.167	4.168	94.33 [2]	95.78	11341	4971	9.149	23.979	-1.989	1.229	3.828	0.730	66.8
800S300-118	0.1242	50	1.779	6.05	17.167	4.292	3.106	1.871	1.025	17.022	4.108	138.41 [2]	126.69	16235	7115	9.149	23.979	-1.989	1.229	3.828	0.730	54.5
800S350-54	0.0566	33	0.938	3.19	9.683	2.421	3.212	1.646	1.325	9.477	2.125	41.98	38.29	2091	2091	1.002	22.897	-2.766	1.668	4.441	0.612	90.0
800S350-54	0.0566	50	0.938	3.19	9.683	2.421	3.212	1.646	1.325	9.191	1.869	55.96	49.74	2091	2091	1.002	22.897	-2.766	1.668	4.441	0.612	73.1
800S350-68	0.0713	33	1.174	4.00	12.046	3.012	3.203	2.034	1.316	12.046	2.837	56.07	51.89	4221	3367	1.990	28.308	-2.748	1.658	4.421	0.614	89.9
800S350-68	0.0713	50	1.174	4.00	12.046	3.012	3.203	2.034	1.316	11.909	2.596	77.73	68.05	4221	3367	1.990	28.308	-2.748	1.658	4.421	0.614	72.9
800S350-97	0.1017	33	1.652	5.62	16.737	4.184	3.183	2.784	1.298	16.737	4.101	89.43 [2]	87.25	8843	4824	5.696	38.834	-2.710	1.639	4.377	0.617	85.4
800S350-97	0.1017	50	1.652	5.62	16.737	4.184	3.183	2.784	1.298	16.737	3.785	113.34	108.67	10885	5938	5.696	38.834	-2.710	1.639	4.377	0.617	72.7
800S350-118	0.1242	33	1.997	6.79	20.041	5.010	3.168	3.295	1.285	20.041	5.010	111.44 [2]	111.44	11341	4971	10.267	46.068	-2.682	1.624	4.345	0.619	84.6
800S350-118	0.1242	50	1.997	6.79	20.041	5.010	3.168	3.295	1.285	20.041	4.762	158.02 [2]	150.37	16235	7115	10.267	46.068	-2.682	1.624	4.345	0.619	68.9
1000S162-43 [1]	0.0451	33	0.627	2.13	8.025	1.605	3.577	0.168	0.518	7.523	1.302	25.74	22.49	836	836	0.425	3.430	-0.823	0.545	3.707	0.951	38.8
1000S162-54	0.0566	33	0.783	2.66	9.950	1.990	3.565	0.204	0.511	9.627	1.722	34.02	31.11	1661	1661	0.836	4.198	-0.812	0.538	3.692	0.952	38.6
1000S162-54	0.0566	50	0.783	2.66	9.950	1.990	3.565	0.204	0.511	9.391	1.572	47.07	40.37	1661	1661	0.836	4.198	-0.812	0.538	3.692	0.952	31.3
1000S162-68	0.0713	33	0.978	3.33	12.325	2.465	3.550	0.246	0.502	12.256	2.276	44.98	42.91	3345	3345	1.658	5.121	-0.798	0.531	3.673	0.953	38.2
1000S162-68	0.0713	50	0.978	3.33	12.325	2.465	3.550	0.246	0.502	11.978	2.154	64.51	56.35	3345	3345	1.658	5.121	-0.798	0.531	3.673	0.953	31.0
1000S162-97	0.1017	33	1.372	4.67	16.967	3.393	3.516	0.320	0.483	16.967	3.393	67.06	67.05	8843	6434	4.731	6.827	-0.768	0.514	3.631	0.955	37.5
1000S162-97	0.1017	50	1.372	4.67	16.967	3.393	3.516	0.320	0.483	16.967	3.269	97.89	92.56	9864	7177	4.731	6.827	-0.768	0.514	3.631	0.955	30.4
1000S162-118	0.1242	33	1.655	5.63	20.169	4.034	3.491	0.363	0.468	20.169	4.034	100.24 [2]	100.25	13189	7747	8.511	7.924	-0.746	0.502	3.600	0.957	32.9
1000S162-118	0.1242	50	1.655	5.63	20.169	4.034	3.491	0.363	0.468	20.169	4.034	120.77	120.34	16235	9536	8.511	7.924	-0.746	0.502	3.600	0.957	30.0
1000S200-43 [1]	0.0451	33	0.672	2.29	9.085	1.817	3.676	0.309	0.677	8.602	1.470	29.05	26.14	836	836	0.456	6.236	-1.147	0.743	3.910	0.914	49.3
1000S200-54	0.0566	33	0.839	2.86	11.278	2.256	3.666	0.378	0.671	10.953	1.984	39.20	35.86	1661	1661	0.896	7.665	-1.135	0.737	3.896	0.915	49.1
1000S200-54	0.0566	50	0.839	2.86	11.278	2.256	3.666	0.378	0.671	10.769	1.705	51.05	46.62	1661	1661	0.896	7.665	-1.135	0.737	3.896	0.915	39.8
1000S200-68	0.0713	33	1.050	3.57	13.994	2.799	3.652	0.460	0.662	13.920	2.607	51.51	49.07	3345	3345	1.779	9.401	-1.120	0.729	3.876	0.917	48.8
1000S200-68	0.0713	50	1.050	3.57	13.994	2.799	3.652	0.460	0.662	13.665	2.420	72.46	64.50	3345	3345	1.779	9.401	-1.120	0.729	3.876	0.917	39.6
1000S200-97	0.1017	33	1.474	5.02	19.336	3.867	3.622	0.609	0.643	19.336	3.867	76.42	76.42	8843	6434	5.082	12.679	-1.088	0.711	3.836	0.920	48.2
1000S200-97	0.1017	50	1.474	5.02	19.336	3.867	3.622	0.609	0.643	19.336	3.741	112.00	104.73	9864	7177	5.082	12.679	-1.088	0.711	3.836	0.920	39.0
1000S200-118	0.1242	33	1.779	6.05	23.052	4.610	3.599	0.703	0.629	23.052	4.610	110.50 [2]	110.50	13189	7747	9.149	14.848	-1.064	0.699	3.805	0.922	43.3
1000S200-118	0.1242	50	1.779	6.05	23.052	4.610	3.599	0.703	0.629	23.052	4.610	138.04	135.74	16235	9536	9.149	14.848	-1.064	0.699	3.805	0.922	38.7
1000S250-43 [1]	0.0451	33	0.717	2.44	10.203	2.041	3.771	0.531	0.860	10.203	1.617	31.95	27.67	836	836	0.486	10.481	-1.518	0.965	4.155	0.867	60.7
1000S250-54	0.0566	33	0.896	3.05	12.677	2.535	3.762	0.653	0.854	12.677	2.277	44.99	38.02	1661	1661	0.957	12.922	-1.505	0.958	4.140	0.868	60.5
1000S250-54	0.0566	50	0.896	3.05	12.677	2.535	3.762	0.653	0.854	12.660	1.879	56.26	49.16	1661	1661	0.957	12.922	-1.505	0.958	4.140	0.868	49.1
1000S250-68	0.0713	33	1.121	3.81	15.751	3.150	3.749	0.799	0.844	15.751	3.028	65.93 [2]	55.62	3345	3345	1.899	15.909	-1.488	0.950	4.121	0.870	57.3
1000S250-68	0.0713	50	1.121	3.81	15.751	3.150	3.749	0.799	0.844	15.741	2.768	82.89	68.13	3345	3345	1.899	15.909	-1.488	0.950	4.121	0.870	48.8
1000S250-97	0.1017	33	1.576	5.36	21.827	4.365	3.722	1.072	0.825	21.827	4.357	98.41 [2]	91.77	8843	6434	5.433	21.632	-1.454	0.932	4.080	0.873	55.8
1000S250-97	0.1017	50	1.576	5.36	21.827	4.365	3.722	1.072	0.825	21.827	4.181	140.63 [2]	120.13	9864	7177	5.433	21.632	-1.454	0.932	4.080	0.873	45.6
1000S250-118	0.1242	33	1.904	6.48	26.080	5.216	3.701	1.249	0.810	26.080	5.216	120.89 [2]	120.71	13189	7747	9.788	25.490	-1.428	0.918	4.049	0.876	54.7
1000S250-118	0.1242	50	1.904	6.48	26.080	5.216	3.701	1.249	0.810	26.080	5.082	174.84 [2]	159.80	16235	9536	9.788	25.490	-1.428	0.918	4.049	0.876	44.8
1000S300-54	0.0566	33	0.953	3.24	14.076	2.815	3.844	1.024	1.037	13.938	2.312	45.69	39.41	1661	1661	1.017	19.888	-1.892	1.185	4.408	0.816	71.5
1000S300-54	0.0566	50	0.953	3.24	14.076	2.815	3.844	1.024	1.037	13.440	1.902	56.96	50.69	1661	1661	1.017	19.888	-1.892	1.185	4.408	0.816	58.1
1000S300-68	0.0713	33	1.192	4.06	17.509	3.502	3.832	1.258	1.027	17.441	3.158	62.41	54.29	3345	3345	2.020	24.551	-1.874	1.176	4.388	0.818	71.3
1000S300-68	0.0713	50	1.192	4.06	17.509	3.502	3.832	1.258	1.027	17.099	2.802	83.89	70.40	3345	3345	2.020	24.551	-1.874	1.176	4.388	0.818	57.8

