wallace design collective

LEE'S SUMMIT LOGISTICS BUILDING C LOT 3
LEE'S SUMMIT, MO
PROJECT NO. 2220003

STRUCTURAL CALCULATIONS

05/06/2022

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Date	4/19/2022	Sheet No.	of
Job	Project Birkdale		
Subject	Roof Loads		

DEAD AND LIVE LOADS

ASCE 7-16 Table C3.1-1a and Table 4.3.1

ROOF LOADS

DEAD

ITEM	DESCRIPTION	UNIT WEIGHT (PSF)		TOTAL
Roof Covering	EPDM Membrane	1.0	x 0.50	0.5
Insulation	Polystyrene Foam (per inch thickness)	3.5	x 0.20	0.7
Deck	Metal Deck, 22 gage, 1.5" B	1.0	x 2.00	2.0
Ceiling	None	1.0	x 0.00	0.0
HVAC	HVAC Allowance (except sprinklers)			1.5
Sprinklers	Branch Lines Only			2.0
Fire-Proofing				0.00
Waterproofing				0.00
Miscellaneous				1.50
Sub-Total				**8.2**
Secondary Frami	K-Series (30K10) joists at 6'-0" O.C.			2.0
Sub-Total				**10.2**
Primary Framing	Joist Girders (60' max. span)			1.5
Total				**11.7**

ROOF LIVE/SNOW LOADS

ITEM	LOAD (PSF)
Roof Live Load	**20.0**
Factored Roof Snow Load, Pf	**20.0**

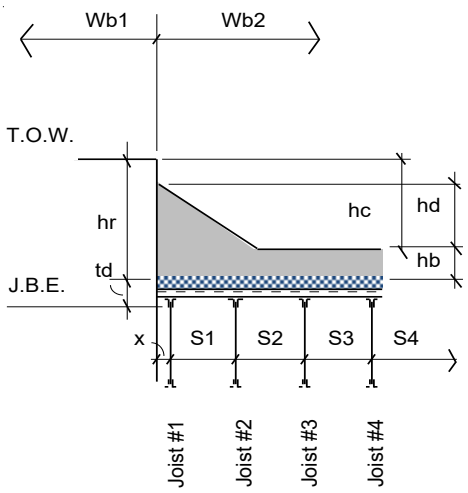
WALLACE DESIGN PROGRAM

Revised 05/20/19, Carrie Johnson

Date	5/5/2022	Sheet No.	of
Project	2220003 Building 3		
Subject	Snow Drift East/West - 4.875ft Parapet		

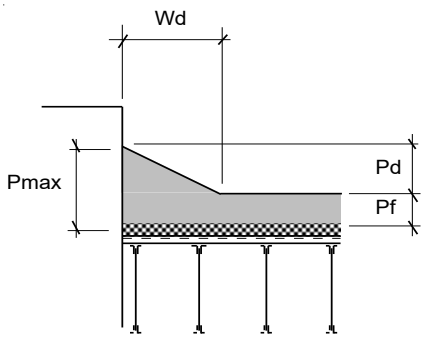
FLAT ROOF SNOW DRIFT - Joists Parallel to Wall

ASCE 7-16



Configuration

Note: For projections, input width of projection for Wb1 and input maximum of leeward and windward drift length for Wb2. For parapets, input the parapet width as Wb1.



Snow Drift

1. Input

Dead Load =	**12**	psf
Roof Live Load =	**20**	psf
Pg, Ground Snow Load =	**20**	psf
Drift for parapet, projection, or upper roof?	**P**	(P), (PR) or (U)
Risk Categoy (I, II, III, or IV) =	**II**	Table 1.5-1
Ce, Exposure Factor =	**1.0**	Table 7.3-1
Ct, Thermal Factor =	**1.0**	Table 7.3-2
Use Pg minimum for drift calc's (Pf = Pg)?	**Y**	(Y or N)

Geometry

T.O.W., Top of Parapet Elevation =	**38.50**	feet
J.B.E., Joist Bearing Elevation =	**34.60**	feet
td, Thickness of Joist, Deck, and Insulation =	**5.00**	inches
Wb1, length of upper roof =	**0.80**	feet
Wb2, length of lower roof =	**350.00**	feet
x, Joist #1 dist. from wall =	**6.25**	feet
S1, First Joist Spacing =	**6.25**	feet
S2, Second Joist Spacing =	**6.25**	feet
S3, Third Joist Spacing =	**6.25**	feet
S4, Fourth Joist Spacing =	**6.25**	feet
S5, Fifth Joist Spacing =	**6.25**	feet

2. Balanced Snow Load Check

Is, Importance Factor =	**1.0**	Table 1.5-2
Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf (7.3-1)
Pm = Is Pg =	**20.00**	psf (7.3.4)
Rain on snow surcharge =	**5.00**	psf (7.10)
Pmin =	**20.00**	psf

3. Drifted Snow Load Check

Pf = Pg =	**20.00**	psf
D = 0.13 Pg + 14.0 ≤ 30 pcf =	**16.60**	pcf (7.7-1)
hb = Pf/D =	**1.20**	feet
Wb =	**350.00**	feet
hd = 0.75[0.43 Wb2^1/3 (Pg+10)^1/4-1.5] Is^1	**4.18**	feet (Fig. 7.6-1)
hd + hb =	**5.39**	feet
hr =	**3.48**	feet
hc = hr - hb =	**2.28**	feet
Wd = 4 hd or 4 [hd^2/hc] ≤ 8 hc =	**18.23**	feet
Pmax = D (hd + hb) ≤ D hr =	**57.82**	psf
Pd =D hd ≤ D hc =	**37.82**	psf

4. Uniform Load Summary

Drifted Snow Load

	Snow	Total	
w, wall	**170.6**	**208.1**	plf *
w, Joist #1	**280.3**	**355.3**	plf *
w, Joist #2	**199.3**	**274.3**	plf *
w, Joist #3	**141.9**	**216.9**	plf *
w, Joist #4	**125.0**	**200.0**	plf
w, Joist #5	**125.0**	**200.0**	plf

Balanced Load Check

	Pmin (20 psf)	Total	
w, wall	**62.5**	**100.0**	plf
w, Joist #1	**125.0**	**200.0**	plf
w, Joist #2	**125.0**	**200.0**	plf
w, Joist #3	**125.0**	**200.0**	plf
w, Joist #4	**125.0**	**200.0**	plf *
w, Joist #5	**125.0**	**200.0**	plf *

* indicates controlling load (drifted vs. undrifted)

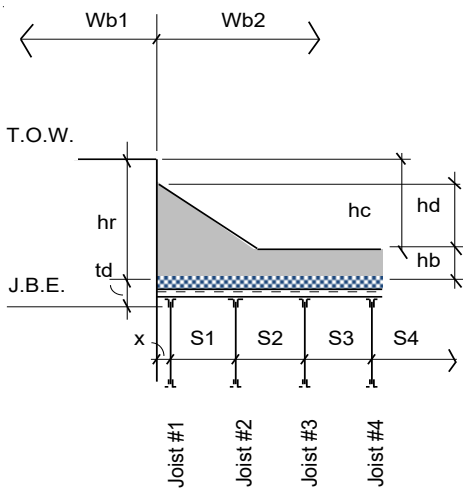
WALLACE DESIGN PROGRAM

Revised 05/20/19, Carrie Johnson

Date	5/5/2022	Sheet No.	of
Project	2220003 Building 3		
Subject	Snow Drift East/West - 4.875ft Parapet		

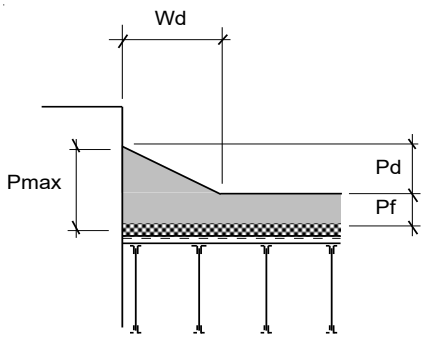
FLAT ROOF SNOW DRIFT - Joists Parallel to Wall

ASCE 7-16



Configuration

Note: For projections, input width of projection for Wb1 and input maximum of leeward and windward drift length for Wb2. For parapets, input the parapet width as Wb1.