[1] *Web height-to-thickness ratio exceeds 200. Web stiffeners are required at all support points and concentrated loads.*

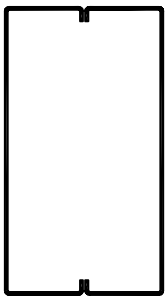
[2] *Allowable moment includes cold work of forming.*

See Table Notes on page 7.

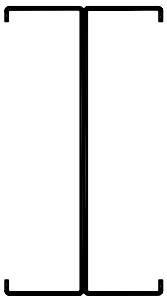
Header Loads

Table Notes

1. Values are for unpunched members.
2. Total load deflection is limited to L/360.
3. Headers are made from two boxed or back-to-back members.
4. Allowable moment, shear, and web crippling are based on twice the capacity of a single member. The moment of inertia is based on twice the value of the single member.
5. Web crippling check is based on 1" of bearing at end supports.
6. Members are assumed adequately braced for bending.
7. Allowable loads are for simply supported headers with uniform bending loads only.
8. See page 5 for additional table notes.



Boxed Header



Back-to-Back Header

Header Allowable Uniform Loads (PLF)

Section	Yield Strength (ksi)	Span						
		3 (ft)	4 (ft)	5 (ft)	6 (ft)	8 (ft)	10 (ft)	12 (ft)
550S162-33	33	931.4e	698.5e	460.1e	319.5e	179.7e	115.0e	73.8e
550S162-43	33	1946.5e	1094.9e	700.8e	486.6e	273.7e	164.6e	95.3e
550S162-54	50	3484.7e	1960.1e	1254.5e	871.2e	396.8e	203.2	117.6
550S162-68	50	4782.6e	2690.2e	1721.7e	1157.8e	488.5e	250.1	144.7
600S137-33	33	850.8e	638.1e	436.5e	303.1e	170.5e	109.1e	75.8e
600S162-33	33	850.8e	638.1e	504.9e	350.6e	197.2e	126.2e	87.6e
600S200-33	33	850.8e	638.1e	510.5e	398.7e	224.2e	143.5e	99.7e
600S137-43	33	1751.1e	985.0e	630.4e	437.8e	246.3e	157.6e	103.2e
600S162-43	33	1887.6e	1205.1e	771.3e	535.6e	301.3e	192.8e	117.1e
600S200-43	33	1887.6e	1282.4e	820.7e	569.9e	320.6e	205.2e	135.7e
600S250-43	33	1887.6e	1350.7e	864.4e	600.3e	337.7e	216.1e	150.1e
600S137-54	50	3146.8e	1770.1e	1132.9e	786.7e	429.8e	220.1	127.3
600S162-54	50	3763.8e	2158.3e	1381.3e	959.3e	488.3e	250.0e	144.7
600S200-54	50	3763.8e	2281.9e	1460.4e	1014.2e	566.7e	290.1e	167.9
600S250-54	50	3763.8e	2392.7e	1531.4e	1063.4e	598.2e	329.1e	190.5
600S137-68	50	4280.5e	2407.8e	1541.0e	1070.1e	528.3e	270.5	156.5
600S162-68	50	5288.3e	2974.7e	1903.8e	1322.1e	601.7e	308.1	178.3
600S200-68	50	5880.1e	3307.5e	2116.8e	1470.0e	700.0e	358.4	207.4
600S250-68	50	5788.2e	3255.8e	2083.7e	1447.0e	806.3e	412.8e	238.9
600S137-97	50	7526.5e	4233.7e	2709.5e	1694.8e	715	366.1	211.8
600S162-97	50	8403.7e	4727.1e	3025.3e	1941.3e	819	419.3	242.7
600S200-97	50	9432.6e	5305.9e	3395.7e	2270.9e	958.0e	490.5	283.9
600S250-97	50	9898.1e	5567.7e	3563.3e	2474.5e	1109.0e	567.8	328.6
600S137-118	50	9138.7e	5140.5e	3289.9e	1987.9e	838.7	429.4	248.5
600S162-118	50	10212.8e	5744.7e	3676.6e	2287.3e	965	494.1	285.9
600S200-118	50	11620.3e	6536.4e	4183.3e	2687.4e	1133.7	580.5	335.9
600S250-118	50	12729.2e	7160.2e	4582.5e	3121.2e	1316.7e	674.2	390.1
800S137-33	33	632.0e	474.0e	379.2e	316.0e	223.2e	142.8e	99.2e
800S162-33	33	632.0e	474.0e	379.2e	316.0e	237.0e	168.1e	116.7e
800S200-33	33	632.0e	474.0e	379.2e	316.0e	237.0e	189.6e	134.5e
800S137-43	33	1401.5e	1051.2e	840.9e	584.3e	328.7e	210.3e	146.1e
800S162-43	33	1401.5e	1051.2e	840.9e	678.8e	381.8e	244.4e	169.7e
800S200-43	33	1401.5e	1051.2e	840.9e	700.8e	437.2e	279.8e	194.3e
800S250-43	33	1401.5e	1051.2e	840.9e	700.8e	459.5e	294.1e	204.2e
800S137-54	50	2788.4e	2091.3e	1518.3e	1054.4e	593.1e	379.6e	251.6e
800S162-54	50	2788.4e	2091.3e	1673.0e	1215.2e	683.6e	437.5e	283.3e
800S200-54	50	2788.4e	2091.3e	1673.0e	1384.1e	778.6e	498.3e	332.5e
800S250-54	50	2788.4e	2091.3e	1673.0e	1394.2e	815.2e	521.7e	362.3e
800S137-68	50	5627.6e	3297.6e	2110.4e	1465.6e	824.4e	527.6e	317.9e
800S162-68	50	5627.6e	3759.1e	2405.8e	1670.7e	939.8e	601.4e	357.6e
800S200-68	50	5627.6e	4220.7e	2917.3e	2025.9e	1139.6e	711.5e	411.8e
800S250-68	50	5627.6e	4220.7e	2866.9e	1990.9e	1119.9e	716.7e	467.4e
800S137-97	50	9468.1e	5325.8e	3408.5e	2367.0e	1331.5e	751.5e	434.9
800S162-97	50	10657.1e	5994.6e	3836.6e	2664.3e	1498.7e	849.0e	491.3
800S200-97	50	13297.5e	7479.8e	4787.1e	3324.4e	1870.0e	979.3e	566.7
800S250-97	50	13839.9e	7785.0e	4982.4e	3460.0e	1946.2e	1117.9e	646.9e
800S137-118	50	14157.3e	7963.5e	5096.6e	3539.3e	1732.3e	886.9	513.3
800S162-118	50	15589.2e	8768.9e	5612.1e	3897.3e	1964.0e	1005.5e	581.9
800S200-118	50	17414.8e	9795.8e	6269.3e	4353.7e	2273.2e	1163.9e	673.5
800S250-118	50	18210.1e	10243.2e	6555.6e	4552.5e	2560.8e	1332.2e	771