Snow Drift

1. Input

Dead Load =	**12**	psf
Roof Live Load =	**20**	psf
Pg, Ground Snow Load =	**20**	psf
Drift for parapet, projection, or upper roof?	**P**	(P), (PR) or (U)
Risk Categoy (I, II, III, or IV) =	**II**	Table 1.5-1
Ce, Exposure Factor =	**1.0**	Table 7.3-1
Ct, Thermal Factor =	**1.0**	Table 7.3-2
Use Pg minimum for drift calc's (Pf = Pg)?	**Y**	(Y or N)

Geometry

T.O.W., Top of Parapet Elevation =	**40.00**	feet
J.B.E., Joist Bearing Elevation =	**34.60**	feet
td, Thickness of Joist, Deck, and Insulation =	**5.00**	inches
Wb1, length of upper roof =	**0.80**	feet
Wb2, length of lower roof =	**350.00**	feet
x, Joist #1 dist. from wall =	**6.25**	feet
S1, First Joist Spacing =	**6.25**	feet
S2, Second Joist Spacing =	**6.25**	feet
S3, Third Joist Spacing =	**6.25**	feet
S4, Fourth Joist Spacing =	**6.25**	feet
S5, Fifth Joist Spacing =	**6.25**	feet

2. Balanced Snow Load Check

Is, Importance Factor =	**1.0**	Table 1.5-2
Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf (7.3-1)
Pm = Is Pg =	**20.00**	psf (7.3.4)
Rain on snow surcharge =	**5.00**	psf (7.10)
Pmin =	**20.00**	psf

3. Drifted Snow Load Check

Pf = Pg =	**20.00**	psf
D = 0.13 Pg + 14.0 ≤ 30 pcf =	**16.60**	pcf (7.7-1)
hb = Pf/D =	**1.20**	feet
Wb =	**350.00**	feet
hd = 0.75[0.43 Wb2^1/3 (Pg+10)^1/4-1.5] Is^1	**4.18**	feet (Fig. 7.6-1)
hd + hb =	**5.39**	feet
hr =	**4.98**	feet
hc = hr - hb =	**3.78**	feet
Wd = 4 hd or 4 [hd^2/hc] ≤ 8 hc =	**18.53**	feet
Pmax = D (hd + hb) ≤ D hr =	**82.72**	psf
Pd =D hd ≤ D hc =	**62.72**	psf

4. Uniform Load Summary

Drifted Snow Load

	Snow	Total	
w, wall	**242.0**	**279.5**	plf *
w, Joist #1	**384.8**	**459.8**	plf *
w, Joist #2	**252.6**	**327.6**	plf *
w, Joist #3	**155.7**	**230.7**	plf *
w, Joist #4	**125.0**	**200.0**	plf
w, Joist #5	**125.0**	**200.0**	plf

Balanced Load Check

	Pmin (20 psf)	Total	
w, wall	**62.5**	**100.0**	plf
w, Joist #1	**125.0**	**200.0**	plf
w, Joist #2	**125.0**	**200.0**	plf
w, Joist #3	**125.0**	**200.0**	plf
w, Joist #4	**125.0**	**200.0**	plf *
w, Joist #5	**125.0**	**200.0**	plf *

* indicates controlling load (drifted vs. undrifted)

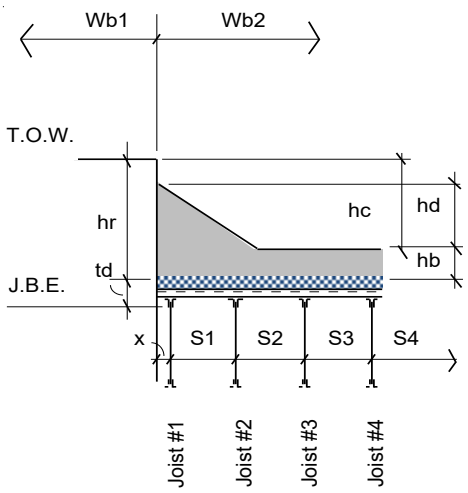
WALLACE DESIGN PROGRAM

Revised 05/20/19, Carrie Johnson

Date	5/5/2022	Sheet No.	of
Project	2220003 Building 3		
Subject	Snow Drift East/West - 4.875ft Parapet		

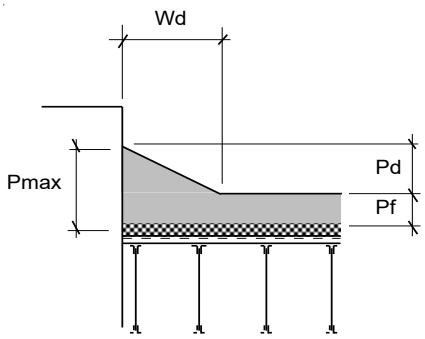
FLAT ROOF SNOW DRIFT - Joists Parallel to Wall

ASCE 7-16



Configuration

Note: For projections, input width of projection for Wb1 and input maximum of leeward and windward drift length for Wb2. For parapets, input the parapet width as Wb1.



Snow Drift

1. Input

Dead Load =	**12**	psf
Roof Live Load =	**20**	psf
Pg, Ground Snow Load =	**20**	psf
Drift for parapet, projection, or upper roof?	**P**	(P), (PR) or (U)
Risk Categoy (I, II, III, or IV) =	**II**	Table 1.5-1
Ce, Exposure Factor =	**1.0**	Table 7.3-1
Ct, Thermal Factor =	**1.0**	Table 7.3-2
Use Pg minimum for drift calc's (Pf = Pg)?	**Y**	(Y or N)

Geometry

T.O.W., Top of Parapet Elevation =	**42.50**	feet
J.B.E., Joist Bearing Elevation =	**36.19**	feet
td, Thickness of Joist, Deck, and Insulation =	**5.00**	inches
Wb1, length of upper roof =	**0.80**	feet
Wb2, length of lower roof =	**350.00**	feet
x, Joist #1 dist. from wall =	**6.25**	feet
S1, First Joist Spacing =	**6.25**	feet
S2, Second Joist Spacing =	**6.25**	feet
S3, Third Joist Spacing =	**6.25**	feet
S4, Fourth Joist Spacing =	**6.25**	feet
S5, Fifth Joist Spacing =	**6.25**	feet

2. Balanced Snow Load Check

Is, Importance Factor =	**1.0**	Table 1.5-2
Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf (7.3-1)
Pm = Is Pg =	**20.00**	psf (7.3.4)
Rain on snow surcharge =	**5.00**	psf (7.10)
Pmin =	**20.00**	psf

3. Drifted Snow Load Check

Pf = Pg =	**20.00**	psf
D = 0.13 Pg + 14.0 ≤ 30 pcf =	**16.60**	pcf (7.7-1)
hb = Pf/D =	**1.20**	feet
Wb =	**350.00**	feet
hd = 0.75[0.43 Wb2^1/3 (Pg+10)^1/4-1.5] Is^1	**4.18**	feet (Fig. 7.6-1)
hd + hb =	**5.39**	feet
hr =	**5.90**	feet
hc = hr - hb =	**4.69**	feet
Wd = 4 hd or 4 [hd^2/hc] ≤ 8 hc =	**16.73**	feet
Pmax = D (hd + hb) ≤ D hr =	**89.45**	psf
Pd =D hd ≤ D hc =	**69.45**	psf

4. Uniform Load Summary

Drifted Snow Load

	Snow	Total	
w, wall	**259.3**	**296.8**	plf *
w, Joist #1	**396.9**	**471.9**	plf *
w, Joist #2	**234.8**	**309.8**	plf *
w, Joist #3	**139.4**	**214.4**	plf *
w, Joist #4	**125.0**	**200.0**	plf
w, Joist #5	**125.0**	**200.0**	plf

Balanced Load Check

	Pmin (20 psf)	Total	
w, wall	**62.5**	**100.0**	plf
w, Joist #1	**125.0**	**200.0**	plf
w, Joist #2	**125.0**	**200.0**	plf
w, Joist #3	**125.0**	**200.0**	plf
w, Joist #4	**125.0**	**200.0**	plf *
w, Joist #5	**125.0**	**200.0**	plf *

* indicates controlling load (drifted vs. undrifted)