"e" web stiffeners required at ends.

Header Loads

Header Allowable Uniform Loads (PLF)

Section	Yield Strength (ksi)	Span						
		3 (ft)	4 (ft)	5 (ft)	6 (ft)	8 (ft)	10 (ft)	12 (ft)
1000S137-43	33	1114.6e	835.9e	668.7e	557.3e	397.8e	254.6e	176.8e
1000S162-43	33	1114.6e	835.9e	668.7e	557.3e	418.0e	299.9e	208.2e
1000S200-43	33	1114.6e	835.9e	668.7e	557.3e	418.0e	334.4e	242.1e
1000S250-43	33	1114.6e	835.9e	668.7e	557.3e	418.0e	334.4e	256.2e
1000S137-54	50	2214.5e	1660.8e	1328.7e	1107.2e	721.1e	461.5e	320.5e
1000S162-54	50	2214.5e	1660.8e	1328.7e	1107.2e	830.4e	538.3e	373.8e
1000S200-54	50	2214.5e	1660.8e	1328.7e	1107.2e	830.4e	621.6e	431.6e
1000S250-54	50	2214.5e	1660.8e	1328.7e	1107.2e	830.4e	655.5e	455.2e
1000S137-68	50	4460.5e	3345.4e	2611.5e	1813.5e	1020.1e	652.9e	453.4e
1000S162-68	50	4460.5e	3345.4e	2676.3e	2087.2e	1174.0e	751.4e	521.8e
1000S200-68	50	4460.5e	3345.4e	2676.3e	2230.3e	1343.8e	860.0e	597.2e
1000S250-68	50	4460.5e	3345.4e	2676.3e	2230.3e	1419.4e	908.4e	630.8e
1000S137-97	50	12117.7e	6816.2e	4362.4e	3029.4e	1704.1e	1090.6e	757.4e
1000S162-97	50	13151.6e	7712.9e	4936.2e	3427.9e	1928.2e	1234.1e	857.0e
1000S200-97	50	13151.6e	8727.6e	5585.7e	3878.9e	2181.9e	1396.4e	969.7e
1000S250-97	50	13151.6e	9863.7e	6407.1e	4449.4e	2502.8e	1601.8e	1104.1e
1000S137-118	50	15854.9e	8918.4e	5707.8e	3963.7e	2229.6e	1426.9e	910.9e
1000S162-118	50	17827.7e	10028.1e	6418.0e	4456.9e	2507.0e	1604.5e	1020.2e
1000S200-118	50	20110.4e	11312.1e	7239.8e	5027.6e	2828.0e	1809.9e	1166.0e
1000S250-118	50	21646.1e	13316.3e	8522.4e	5918.4e	3329.1e	2130.6e	1319.2e
1200S137-54	50	1836.5e	1377.4e	1101.9e	918.2e	688.7e	529.9e	368.0e
1200S162-54	50	1836.5e	1377.4e	1101.9e	918.2e	688.7e	550.9e	432.9e
1200S200-54	50	1836.5e	1377.4e	1101.9e	918.2e	688.7e	550.9e	459.1e
1200S250-54	50	1836.5e	1377.4e	1101.9e	918.2e	688.7e	550.9e	459.1e
1200S137-68	50	3694.3e	2770.7e	2216.6e	1847.2e	1187.3e	759.9e	527.7e
1200S162-68	50	3694.3e	2770.7e	2216.6e	1847.2e	1377.9e	881.8e	612.4e
1200S200-68	50	3694.3e	2770.7e	2216.6e	1847.2e	1385.4e	1020.7e	708.8e
1200S250-68	50	3694.3e	2770.7e	2216.6e	1847.2e	1385.4e	1087.9e	755.5e
1200S137-97	50	10862.7e	8144.0e	5212.1e	3619.5e	2036.0e	1303.0e	904.9e
1200S162-97	50	10862.7e	8147.0e	5936.1e	4122.3e	2318.8e	1484.0e	1030.6e
1200S200-97	50	10862.7e	8147.0e	6517.6e	4698.7e	2643.0e	1691.5e	1174.7e
1200S250-97	50	10862.7e	8147.0e	6517.6e	5013.8e	2820.3e	1805.0e	1253.5e
1200S137-118	50	19323.9e	10869.7e	6956.6e	4831.0e	2717.4e	1739.1e	1207.7e
1200S162-118	50	19980.7e	12269.5e	7852.5e	5453.1e	3067.4e	1963.1e	1363.3e
1200S200-118	50	19980.7e	13900.1e	8896.1e	6177.8e	3475.0e	2224.0e	1544.5e
1200S250-118	50	19980.7e	14880.8e	9523.7e	6613.7e	3720.2e	2380.9e	1653.4e
1200S300-118	50	19980.7e	14985.5e	10756.0e	7469.4e	4201.6e	2689.0e	1867.4e
1200S350-118	50	19980.7e	14985.5e	11988.4e	8850.4e	4978.3e	3186.1e	2212.6e
1400S162-54	50	1568.7e	1176.5e	941.2e	784.4e	588.3e	470.6e	392.2e
1400S200-54	50	1568.7e	1176.5e	941.2e	784.4e	588.3e	470.6e	392.2e
1400S250-54	50	1568.7e	1176.5e	941.2e	784.4e	588.3e	470.6e	392.2e
1400S300-54	50	1568.7e	1176.5e	941.2e	784.4e	588.3e	470.6e	392.2e
1400S350-54	50	1568.7e	1176.5e	941.2e	784.4e	588.3e	470.6e	392.2e
1400S162-68	50	3152.8e	2364.6e	1891.7e	1576.4e	1182.3e	945.8e	690.3e
1400S200-68	50	3152.8e	2364.6e	1891.7e	1576.4e	1182.3e	945.8e	788.2e
1400S250-68	50	3152.8e	2364.6e	1891.7e	1576.4e	1182.3e	945.8e	788.2e
1400S300-68	50	3152.8e	2364.6e	1891.7e	1576.4e	1182.3e	945.8e	788.2e
1400S350-68	50	3152.8e	2364.6e	1891.7e	1576.4e	1182.3e	945.8e	788.2e
1400S162-97	50	9252.4e	6939.3e	5551.4e	4626.2e	2665.9e	1706.2e	1184.8e
1400S200-97	50	9252.4e	6939.3e	5551.4e	4626.2e	3062.0e	1959.7e	1360.9e
1400S250-97	50	9252.4e	6939.3e	5551.4e	4626.2e	3290.4e	2105.8e	1462.4e
1400S300-97	50	9252.4e	6939.3e	5551.4e	4626.2e	3446.8e	2206.0e	1531.9e
1400S350-97	50	9252.4e	6939.3e	5551.4e	4626.2e	3469.6e	2683.4e	1863.5e
1400S162-118	50	16993.8e	12745.4e	9153.4e	6356.5e	3575.5e	2288.3e	1589.1e
1400S200-118	50	16993.8e	12745.4e	10196.3e	7245.3e	4075.5e	2608.3e	1811.3e
1400S250-118	50	16993.8e	12745.4e	10196.3e	7793.3e	4383.7e	2805.6e	1948.3e
1400S300-118	50	16993.8e	12745.4e	10196.3e	8178.0e	4600.1e	2944.1e	2044.5e
1400S350-118	50	16993.8e	12745.4e	10196.3e	8496.9e	5892.6e	3771.3e	2618.9e
1600S162-68	50	2749.7e	2062.3e	1649.8e	1374.8e	1031.1e	824.9e	687.4e
1600S200-68	50	2749.7e	2062.3e	1649.8e	1374.8e	1031.1e	824.9e	687.4e
1600S250-68	50	2749.7e	2062.3e	1649.8e	1374.8e	1031.1e	824.9e	687.4e
1600S300-68	50	2749.7e	2062.3e	1649.8e	1374.8e	1031.1e	824.9e	687.4e
1600S350-68	50	2749.7e	2062.3e	1649.8e	1374.8e	1031.1e	824.9e	687.4e
1600S162-97	50	8057.9e	6043.4e	4834.7e	4028.9e	2975.1e	1904.1e	1322.3e
1600S200-97	50	8057.9e	6043.4e	4834.7e	4028.9e	3021.7e	2199.8e	1527.7e
1600S250-97	50	8057.9e	6043.4e	4834.7e	4028.9e	3021.7e	2381.4e	1653.7e
1600S300-97	50	8057.9e	6043.4e	4834.7e	4028.9e	3021.7e	2417.4e	1743.7e
1600S350-97	50	8057.9e	6043.4e	4834.7e	4028.9e	3021.7e	2417.4e	2014.5e
1600S162-118	50	14783.8e	11087.9e	8870.3e	7175.0e	4035.9e	2583.0e	1793.8e
1600S200-118	50	14783.8e	11087.9e	8870.3e	7391.9e	4622.1e	2958.1e	2054.3e
1600S250-118	50	14783.8e	11087.9e	8870.3e	7391.9e	5001.5e	3201.0e	2222.9e
1600S300-118	50	14783.8e	11087.9e	8870.3e	7391.9e	5275.8e	3376.5e	2344.8e
1600S350-118	50	14783.8e	11087.9e	8870.3e	7391.9e	5543.9e	4061.0e	2820.1e

"e" web stiffeners required at ends.

See Table Notes on page 49.

Screw Capacities

Table Notes

1. Capacities based on AISI S100 Section E4.
2. When connecting materials of different steel thicknesses or tensile strengths, use the lowest values. Tabulated values assume two sheets of equal thickness are connected.
3. Capacities are based on Allowable Strength Design (ASD) and include safety factor of 3.0.
4. Where multiple fasteners are used, screws are assumed to have a center-to-center spacing of at least 3 times the nominal diameter (d).
5. Screws are assumed to have a center-of-screw to edge-of-steel dimension of at least 1.5 times the nominal diameter (d) of the screw.
6. Pull-out capacity is based on the lesser of pull-out capacity in sheet closest to screw tip or tension strength of screw.
7. Pull-over capacity is based on the lesser of pull-over capacity for sheet closest to screw header or tension strength of screw.
8. Values are for pure shear or tension loads. See AISI Section E4.5 for combined shear and pull-over.
9. Screw Shear (Pss), tension (Pts), diameter, and head diameter are from CFSEI Tech Note (F701-12).
10. Screw shear strength is the average value, and tension strength is the lowest value listed in CFSEI Tech Note (F701-12).
11. Higher values for screw strength (Pss, Pts), may be obtained by specifying screws from a specific manufacturer.