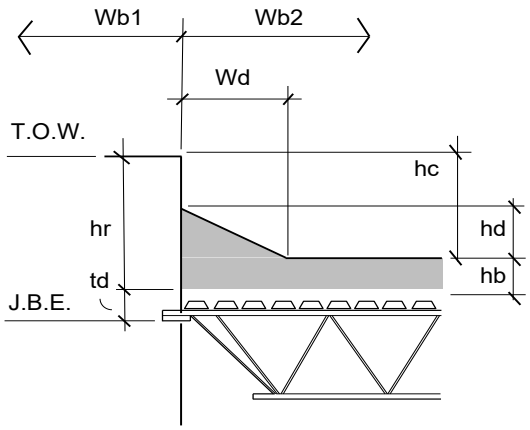
WALLACE DESIGN PROGRAM

Revised 05/20/19, Carrie Johnson

Date	5/5/2022	Sheet No.	of
Project	2220003 Building 3		
Subject			

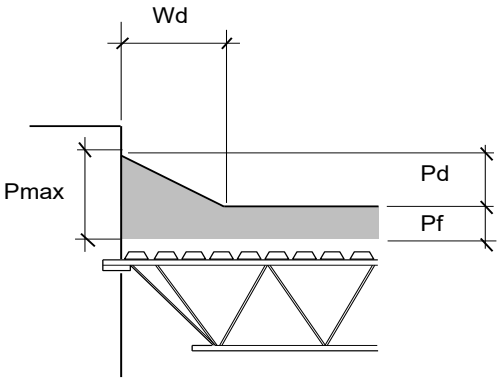
FLAT ROOF SNOW DRIFT - Joists Perpendicular to Wall

ASCE 7-16



Configuration

Note: For projections, input width of projection for Wb1 and input maximum of leeward and windward drift length for Wb2. For parapets, input the parapet width as Wb1.



Snow Drift

1. Input

Dead Load =	**12**	psf
Roof Live Load =	**20**	psf
Pg, Ground Snow Load =	**20**	psf
Drift for parapet, projection, or upper roof?	**P**	(P), (PR) or (U)
Risk Categoy (I, II, III, or IV) =	**II**	Table 1.5-1
Ce, Exposure Factor =	**1.00**	Table 7.3-1
Ct, Thermal Factor =	**1.00**	Table 7.3-2
Use Pg minimum for drift calc's (Pf = Pg)?	**N**	(Y or N)

Geometry

T.O.W., Top of Parapet Elevation =	**37.50**	feet
J.B.E., Joist Bearing Elevation =	**33.58**	feet
td, Thickness of Joist, Deck, and Insulation =	**5.00**	inches
Wb1, length of upper roof =	**0.80**	feet
Wb2, length of lower roof =	**220.83**	feet
S, Joist Spacing =	**6.25**	feet
L, Joist Span =	**60.00**	feet

2. Balanced Snow Load Check

Is, Importance Factor =	**1.00**	Table 1.5-2
Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf (7.3-1)
Pm = Is Pg =	**20.00**	psf (7.3.4)
Rain on snow surcharge =	**5.00**	psf (7.10)
Pmin =	**20.00**	psf

3. Drifted Snow Load Check

Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf
D = 0.13 Pg + 14.0 ≤ 30 pcf =	**16.60**	pcf
hb = Pf/D =	**0.84**	ft
Wb =	**220.83**	ft
hd = 0.75[0.43 Wb2^1/3 (Pg+10)^1/4-1.5] Is^2	**3.43**	ft
hd + hb =	**4.27**	ft
hr =	**3.50**	ft
hc = hr - hb =	**2.66**	ft
Wd = 4 hd or 4 [hd^2/hc] ≤ 8 hc =	**17.68**	ft
Pmax = D (hd + hb) ≤ D hr =	**58.16**	psf
Pd =D hd ≤ D hc =	**44.16**	psf

4. Uniform Load Summary

Drifted Snow Load

	Snow	Total	
R left =	**4825.0**	**7075.0**	lbs
R right =	**2864.6**	**5114.6**	lbs
M max =	**46892.0**	**80490.5**	ft-lbs
w base =	**87.5**	**162.5**	plf
w drift =	**276.0**	**351.0**	plf
w equiv =	**160.8**	**235.8**	plf *

Load Without Drift

	Live	Total	
w (Live = 20 psf) =	**125.0**	**200.0**	plf

* indicates controlling load (drifted vs. undrifted)

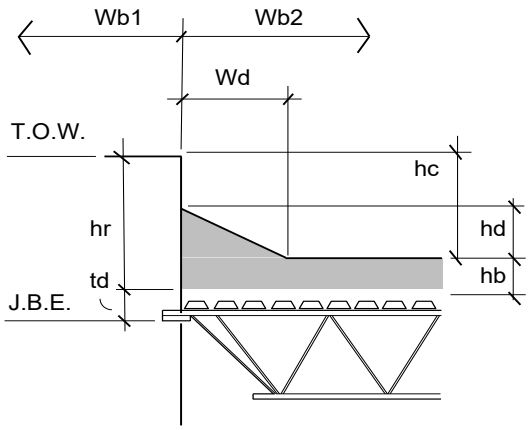
WALLACE DESIGN PROGRAM

Revised 05/20/19, Carrie Johnson

Date	5/5/2022	Sheet No.	of
Project	2220003 Building 3		
Subject			

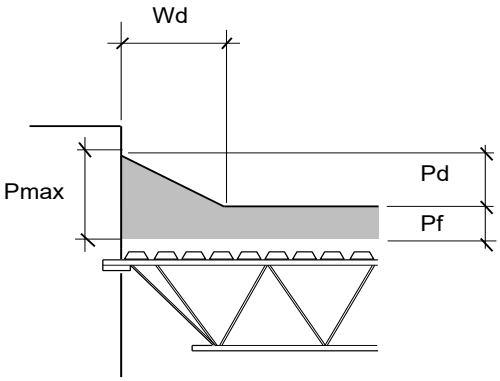
FLAT ROOF SNOW DRIFT - Joists Perpendicular to Wall

ASCE 7-16



Configuration

Note: For projections, input width of projection for Wb1 and input maximum of leeward and windward drift length for Wb2. For parapets, input the parapet width as Wb1.



Snow Drift

1. Input

Dead Load =	**12**	psf
Roof Live Load =	**20**	psf
Pg, Ground Snow Load =	**20**	psf
Drift for parapet, projection, or upper roof?	**P**	(P), (PR) or (U)
Risk Categoy (I, II, III, or IV) =	**II**	Table 1.5-1
Ce, Exposure Factor =	**1.00**	Table 7.3-1
Ct, Thermal Factor =	**1.00**	Table 7.3-2
Use Pg minimum for drift calc's (Pf = Pg)?	**N**	(Y or N)

Geometry

T.O.W., Top of Parapet Elevation =	**37.50**	feet
J.B.E., Joist Bearing Elevation =	**33.58**	feet
td, Thickness of Joist, Deck, and Insulation =	**5.00**	inches
Wb1, length of upper roof =	**0.80**	feet
Wb2, length of lower roof =	**220.83**	feet
S, Joist Spacing =	**6.25**	feet
L, Joist Span =	**60.00**	feet

2. Balanced Snow Load Check

Is, Importance Factor =	**1.00**	Table 1.5-2
Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf (7.3-1)
Pm = Is Pg =	**20.00**	psf (7.3.4)
Rain on snow surcharge =	**5.00**	psf (7.10)
Pmin =	**20.00**	psf

3. Drifted Snow Load Check

Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf
D = 0.13 Pg + 14.0 ≤ 30 pcf =	**16.60**	pcf
hb = Pf/D =	**0.84**	ft
Wb =	**220.83**	ft
hd = 0.75[0.43 Wb2^1/3 (Pg+10)^1/4-1.5] Is^2	**3.43**	ft
hd + hb =	**4.27**	ft
hr =	**3.50**	ft
hc = hr - hb =	**2.66**	ft
Wd = 4 hd or 4 [hd^2/hc] ≤ 8 hc =	**17.68**	ft
Pmax = D (hd + hb) ≤ D hr =	**58.16**	psf
Pd =D hd ≤ D hc =	**44.16**	psf

4. Uniform Load Summary

Drifted Snow Load

	Snow	Total	
R left =	**4825.0**	**7075.0**	lbs
R right =	**2864.6**	**5114.6**	lbs
M max =	**46892.0**	**80490.5**	ft-lbs
w base =	**87.5**	**162.5**	plf
w drift =	**276.0**	**351.0**	plf
w equiv =	**160.8**	**235.8**	plf *

Load Without Drift

	Live	Total	
w (Live = 20 psf) =	**125.0**	**200.0**	plf

* indicates controlling load (drifted vs. undrifted)