Allowable Screw Connection Capacity (lbs)

Thickness (Mils)	Design Thickness	Fy Yield (ksi)	Fu Tensile (ksi)	#6 Screw (Pss = 643 lbs, Pts = 419 lbs) 0.138" dia, 0.272" Head			#8 Screw (Pss= 1278 lbs, Pts = 586 lbs) 0.164" dia, 0.272" Head			#10 Screw (Pss= 1644 lbs, Pts = 1158 lbs) 0.190" dia, 0.340" Head			#12 Screw (Pss= 2330 lbs, Pts = 2325 lbs) 0.216" dia, 0.340" Head			¼" Screw (Pss= 3048 lbs, Pts = 3201 lbs) 0.250" dia, 0.409" Head		
				Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over
18	0.0188	33	33	44	24	84	48	29	84	52	33	105	55	38	105	60	44	127
27	0.0283	33	33	82	37	127	89	43	127	96	50	159	102	57	159	110	66	191
30	0.0312	33	33	95	40	140	103	48	140	111	55	175	118	63	175	127	73	211
33	0.0346	33	45	151	61	140	164	72	195	177	84	265	188	95	265	203	110	318
43	0.0451	33	45	214	79	140	244	94	195	263	109	345	280	124	345	302	144	415
54	0.0566	33	45	214	100	140	344	118	195	370	137	386	394	156	433	424	180	521
68	0.0713	33	45	214	125	140	426	149	195	523	173	386	557	196	545	600	227	656
97	0.1017	33	45	214	140	140	426	195	195	548	246	386	777	280	775	1,016	324	936
118	0.1242	33	45	214	140	140	426	195	195	548	301	386	777	342	775	1,016	396	1,067
54	0.0566	50	65	214	140	140	426	171	195	534	198	386	569	225	625	613	261	752
68	0.0713	50	65	214	140	140	426	195	195	548	249	386	777	284	775	866	328	948
97	0.1017	50	65	214	140	140	426	195	195	548	356	386	777	405	775	1,016	468	1,067
118	0.1242	50	65	214	140	140	426	195	195	548	386	386	777	494	775	1,016	572	1,067

Weld Capacities

Table Notes

1. Capacities based on the AISI S100 Specification Sections E2.4 for fillet welds and E2.5 for flare groove welds.
2. When connecting materials of different steel thicknesses or tensile strengths, use the lowest values.
3. Capacities are based on Allowable Strength Design (ASD).
4. Weld capacities are based on E60 electrodes. For material thinner than 68 mil, 0.030" to 0.035" diameter wire electrodes may provide best results.
5. Longitudinal capacity is considered to be loading in the direction of the length of the weld.
6. Transverse capacity is loading in perpendicular direction of the length of the weld.
7. For flare groove welds, the effective throat of weld is conservatively assumed to be less than 2t.
8. For longitudinal fillet welds, a minimum value of EQ E2.4-1, E2.4-2, and E2.4-4 was used.
9. For transverse fillet welds, a minimum value of EQ E2.4-3 and E2.4-4 was used.
10. For longitudinal flare groove welds, a minimum value of EQ E2.5-2 and E2.5-3 was used.

Allowable Weld Capacity (lbs / in)

Thickness (Mils)	Design Thickness	Fy Yield (ksi)	Fu Tensile (ksi)	Fillet Welds		Flare Groove Welds	
				Longitudinal	Transverse	Longitudinal	Transverse
43	0.0451	33	45	499	864	544	663
54	0.0566	33	45	626	1084	682	832
68	0.0713	33	45	789	1365	859	1048
97	0.1017	33	45	1125	1269	-[1]	-[1]
54	0.0566	50	65	905	1566	985	1202
68	0.0713	50	65	1140	1972	1241	1514
97	0.1017	50	65	1269	1269	-[1]	-[1]

[1] *Weld capacity for material thickness greater than 0.10" requires engineering judgment to determine leg of welds, W1 and W2.*

Company:		Page:	1
Specifier:		Project:	
Address:		Sub-Project I Pos. No.:	
Phone I Fax:	|	Date:	10/26/2022
E-Mail:			

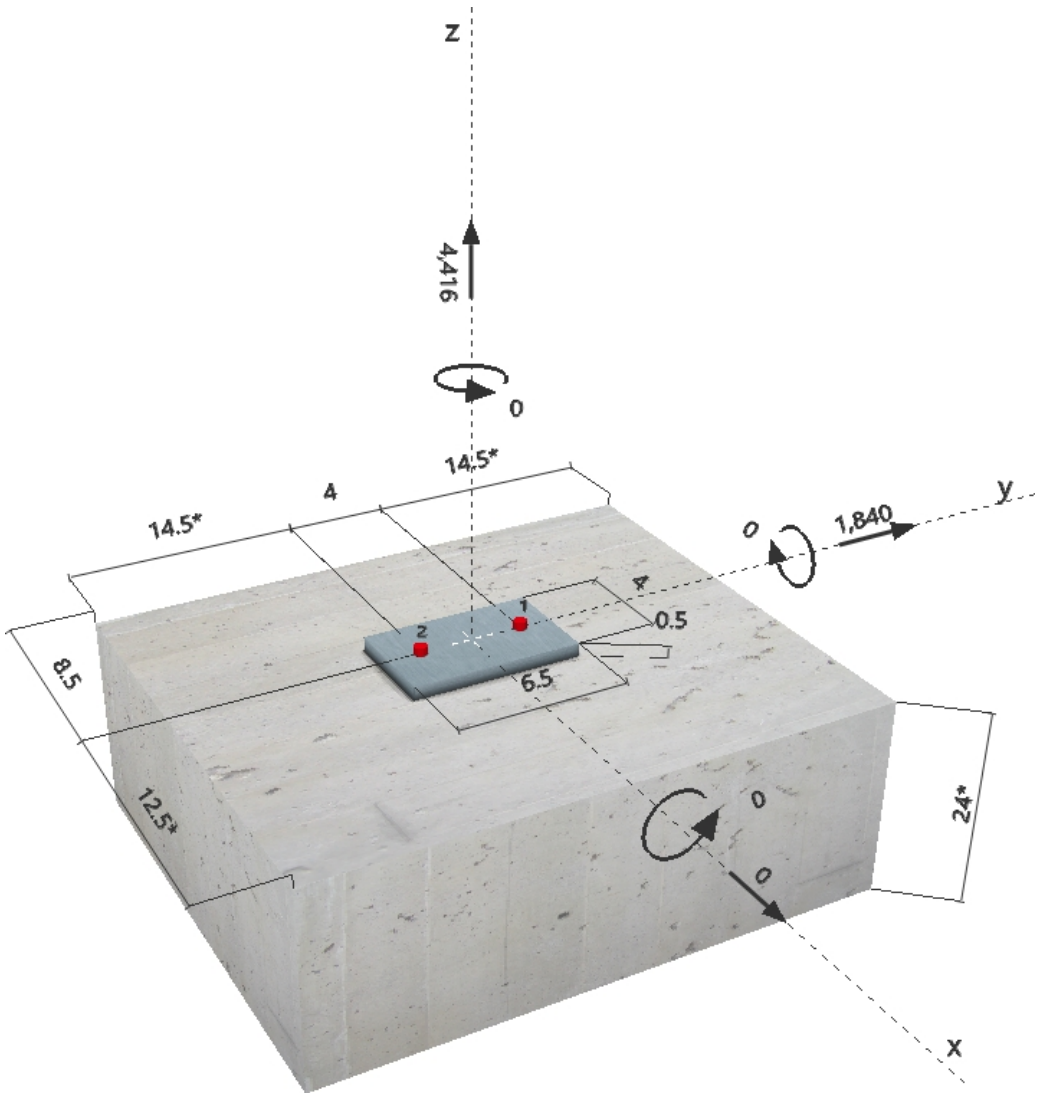
Specifier's comments:

1 Input data

SAFE-SET

Anchor type and diameter:	**HIT-HY 200 + HIT-Z 1/2**
Effective embedment depth:	$h_{ef,opti}$ = 3.071 in. ($h_{ef,limit}$ = 6.000 in.)
Material:	DIN EN ISO 4042
Evaluation Service Report:	ESR-3187
Issued I Valid:	11/1/2016 | 3/1/2018
Proof:	Design method ACI 318-11 / Chem
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.500 in.
Anchor plate:	l_x x l_y x t = 4.000 in. x 6.500 in. x 0.500 in.; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, 2500, f_c' = 2500 psi; h = 24.000 in., Temp. short/long: 32/32 °F
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition A, shear: condition A; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar

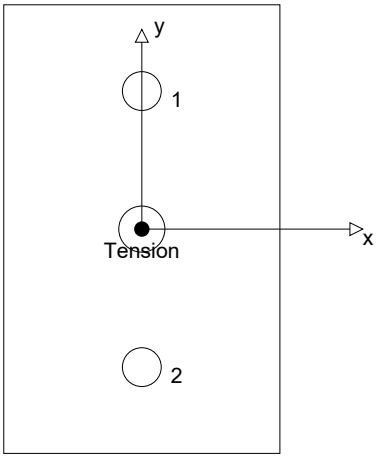
Geometry [in.] & Loading [lb, in.lb]



Company:
Specifier:
Address:
Phone I Fax: |
E-Mail:

2 Load case/Resulting anchor forces

Load case: Design loads



Anchor reactions [lb]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	2208	920	0	920
2	2208	920	0	920

max. concrete compressive strain: - [‰]
max. concrete compressive stress: - [psi]
resulting tension force in (x/y)=(0.000/0.000): 4416 [lb]
resulting compression force in (x/y)=(0.000/0.000): 0 [lb]

3 Tension load

	Load N_{ua} [lb]	Capacity ϕN_n [lb]	Utilization $\beta_N = N_{ua}/\phi N_n$	Status
Steel Strength*	2208	8695	26	OK
Pullout Strength*	2208	7108	32	OK
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Strength**	4416	4909	90	OK

* anchor having the highest loading **anchor group (anchors in tension)

3.1 Steel Strength

N_{sa} = ESR value refer to ICC-ES ESR-3187
$\phi N_{sa} \geq N_{ua}$ ACI 318-11 Table D.4.1.1

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.14	94200

Calculations

N_{sa} [lb]
13377

Results

N_{sa} [lb]	ϕ steel	ϕN_{sa} [lb]	N_{ua} [lb]
13377	0.650	8695	2208

3.2 Pullout Strength

N_{pn} = $N_p \lambda_a$ refer to ICC-ES ESR-3187
$\phi N_{pn} \geq N_{ua}$ ACI 318-11 Table D.4.1.1

Variables

λ_a	N_p [lb]
1.000	10936

Calculations

-
-

Results

N_{pn} [lb]	ϕ concrete	ϕN_{pn} [lb]	N_{ua} [lb]
10936	0.650	7108	2208

Company:
Specifier:
Address:
Phone I Fax: |
E-Mail:

3.3 Concrete Breakout Strength

$N_{cbg} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ ACI 318-11 Eq. (D-4)

$\phi N_{cbg} \geq N_{ua}$ ACI 318-11 Table D.4.1.1

A_{Nc} see ACI 318-11, Part D.5.2.1, Fig. RD.5.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-11 Eq. (D-5)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 e'_N}{3 h_{ef}}}\right) \leq 1.0$ ACI 318-11 Eq. (D-8)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}}\right) \leq 1.0$ ACI 318-11 Eq. (D-10)

$\psi_{cp,N} = MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}}\right) \leq 1.0$ ACI 318-11 Eq. (D-12)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ ACI 318-11 Eq. (D-6)

Variables

h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
3.071	0.000	0.000	8.500	1.000

c_{ac} [in.]	k_c	λ_a	f'_c [psi]
4.597	17	1.000	2500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
121.33	84.55	1.000	1.000	1.000	1.000	4561

Results

N_{cbg} [lb]	ϕ concrete	ϕN_{cbg} [lb]	N_{ua} [lb]
6545	0.750	4909	4416

Company:
Specifier:
Address:
Phone I Fax: |
E-Mail:

4 Shear load

	Load V_{ua} [lb]	Capacity ϕV_n [lb]	Utilization $\beta_V = V_{ua}/\phi V_n$	Status
Steel Strength*	920	3532	27	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength (Concrete Breakout Strength controls)**	1840	9163	21	OK
Concrete edge failure in direction y+**	1840	5811	32	OK

* anchor having the highest loading **anchor group (relevant anchors)

4.1 Steel Strength

V_{sa} = $(0.6\ A_{se,V}\ f_{uta})$ refer to ICC-ES ESR-3187
$\phi\ V_{steel} \geq V_{ua}$ ACI 318-11 Table D.4.1.1

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]	$(0.6\ A_{se,V}\ f_{uta})$ [lb]
0.14	94200	5886

Calculations

V_{sa} [lb]
5886

Results

V_{sa} [lb]	ϕ steel	$\phi\ V_{sa}$ [lb]	V_{ua} [lb]
5886	0.600	3532	920

4.2 Pryout Strength (Concrete Breakout Strength controls)

$V_{cpg} = k_{cp}\left[\left(\frac{A_{Nc}}{A_{Nc0}}\right)\psi_{ec,N}\,\psi_{ed,N}\,\psi_{c,N}\,\psi_{cp,N}\,N_b\right]$ ACI 318-11 Eq. (D-41)

$\phi\ V_{cpg} \geq V_{ua}$ ACI 318-11 Table D.4.1.1

A_{Nc} see ACI 318-11, Part D.5.2.1, Fig. RD.5.2.1(b)