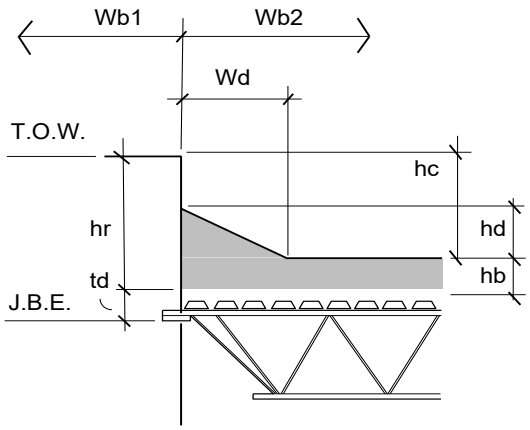
WALLACE DESIGN PROGRAM

Revised 05/20/19, Carrie Johnson

Date	5/5/2022	Sheet No.	of
Project	2220003 Building 3		
Subject	South Drift 42'-0"		

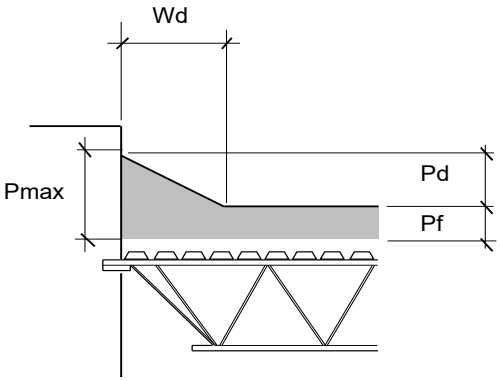
FLAT ROOF SNOW DRIFT - Joists Perpendicular to Wall

ASCE 7-16



Configuration

Note: For projections, input width of projection for Wb1 and input maximum of leeward and windward drift length for Wb2. For parapets, input the parapet width as Wb1.



Snow Drift

1. Input

Dead Load =	**12**	psf
Roof Live Load =	**20**	psf
Pg, Ground Snow Load =	**20**	psf
Drift for parapet, projection, or upper roof?	**P**	(P), (PR) or (U)
Risk Categoy (I, II, III, or IV) =	**II**	Table 1.5-1
Ce, Exposure Factor =	**1.00**	Table 7.3-1
Ct, Thermal Factor =	**1.00**	Table 7.3-2
Use Pg minimum for drift calc's (Pf = Pg)?	**N**	(Y or N)

Geometry

T.O.W., Top of Parapet Elevation =	**42.00**	feet
J.B.E., Joist Bearing Elevation =	**37.58**	feet
td, Thickness of Joist, Deck, and Insulation =	**5.00**	inches
Wb1, length of upper roof =	**0.80**	feet
Wb2, length of lower roof =	**220.83**	feet
S, Joist Spacing =	**6.25**	feet
L, Joist Span =	**53.33**	feet

2. Balanced Snow Load Check

Is, Importance Factor =	**1.00**	Table 1.5-2
Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf (7.3-1)
Pm = Is Pg =	**20.00**	psf (7.3.4)
Rain on snow surcharge =	**5.00**	psf (7.10)
Pmin =	**20.00**	psf

3. Drifted Snow Load Check

Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf
D = 0.13 Pg + 14.0 ≤ 30 pcf =	**16.60**	pcf
hb = Pf/D =	**0.84**	ft
Wb =	**220.83**	ft
hd = 0.75[0.43 Wb2^1/3 (Pg+10)^1/4-1.5] Is^2	**3.43**	ft
hd + hb =	**4.27**	ft
hr =	**4.00**	ft
hc = hr - hb =	**3.16**	ft
Wd = 4 hd or 4 [hd^2/hc] ≤ 8 hc =	**14.88**	ft
Pmax = D (hd + hb) ≤ D hr =	**66.46**	psf
Pd =D hd ≤ D hc =	**52.46**	psf

4. Uniform Load Summary

Drifted Snow Load

	Snow	Total	
R left =	**4546.0**	**6546.0**	lbs
R right =	**2560.3**	**4560.3**	lbs
M max =	**37456.7**	**63987.5**	ft-lbs
w base =	**87.5**	**162.5**	plf
w drift =	**327.8**	**402.8**	plf
w equiv =	**170.5**	**245.5**	plf *

Load Without Drift

	Live	Total	
w (Live = 20 psf) =	**125.0**	**200.0**	plf

* indicates controlling load (drifted vs. undrifted)

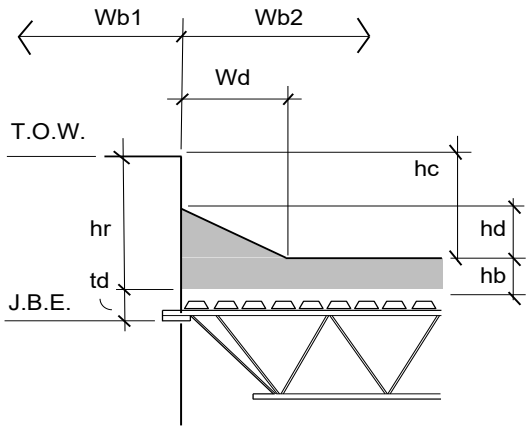
WALLACE DESIGN PROGRAM

Revised 05/20/19, Carrie Johnson

Date	5/5/2022	Sheet No.	of
Project	2220003 Building 3		
Subject	South Drift 42'-0"		

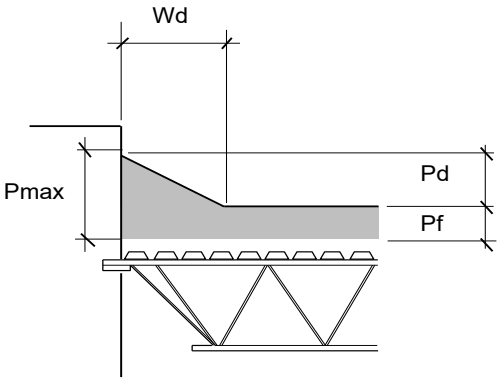
FLAT ROOF SNOW DRIFT - Joists Perpendicular to Wall

ASCE 7-16



Configuration

Note: For projections, input width of projection for Wb1 and input maximum of leeward and windward drift length for Wb2. For parapets, input the parapet width as Wb1.



Snow Drift

1. Input

Dead Load =	**12**	psf
Roof Live Load =	**20**	psf
Pg, Ground Snow Load =	**20**	psf
Drift for parapet, projection, or upper roof?	**P**	(P), (PR) or (U)
Risk Categoy (I, II, III, or IV) =	**II**	Table 1.5-1
Ce, Exposure Factor =	**1.00**	Table 7.3-1
Ct, Thermal Factor =	**1.00**	Table 7.3-2
Use Pg minimum for drift calc's (Pf = Pg)?	**N**	(Y or N)

Geometry

T.O.W., Top of Parapet Elevation =	**40.00**	feet
J.B.E., Joist Bearing Elevation =	**37.75**	feet
td, Thickness of Joist, Deck, and Insulation =	**5.00**	inches
Wb1, length of upper roof =	**0.80**	feet
Wb2, length of lower roof =	**220.83**	feet
S, Joist Spacing =	**6.25**	feet
L, Joist Span =	**53.33**	feet

2. Balanced Snow Load Check

Is, Importance Factor =	**1.00**	Table 1.5-2
Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf (7.3-1)
Pm = Is Pg =	**20.00**	psf (7.3.4)
Rain on snow surcharge =	**5.00**	psf (7.10)
Pmin =	**20.00**	psf

3. Drifted Snow Load Check

Pf = 0.7 Ce Ct Is Pg =	**14.00**	psf
D = 0.13 Pg + 14.0 ≤ 30 pcf =	**16.60**	pcf
hb = Pf/D =	**0.84**	ft
Wb =	**220.83**	ft
hd = 0.75[0.43 Wb2^1/3 (Pg+10)^1/4-1.5] Is^2	**3.43**	ft
hd + hb =	**4.27**	ft
hr =	**1.83**	ft
hc = hr - hb =	**0.99**	ft
Wd = 4 hd or 4 [hd^2/hc] ≤ 8 hc =	**7.92**	ft
Pmax = D (hd + hb) ≤ D hr =	**30.43**	psf
Pd =D hd ≤ D hc =	**16.43**	psf

4. Uniform Load Summary

Drifted Snow Load

	Snow	Total	
R left =	**2719.9**	**4719.9**	lbs
R right =	**2353.5**	**4353.5**	lbs
M max =	**31650.2**	**58315.8**	ft-lbs
w base =	**87.5**	**162.5**	plf
w drift =	**102.7**	**177.7**	plf
w equiv =	**102.0**	**177.0**	plf