$A_{Nc0} = 9\ h_{ef}^2$ ACI 318-11 Eq. (D-5)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2\ e'_N}{3\ h_{ef}}}\right) \leq 1.0$ ACI 318-11 Eq. (D-8)

$\psi_{ed,N} = 0.7 + 0.3\left(\frac{c_{a,min}}{1.5h_{ef}}\right) \leq 1.0$ ACI 318-11 Eq. (D-10)

$\psi_{cp,N} = \mathrm{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ ACI 318-11 Eq. (D-12)

$N_b = k_c\ \lambda_a\ \sqrt{f'_c}\ h_{ef}^{1.5}$ ACI 318-11 Eq. (D-6)

Variables

k_{cp}	h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
2	3.071	0.000	0.000	8.500

$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
1.000	4.597	17	1.000	2500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
121.33	84.55	1.000	1.000	1.000	1.000	4561

Results

V_{cpg} [lb]	ϕ concrete	$\phi\ V_{cpg}$ [lb]	V_{ua} [lb]
13090	0.700	9163	1840

Company:
Specifier:
Address:
Phone I Fax: |
E-Mail:

4.3 Concrete edge failure in direction y+

$V_{cbg} = \left(\frac{A_{Vc}}{A_{Vc0}}\right) \psi_{ec,V} \psi_{ed,V} \psi_{c,V} \psi_{h,V} \psi_{parallel,V} V_b$ ACI 318-11 Eq. (D-31)

$\phi V_{cbg} \geq V_{ua}$ ACI 318-11 Table D.4.1.1

A_{Vc} see ACI 318-11, Part D.6.2.1, Fig. RD.6.2.1(b)

$A_{Vc0} = 4.5 c_{a1}^2$ ACI 318-11 Eq. (D-32)

$\psi_{ec,V} = \left(\frac{1}{1 + \frac{2e'_v}{3c_{a1}}}\right) \leq 1.0$ ACI 318-11 Eq. (D-36)

$\psi_{ed,V} = 0.7 + 0.3\left(\frac{c_{a2}}{1.5c_{a1}}\right) \leq 1.0$ ACI 318-11 Eq. (D-38)

$\psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0$ ACI 318-11 Eq. (D-39)

$V_b = \left(7\left(\frac{l_e}{d_a}\right)^{0.2}\sqrt{d_a}\right) \lambda_a \sqrt{f'_c}\, c_{a1}^{1.5}$ ACI 318-11 Eq. (D-33)

Variables

c_{a1} [in.]	c_{a2} [in.]	e_{cV} [in.]	$\psi_{c,V}$	h_a [in.]
14.500	8.500	0.000	1.000	24.000

l_e [in.]	λ_a	d_a [in.]	f'_c [psi]	$\psi_{parallel,V}$
3.065	1.000	0.500	2500	1.000

Calculations

A_{Vc} [in.^{2}]	A_{Vc0} [in.^{2}]	$\psi_{ec,V}$	$\psi_{ed,V}$	$\psi_{h,V}$	V_b [lb]
456.75	946.13	1.000	0.817	1.000	19638

Results

V_{cbg} [lb]	$\phi_{concrete}$	ϕV_{cbg} [lb]	V_{ua} [lb]
7748	0.750	5811	1840

5 Combined tension and shear loads

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.900	0.317	5/3	99	OK

$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} <= 1$

6 Warnings

- The anchor design methods in PROFIS Anchor require rigid anchor plates per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Anchor calculates the minimum required anchor plate thickness with FEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid base plate assumption is valid is not carried out by PROFIS Anchor. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies when supplementary reinforcement is used. The Φ factor is increased for non-steel Design Strengths except Pullout Strength and Pryout strength. Condition B applies when supplementary reinforcement is not used and for Pullout Strength and Pryout Strength. Refer to your local standard.
- Design Strengths of adhesive anchor systems are influenced by the cleaning method. Refer to the INSTRUCTIONS FOR USE given in the Evaluation Service Report for cleaning and installation instructions
- Checking the transfer of loads into the base material and the shear resistance are required in accordance with ACI 318 or the relevant standard!
- Installation of Hilti adhesive anchor systems shall be performed by personnel trained to install Hilti adhesive anchors. Reference ACI 318-11, Part D.9.1

Fastening meets the design criteria!

Company:
Specifier:
Address:
Phone I Fax: |
E-Mail:

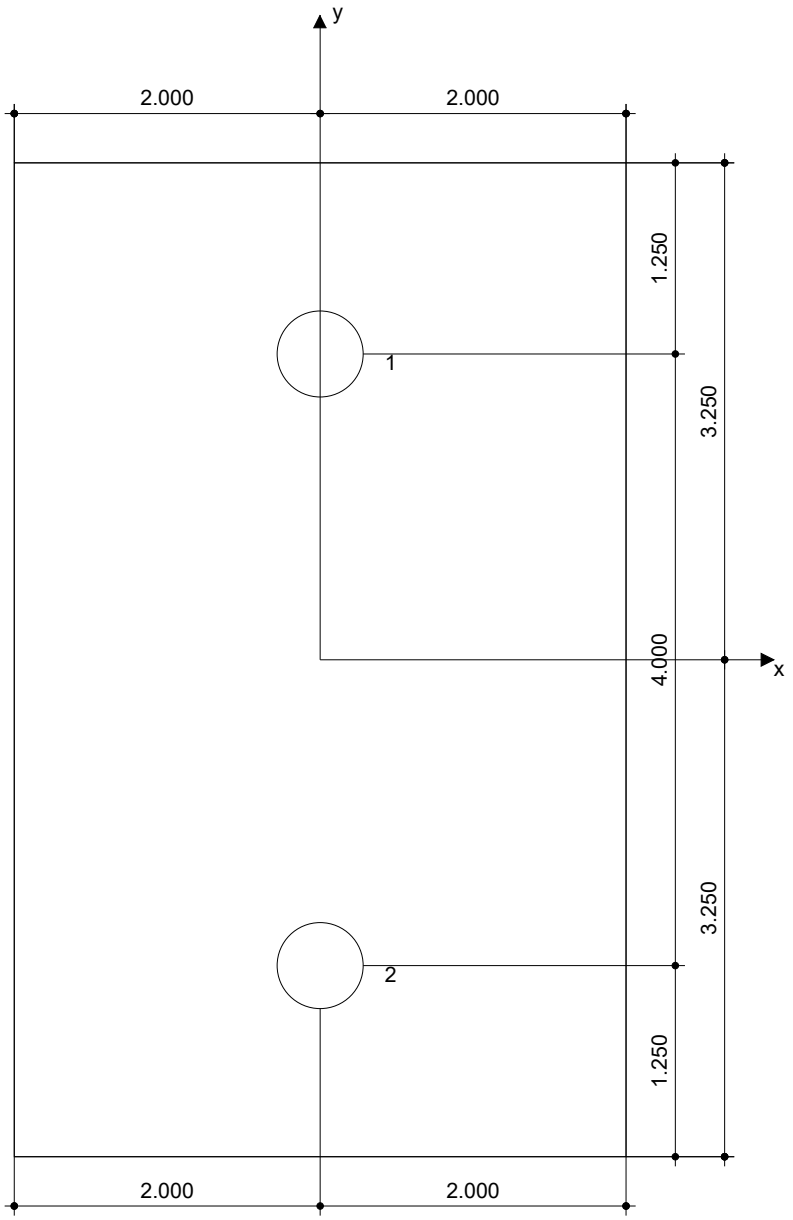
7 Installation data

Anchor plate, steel: -
Profile: no profile
Hole diameter in the fixture: d_f = 0.563 in.
Plate thickness (input): 0.500 in.
Recommended plate thickness: not calculated
Drilling method: Hammer drilled
Cleaning: No cleaning of the drilled hole is required