Load Without Drift

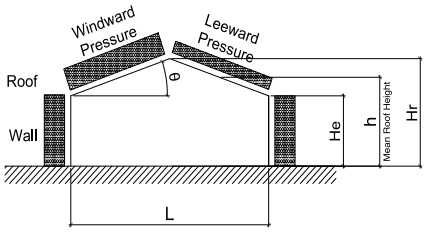
	Live	Total	
w (Live = 20 psf) =	**125.0**	**200.0**	plf *

* indicates controlling load (drifted vs. undrifted)

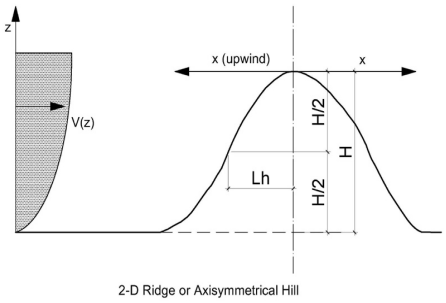
WALLACE DESIGN PROGRAM
Revised: 02/12/2019
Author: Katie Faulkner

Date	4/29/2022	Sheet	of
Job	2220003 Building 3		
Subject	North Wind TOW: 37.5ft		

WIND ANALYSIS: ANALYTICAL - ALL HEIGHTS METHOD
ASCE 7-16, Chapters 26, 27 and 30



REFER TO FIGURE 27.3-1



2-D Ridge or Axisymmetrical Hill

REFER TO FIGURE 26.8-1

1. Input

Design Parameters

Basic Wind Speed, V =	**109**	mph (Section 26.5, Fig. 1A-2D)
Exposure Category (B, C, or D) =	**C**	(Section 26.7)
Building Risk Category (I, II, III, IV) =	**II**	(Table 1.5-1)
Civil finished floor elevation (if unknown input 0) =	**0.00**	feet (Sect. 26.9, Table 26.9-1)
Eave Height, He =	**33.58**	feet
Max Building Height or Ridge Height above ground level, Hr =	**34.61**	feet
Parapet Height above ground level, Hp =	**37.50**	feet
Building Width Perpendicular to Wind, B =	**1150.00**	feet (max bldg dim)
Building Width Parallel to Wind, L =	**220.83**	feet
Enclosure Classification =	**Enclosed Buildings**	(Section 26.12)
Roof Configuration =	**Gabled, Hipped or Monoslope Roofs (ø ≤ 7)**	
Angle of Plane of Roof From Horizontal, θ =	**1.20**	degrees
Is building on or near a hill, ridge, or escarpment?	**N**	(Y or N) (Section 26.8)
Height of Hill or Escarpment relative to upwind terrain, H =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
Horiz. Dist. Upwind to Point Where Elevation = H/2, Lh =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
Horiz. Dist. from Crest to Building Site, x =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
2D Ridge, 2D Escarpment, or Axisymmetrical Hill =	**E**	(R, E, or H)
Is the building site upwind or downwind of the crest?	**DOWN**	(up, down)

2. Calculations - Main Wind Force Resisting System

Equivalent Allowable Stress Design Wind Speed, Vasd =	**84.43**	mph (IBC 2018, 1609.3.1)	
Mean roof height, h =	**33.58**	feet	
Kz, velocity pressure exposure coefficient at hz = 34.61ft =	**1.01**	Table 26.10-1	(use with qz)
Kz, velocity pressure exposure coefficient at hh = 33.58ft =	**1.00**	Table 26.10-1	(use with qh)
Kz, velocity pressure exposure coefficient at hp = 37.5ft =	**1.03**	Table 26.10-1	(use with qp)
Kzt,topographic factor at hz = 34.61ft =	**1.00**	Figure 26.8-1	(use with qz)
Kzt,topographic factor at hh = 33.58ft =	**1.00**	Figure 26.8-1	(use with qh)
Kzt,topographic factor at hp = 37.5ft =	**1.00**	Figure 26.8-1	(use with qp)
Kd, wind directionality factor =	**0.85**	Table 26.6-1	
Ke, ground elevation factor at	**1.00**	Table 26.9-1	
G, gust factor =	**0.85**	Section 26.11.4	
qz, velocity pressure at hz = 34.61ft =	**26.11**	psf (Eq. 26.10-1)	
qh, velocity pressure at hh = 33.58ft =	**25.85**	psf (Eq. 26.10-1)	
qp, velocity pressure at hp = 37.5ft =	**26.63**	psf (Eq. 26.10-1)	

Walls: P = q(GCpf-GCpi) Eqn. 27.3-1	**qz**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Windward pressure	26.11	0.68		17.8 psf	10.7 psf
	qh	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Leeward Pressure	25.85	-0.43		-11 psf	-6.6 psf
Sidewall pressure	25.85	-0.60	0.18	-20 psf	-12 psf
Internal Pressure	25.85		0.18	4.7 psf	2.8 psf

(1.0)W = (1.0)(Windward + Leeward Pressure) =	**17.76 psf + 10.99 psf =**	**28.7 psf**	
(0.6)W =(0.6)(Windward + Leeward Pressure) =	**10.65 psf + 6.59 psf =**	**17.2 psf**	

Parapets: Pp =qp(GCpn) Eqn. 27.3-3	**qp**	**GCpn**	**(1.0)Pp**	**(0.6)Pp**
Windward parapet pressure	26.63	1.5	39.9 psf	24 psf
Leeward parapet pressure	26.63	-1.0	-26.6 psf	-16 psf
Windward + Leeward Pressure	26.63	2.50	**66.6 psf**	**39.9 psf**

Roof Normal to Ridge (θ≥10 degrees)		**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Windward Pressure	case i	25.85	-0.60	0.18	**-20 psf**	**-12 psf**
	case ii	25.85	-0.15	0.18	**-8.6 psf**	**-5.2 psf**
Leeward Pressure		25.85	-0.26	0.18	**-11.2 psf**	**-6.7 psf**

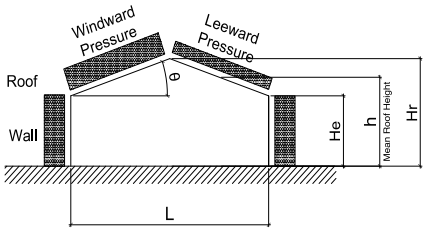
Roof All Other Conditions	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
For 0 to h/2 = 0 ft to 16.79 ft	25.85	-0.77	0.18	**-24.4 psf**	**-14.7 psf**
h/2 to h = 16.79 ft to 33.58 ft	25.85	-0.77	0.18	**-24.4 psf**	**-14.7 psf**
h to 2h = 33.58 ft to 67.16 ft	25.85	-0.43	0.18	**-15.6 psf**	**-9.4 psf**
>2h = >67.16 ft	25.85	-0.26	0.18	**-11.2 psf**	**-6.7 psf**

Roof Overhangs Section 27.3.3	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Maximum pressures	25.85	-0.77	0.68	**-37.4 psf**	**-22.4 psf**

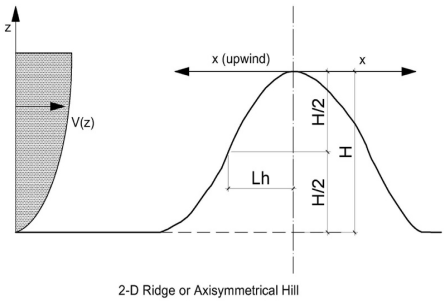
WALLACE DESIGN PROGRAM
Revised: 02/12/2019
Author: Katie Faulkner

Date	4/29/2022	Sheet	of
Job	2220003 Building 3		
Subject	North Wind TOW: 38.5ft		

WIND ANALYSIS: ANALYTICAL - ALL HEIGHTS METHOD
ASCE 7-16, Chapters 26, 27 and 30



REFER TO FIGURE 27.3-1



2-D Ridge or Axisymmetrical Hill

REFER TO FIGURE 26.8-1

1. Input

Design Parameters

Basic Wind Speed, V =	**109**	mph (Section 26.5, Fig. 1A-2D)
Exposure Category (B, C, or D) =	**C**	(Section 26.7)
Building Risk Category (I, II, III, IV) =	**II**	(Table 1.5-1)
Civil finished floor elevation (if unknown input 0) =	**0.00**	feet (Sect. 26.9, Table 26.9-1)
Eave Height, He =	**33.58**	feet
Max Building Height or Ridge Height above ground level, Hr =	**34.61**	feet
Parapet Height above ground level, Hp =	**38.50**	feet
Building Width Perpendicular to Wind, B =	**1150.00**	feet (max bldg dim)
Building Width Parallel to Wind, L =	**220.83**	feet
Enclosure Classification =	**Enclosed Buildings**	(Section 26.12)
Roof Configuration =	**Gabled, Hipped or Monoslope Roofs (ø ≤ 7)**	
Angle of Plane of Roof From Horizontal, θ =	**1.20**	degrees
Is building on or near a hill, ridge, or escarpment?	**N**	(Y or N) (Section 26.8)
Height of Hill or Escarpment relative to upwind terrain, H =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
Horiz. Dist. Upwind to Point Where Elevation = H/2, Lh =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
Horiz. Dist. from Crest to Building Site, x =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
2D Ridge, 2D Escarpment, or Axisymmetrical Hill =	**E**	(R, E, or H)
Is the building site upwind or downwind of the crest?	**DOWN**	(up, down)

2. Calculations - Main Wind Force Resisting System

Equivalent Allowable Stress Design Wind Speed, Vasd =	**84.43**	mph (IBC 2018, 1609.3.1)	
Mean roof height, h =	**33.58**	feet	
Kz, velocity pressure exposure coefficient at hz = 34.61ft =	**1.01**	Table 26.10-1	(use with qz)
Kz, velocity pressure exposure coefficient at hh = 33.58ft =	**1.00**	Table 26.10-1	(use with qh)
Kz, velocity pressure exposure coefficient at hp = 38.5ft =	**1.03**	Table 26.10-1	(use with qp)
Kzt,topographic factor at hz = 34.61ft =	**1.00**	Figure 26.8-1	(use with qz)
Kzt,topographic factor at hh = 33.58ft =	**1.00**	Figure 26.8-1	(use with qh)
Kzt,topographic factor at hp = 38.5ft =	**1.00**	Figure 26.8-1	(use with qp)
Kd, wind directionality factor =	**0.85**	Table 26.6-1	
Ke, ground elevation factor at	**1.00**	Table 26.9-1	
G, gust factor =	**0.85**	Section 26.11.4	
qz, velocity pressure at hz = 34.61ft =	**26.11**	psf (Eq. 26.10-1)	
qh, velocity pressure at hh = 33.58ft =	**25.85**	psf (Eq. 26.10-1)	
qp, velocity pressure at hp = 38.5ft =	**26.63**	psf (Eq. 26.10-1)	

Walls: P = q(GCpf-GCpi) Eqn. 27.3-1	**qz**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Windward pressure	26.11	0.68		17.8 psf	10.7 psf
	qh	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Leeward Pressure	25.85	-0.43		-11 psf	-6.6 psf
Sidewall pressure	25.85	-0.60	0.18	-20 psf	-12 psf
Internal Pressure	25.85		0.18	4.7 psf	2.8 psf

(1.0)W = (1.0)(Windward + Leeward Pressure) =	**17.76 psf + 10.99 psf =**	**28.7 psf**	
(0.6)W =(0.6)(Windward + Leeward Pressure) =	**10.65 psf + 6.59 psf =**	**17.2 psf**	

Parapets: Pp =qp(GCpn) Eqn. 27.3-3	**qp**	**GCpn**	**(1.0)Pp**	**(0.6)Pp**
Windward parapet pressure	26.63	1.5	39.9 psf	24 psf
Leeward parapet pressure	26.63	-1.0	-26.6 psf	-16 psf
Windward + Leeward Pressure	26.63	2.50	**66.6 psf**	**39.9 psf**

Roof Normal to Ridge (θ≥10 degrees)		**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Windward Pressure	case i	25.85	-0.60	0.18	**-20 psf**	**-12 psf**
	case ii	25.85	-0.15	0.18	**-8.6 psf**	**-5.2 psf**
Leeward Pressure		25.85	-0.26	0.18	**-11.2 psf**	**-6.7 psf**

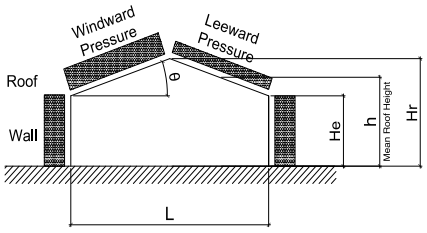
Roof All Other Conditions	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
For 0 to h/2 = 0 ft to 16.79 ft	25.85	-0.77	0.18	**-24.4 psf**	**-14.7 psf**
h/2 to h = 16.79 ft to 33.58 ft	25.85	-0.77	0.18	**-24.4 psf**	**-14.7 psf**
h to 2h = 33.58 ft to 67.16 ft	25.85	-0.43	0.18	**-15.6 psf**	**-9.4 psf**
>2h = >67.16 ft	25.85	-0.26	0.18	**-11.2 psf**	**-6.7 psf**

Roof Overhangs Section 27.3.3	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Maximum pressures	25.85	-0.77	0.68	**-37.4 psf**	**-22.4 psf**

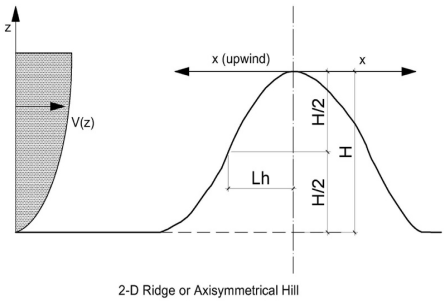
WALLACE DESIGN PROGRAM
Revised: 02/12/2019
Author: Katie Faulkner

Date	4/29/2022	Sheet	of
Job	2220003 Building 3		
Subject	South Wind TOW: 40.0ft		

WIND ANALYSIS: ANALYTICAL - ALL HEIGHTS METHOD
ASCE 7-16, Chapters 26, 27 and 30



REFER TO FIGURE 27.3-1



2-D Ridge or Axisymmetrical Hill

REFER TO FIGURE 26.8-1

1. Input

Design Parameters

Basic Wind Speed, V =	**109**	mph (Section 26.5, Fig. 1A-2D)
Exposure Category (B, C, or D) =	**C**	(Section 26.7)
Building Risk Category (I, II, III, IV) =	**II**	(Table 1.5-1)
Civil finished floor elevation (if unknown input 0) =	**0.00**	feet (Sect. 26.9, Table 26.9-1)
Eave Height, He =	**33.58**	feet
Max Building Height or Ridge Height above ground level, Hr =	**37.75**	feet
Parapet Height above ground level, Hp =	**40.00**	feet
Building Width Perpendicular to Wind, B =	**1150.00**	feet (max bldg dim)
Building Width Parallel to Wind, L =	**220.83**	feet
Enclosure Classification =	**Enclosed Buildings**	(Section 26.12)
Roof Configuration =	**Gabled, Hipped or Monoslope Roofs (ø ≤ 7)**	
Angle of Plane of Roof From Horizontal, θ =	**1.20**	degrees
Is building on or near a hill, ridge, or escarpment?	**N**	(Y or N) (Section 26.8)
Height of Hill or Escarpment relative to upwind terrain, H =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
Horiz. Dist. Upwind to Point Where Elevation = H/2, Lh =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
Horiz. Dist. from Crest to Building Site, x =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
2D Ridge, 2D Escarpment, or Axisymmetrical Hill =	**E**	(R, E, or H)
Is the building site upwind or downwind of the crest?	**DOWN**	(up, down)

2. Calculations - Main Wind Force Resisting System

Equivalent Allowable Stress Design Wind Speed, Vasd =	**84.43**	mph (IBC 2018, 1609.3.1)	
Mean roof height, h =	**33.58**	feet	
Kz, velocity pressure exposure coefficient at hz = 37.75ft =	**1.03**	Table 26.10-1	(use with qz)
Kz, velocity pressure exposure coefficient at hh = 33.58ft =	**1.00**	Table 26.10-1	(use with qh)
Kz, velocity pressure exposure coefficient at hp = 40ft =	**1.04**	Table 26.10-1	(use with qp)
Kzt,topographic factor at hz = 37.75ft =	**1.00**	Figure 26.8-1	(use with qz)
Kzt,topographic factor at hh = 33.58ft =	**1.00**	Figure 26.8-1	(use with qh)
Kzt,topographic factor at hp = 40ft =	**1.00**	Figure 26.8-1	(use with qp)
Kd, wind directionality factor =	**0.85**	Table 26.6-1	
Ke, ground elevation factor at	**1.00**	Table 26.9-1	
G, gust factor =	**0.85**	Section 26.11.4	
qz, velocity pressure at hz = 37.75ft =	**26.63**	psf (Eq. 26.10-1)	
qh, velocity pressure at hh = 33.58ft =	**25.85**	psf (Eq. 26.10-1)	
qp, velocity pressure at hp = 40ft =	**26.89**	psf (Eq. 26.10-1)	