Anchor type and diameter: HIT-HY 200 + HIT-Z 1/2
Installation torque: 354.030 in.lb
Hole diameter in the base material: 0.563 in.
Hole depth in the base material: 4.071 in.
Minimum thickness of the base material: 5.321 in.

7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer	• No accessory required	• Dispenser including cassette and mixer
• Properly sized drill bit		• Torque wrench



Coordinates Anchor in.

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	0.000	2.000	8.500	12.500	18.500	14.500
2	0.000	-2.000	8.500	12.500	14.500	18.500

Company:
Specifier:
Address:
Phone I Fax: |
E-Mail:

8 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.

APB CONSULTING ENGINEERS, PLLC
23650 N. 84th Place, Scottsdale AZ 85255
602 904 5748 PH 602 916 0975 FAX

Job Name
Job # Sheet #
BY AB Date 11/2/2022

B1	Span =	18.34	ft max	8	ft roof	0	ft roof			
	w =	120	D	320	Lr	-136.393	W	80.68	Sl	plf
	R =	0.78	D	2.08	Lr	-0.89	W	0.53	Sl	k
	6x12									

F1	Footing for (2) B1									
			Soil Capacit =		1.5	kips				
	P =	2.028	D	4.16	Lr	-1.78	W	1.06	Sl	k
	Try =	12	in Depth	2.67	ft Width	2.67	ft Length			
	Bearing	0.868016								
	Uplift	0.790401								
	12 in x 2.67 ft x 2.67 ft Concrete Footing w/ (3) #5 Each Way									

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22 196.ec6

DESCRIPTION: B1 Rough Sawn

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-16

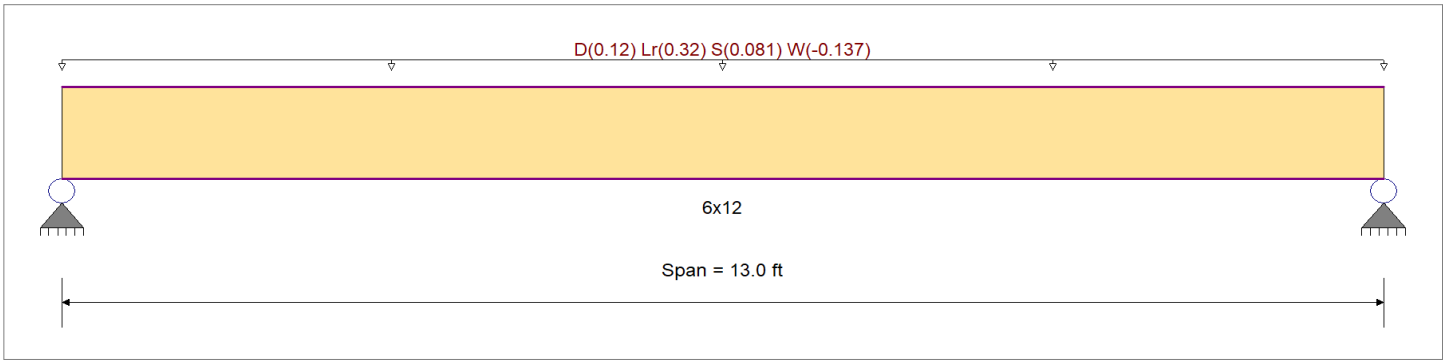
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.120, Lr = 0.320, S = 0.0810, W = -0.1370 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.818 : 1	Maximum Shear Stress Ratio	=	0.257 : 1
Section used for this span		6x12	Section used for this span		6x12
fb: Actual	=	920.08 psi	fv: Actual	=	57.92 psi
Fb: Allowable	=	1,125.00 psi	Fv: Allowable	=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	6.500 ft	Location of maximum on span	=	12.051 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.185 in	Ratio =	841	>=240	Span: 1 : Lr Only
Max Upward Transient Deflection	-0.079 in	Ratio =	1964	>=240	Span: 1 : W Only
Max Downward Total Deflection	0.255 in	Ratio =	611	>=180	Span: 1 : +D+Lr
Max Upward Total Deflection	-0.006 in	Ratio =	26389	>=180	Span: 1 : +0.60D+0.60W

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.310	0.098	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.54	250.93	810.00	0.67	15.80	162.00
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.818	0.257	1.25	1.000	1.00	1.00	1.00	1.00	1.00	9.30	920.08	1125.00	2.44	57.92	225.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.406	0.128	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.25	420.31	1035.00	1.12	26.46	207.00
+D+0.750Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.669	0.211	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.61	752.79	1125.00	2.00	47.39	225.00
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.365	0.115	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.82	377.96	1035.00	1.00	23.80	207.00
+D+0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.055	0.017	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.80	79.04	1440.00	0.21	4.98	288.00
+D+0.750Lr+0.450W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22 196.ec6

DESCRIPTION: B1 Rough Sawn

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 13.0 ft	**1**	0.433	0.136	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.30	623.87	1440.00	1.66	39.28	288.00
+D+0.750S+0.450W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	**1**	0.173	0.054	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.52	249.05	1440.00	0.66	15.68	288.00
+0.60D+0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	**1**	0.015	0.005	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.22	21.33	1440.00	0.06	1.34	288.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	**1**	0.105	0.033	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.52	150.56	1440.00	0.40	9.48	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.2550	6.547		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.860	2.860
Overall MINimum	0.527	0.527
D Only	0.780	0.780
+D+Lr	2.860	2.860
+D+S	1.307	1.307
+D+0.750Lr	2.340	2.340
+D+0.750S	1.175	1.175
+D+0.60W	0.246	0.246
+D+0.750Lr+0.450W	1.939	1.939
+D+0.750S+0.450W	0.774	0.774
+0.60D+0.60W	-0.066	-0.066
+0.60D	0.468	0.468
Lr Only	2.080	2.080
S Only	0.527	0.527
W Only	-0.891	-0.891