Walls: P = q(GCpf-GCpi) Eqn. 27.3-1	**qz**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Windward pressure	26.63	0.68		18.1 psf	10.9 psf
	qh	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Leeward Pressure	25.85	-0.43		-11 psf	-6.6 psf
Sidewall pressure	25.85	-0.60	0.18	-20 psf	-12 psf
Internal Pressure	25.85		0.18	4.7 psf	2.8 psf

(1.0)W = (1.0)(Windward + Leeward Pressure) = **18.11 psf + 10.99 psf = 29.1 psf**
(0.6)W =(0.6)(Windward + Leeward Pressure) = **10.86 psf + 6.59 psf = 17.5 psf**

Parapets: Pp =qp(GCpn) Eqn. 27.3-3	**qp**	**GCpn**		**(1.0)Pp**	**(0.6)Pp**
Windward parapet pressure	26.89	1.5		40.3 psf	24.2 psf
Leeward parapet pressure	26.89	-1.0		-26.9 psf	-16.1 psf
Windward + Leeward Pressure	26.89	2.50		**67.2 psf**	**40.3 psf**

Roof Normal to Ridge (θ≥10 degrees)		**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Windward Pressure	case i	25.85	-0.60	0.18	**-20 psf**	**-12 psf**
	case ii	25.85	-0.15	0.18	**-8.6 psf**	**-5.2 psf**
Leeward Pressure		25.85	-0.26	0.18	**-11.2 psf**	**-6.7 psf**

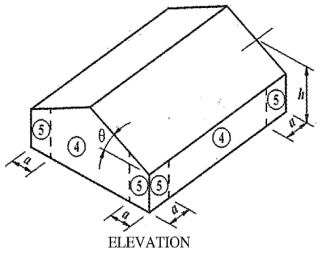
Roof All Other Conditions	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
For 0 to h/2 = 0 ft to 16.79 ft	25.85	-0.77	0.18	**-24.4 psf**	**-14.7 psf**
h/2 to h = 16.79 ft to 33.58 ft	25.85	-0.77	0.18	**-24.4 psf**	**-14.7 psf**
h to 2h = 33.58 ft to 67.16 ft	25.85	-0.43	0.18	**-15.6 psf**	**-9.4 psf**
>2h = >67.16 ft	25.85	-0.26	0.18	**-11.2 psf**	**-6.7 psf**

Roof Overhangs Section 27.3.3	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Maximum pressures	25.85	-0.77	0.68	**-37.4 psf**	**-22.4 psf**

WALLACE DESIGN PROGRAM
Revised: 02/12/2019
Author: Katie Faulkner

Date	4/29/2022	Sheet	of
Job	2220003 Building 3		
Subject	South Wind TOW: 40.0ft		

WIND ANALYSIS: ANALYTICAL - ALL HEIGHTS METHOD
ASCE 7-16, Chapters 27 and 30



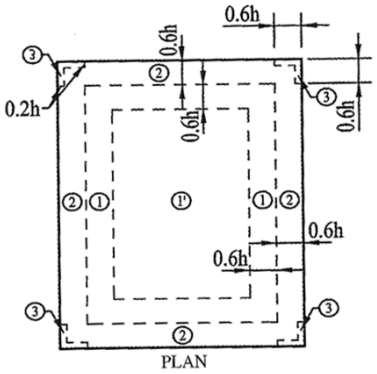
3. Input - Component and Cladding Elements

Tributary Area for Wall Components, 1 =	**1000.00**	square feet
Tributary Area for Wall Components, 2 =	**500.00**	square feet
Tributary Area for Parapet Components, 1 =	**1000.00**	square feet
Tributary Area for Parapet Components, 2 =	**500.00**	square feet
Tributary Area for Roof Components, 1 =	**320.00**	square feet
Tributary Area for Roof Components, 2 =	**10.00**	square feet
Tributary Area for Overhangs or Canopies, 1 =	**50.00**	square feet
Tributary Area for Overhangs or Canopies, 2 =	**10.00**	square feet

4. Calculations - Component and Cladding Elements

Kh, velocity pressure exposure coefficient at hh = 33.58ft =	**1.00**	Table 26.10-1	(use with qh)
Kh, velocity pressure exposure coefficient at hp = 40ft =	**1.04**	Table 26.10-1	(use with qp)
Kzt,topographic factor at hh = 33.58ft =	**1.00**	Figure 26.8-1	(use with qh)
Kzt,topographic factor at hp = 40ft =	**1.00**	Figure 26.8-1	(use with qp)
Kd, wind directionality factor =	**0.85**	Table 26.6-1	
Ke, ground elevation factor at	**1.00**	Table 26.9-1	
G, gust factor =	**0.85**	Section 26.11.4	

qh, velocity pressure at hh = 33.58ft =	**25.85**	psf (Eq. 26.10-1)
qp, velocity pressure at hp = 40ft =	**26.89**	psf (Eq. 26.10-1)

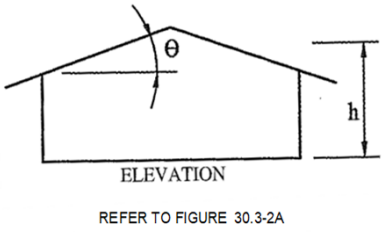


Walls: trib. Area = 1000 sq. ft.		**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Zone 4	Interior Zone	25.85	-0.72	0.18	**-23.3 psf**	**-14 psf**
Zone 5	End Zone	25.85	-0.72	0.18	**-23.3 psf**	**-14 psf**
Zone 4 and 5		25.85	0.63	-0.18	**20.9 psf**	**12.6 psf**

Walls: trib. Area = 500 sq. ft.		**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Zone 4	Interior Zone	25.85	-0.72	0.18	**-23.3 psf**	**-14 psf**
Zone 5	End Zone	25.85	-0.72	0.18	**-23.3 psf**	**-14 psf**
Zone 4 and 5		25.85	0.63	-0.18	**20.9 psf**	**12.6 psf**

Parapets: trib. Area = 1000 sq. ft.			**qp**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Case A	Zone 4	Interior Zone	26.89	1.89	0.00	**50.8 psf**	**30.5 psf**
	Zone 5	End Zone	26.89	1.89	0.00	**50.8 psf**	**30.5 psf**
Case B	Zone 4	Interior Zone	26.89	1.35	0.00	**36.3 psf**	**21.8 psf**
	Zone 5	End Zone	26.89	1.35	0.00	**36.3 psf**	**21.8 psf**

Parapets: trib. Area = 500 sq. ft.			**qp**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Case A	Zone 4	Interior Zone	26.89	1.89	0.00	**50.8 psf**	**30.5 psf**
	Zone 5	End Zone	26.89	1.89	0.00	**50.8 psf**	**30.5 psf**
Case B	Zone 4	Interior Zone	26.89	1.35	0.00	**36.3 psf**	**21.8 psf**
	Zone 5	End Zone	26.89	1.35	0.00	**36.3 psf**	**21.8 psf**



REFER TO FIGURE 30.3-2A

Roofs: trib. Area = 320 sq. ft.	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Corner Zone (3)	25.85	-1.61	0.18	**-46.2 psf**	**-27.7 psf**
End Zone (2)	25.85	-1.50	0.18	**-43.5 psf**	**-26.1 psf**
Interior Zone (1)	25.85	-1.08	0.18	**-32.6 psf**	**-19.5 psf**
Interior Zone (1')	25.85	-0.65	0.18	**-21.4 psf**	**-12.8 psf**
Positive (All Zones)	25.85	0.20	-0.18	**16 psf**	**9.6 psf**

Roofs: trib. Area = 10 sq. ft.	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Corner Zone (3)	25.85	-3.20	0.18	**-87.4 psf**	**-52.4 psf**
End Zone (2)	25.85	-2.30	0.18	**-64.1 psf**	**-38.5 psf**
Interior Zone (1)	25.85	-1.70	0.18	**-48.6 psf**	**-29.2 psf**
Interior Zone (1')	25.85	-0.90	0.18	**-27.9 psf**	**-16.8 psf**
Positive (All Zones)	25.85	0.30	-0.18	**16 psf**	**9.6 psf**

Overhangs: trib. Area = 50 sq. ft.	**qh**	**GCpn**	**(1.0)Pp**	**(0.6)Pp**
Corner Zone (3)	25.85	-2.34	**-60.4 psf**	**-36.2 psf**
End Zone (2)	25.85	-1.81	**-46.7 psf**	**-28 psf**
Interior Zone (1)	25.85	-1.63	**-42.1 psf**	**-25.3 psf**
Interior Zone (1')	25.85	-1.63	**-42.1 psf**	**-25.3 psf**
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Overhangs: trib. Area = 10 sq. ft.	**qh**	**GCpn**	**(1.0)Pp**	**(0.6)Pp**
Corner Zone (3)	25.85	-3.20	**-82.7 psf**	**-49.6 psf**
End Zone (2)	25.85	-2.30	**-59.5 psf**	**-35.7 psf**
Interior Zone (1)	25.85	-1.70	**-44 psf**	**-26.4 psf**
Interior Zone (1')	25.85	-1.70	**-44 psf**	**-26.4 psf**
---	---	---	**---**	**---**

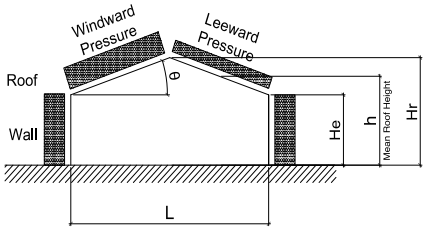
a, end zone width = Min. of 10% L and .4H but not < 4% L or 3' = **13.4** feet (Fig. 30.3-1)

Notes:
1. The gust factor of 0.85 is based on a building with a natural frequency of > 1 Hz. For other buildings, the gust factor must be calculated.
2. GCp for walls include a 10% reduction when angle of roof is 10 deg or less. (Figure 30.3-1, Footnote 5)
3. If a parapet equal to 3 ft or higher is provided around the perimeter of a roof with a slope of ≤ 7°, the roof corner zones may be treated as end zones. (Fig. 30.3-2A, Footnote 5)

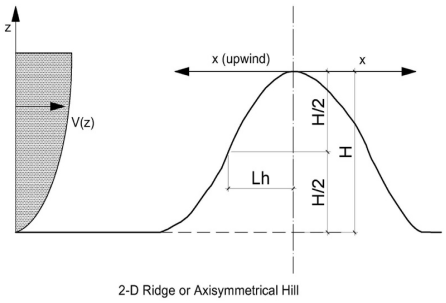
WALLACE DESIGN PROGRAM
Revised: 02/12/2019
Author: Katie Faulkner

Date	4/29/2022	Sheet	of
Job	2220003 Building 3		
Subject	South Wind TOW: 42.0ft		

WIND ANALYSIS: ANALYTICAL - ALL HEIGHTS METHOD
ASCE 7-16, Chapters 26, 27 and 30



REFER TO FIGURE 27.3-1



2-D Ridge or Axisymmetrical Hill

REFER TO FIGURE 26.8-1

1. Input

Design Parameters

Basic Wind Speed, V =	**109**	mph (Section 26.5, Fig. 1A-2D)
Exposure Category (B, C, or D) =	**C**	(Section 26.7)
Building Risk Category (I, II, III, IV) =	**II**	(Table 1.5-1)
Civil finished floor elevation (if unknown input 0) =	**0.00**	feet (Sect. 26.9, Table 26.9-1)
Eave Height, He =	**33.58**	feet
Max Building Height or Ridge Height above ground level, Hr =	**37.75**	feet
Parapet Height above ground level, Hp =	**42.00**	feet
Building Width Perpendicular to Wind, B =	**1150.00**	feet (max bldg dim)
Building Width Parallel to Wind, L =	**220.83**	feet
Enclosure Classification =	**Enclosed Buildings**	(Section 26.12)
Roof Configuration =	**Gabled, Hipped or Monoslope Roofs (ø ≤ 7)**	
Angle of Plane of Roof From Horizontal, θ =	**1.20**	degrees
Is building on or near a hill, ridge, or escarpment?	**N**	(Y or N) (Section 26.8)
Height of Hill or Escarpment relative to upwind terrain, H =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
Horiz. Dist. Upwind to Point Where Elevation = H/2, Lh =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
Horiz. Dist. from Crest to Building Site, x =	**10.00**	feet (Section 26.8, Fig. 26.8-1)
2D Ridge, 2D Escarpment, or Axisymmetrical Hill =	**E**	(R, E, or H)
Is the building site upwind or downwind of the crest?	**DOWN**	(up, down)

2. Calculations - Main Wind Force Resisting System

Equivalent Allowable Stress Design Wind Speed, Vasd =	**84.43**	mph (IBC 2018, 1609.3.1)	
Mean roof height, h =	**33.58**	feet	
Kz, velocity pressure exposure coefficient at hz = 37.75ft =	**1.03**	Table 26.10-1	(use with qz)
Kz, velocity pressure exposure coefficient at hh = 33.58ft =	**1.00**	Table 26.10-1	(use with qh)
Kz, velocity pressure exposure coefficient at hp = 42ft =	**1.05**	Table 26.10-1	(use with qp)
Kzt,topographic factor at hz = 37.75ft =	**1.00**	Figure 26.8-1	(use with qz)
Kzt,topographic factor at hh = 33.58ft =	**1.00**	Figure 26.8-1	(use with qh)
Kzt,topographic factor at hp = 42ft =	**1.00**	Figure 26.8-1	(use with qp)
Kd, wind directionality factor =	**0.85**	Table 26.6-1	
Ke, ground elevation factor at	**1.00**	Table 26.9-1	
G, gust factor =	**0.85**	Section 26.11.4	
qz, velocity pressure at hz = 37.75ft =	**26.63**	psf (Eq. 26.10-1)	
qh, velocity pressure at hh = 33.58ft =	**25.85**	psf (Eq. 26.10-1)	
qp, velocity pressure at hp = 42ft =	**27.15**	psf (Eq. 26.10-1)	

Walls: P = q(GCpf-GCpi) Eqn. 27.3-1	**qz**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Windward pressure	26.63	0.68		18.1 psf	10.9 psf
	qh	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Leeward Pressure	25.85	-0.43		-11 psf	-6.6 psf
Sidewall pressure	25.85	-0.60	0.18	-20 psf	-12 psf
Internal Pressure	25.85		0.18	4.7 psf	2.8 psf

(1.0)W = (1.0)(Windward + Leeward Pressure) = **18.11 psf + 10.99 psf = 29.1 psf**
(0.6)W =(0.6)(Windward + Leeward Pressure) = **10.86 psf + 6.59 psf = 17.5 psf**

Parapets: Pp =qp(GCpn) Eqn. 27.3-3	**qp**	**GCpn**		**(1.0)Pp**	**(0.6)Pp**
Windward parapet pressure	27.15	1.5		40.7 psf	24.4 psf
Leeward parapet pressure	27.15	-1.0		-27.1 psf	-16.3 psf
Windward + Leeward Pressure	27.15	2.50		**67.9 psf**	**40.7 psf**

Roof Normal to Ridge (θ≥10 degrees)		**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Windward Pressure	case i	25.85	-0.60	0.18	**-20 psf**	**-12 psf**
	case ii	25.85	-0.15	0.18	**-8.6 psf**	**-5.2 psf**
Leeward Pressure		25.85	-0.26	0.18	**-11.2 psf**	**-6.7 psf**

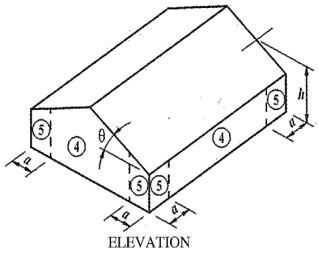
Roof All Other Conditions	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
For 0 to h/2 = 0 ft to 16.79 ft	25.85	-0.77	0.18	**-24.4 psf**	**-14.7 psf**
h/2 to h = 16.79 ft to 33.58 ft	25.85	-0.77	0.18	**-24.4 psf**	**-14.7 psf**
h to 2h = 33.58 ft to 67.16 ft	25.85	-0.43	0.18	**-15.6 psf**	**-9.4 psf**
>2h = >67.16 ft	25.85	-0.26	0.18	**-11.2 psf**	**-6.7 psf**

Roof Overhangs Section 27.3.3	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Maximum pressures	25.85	-0.77	0.68	**-37.4 psf**	**-22.4 psf**

WALLACE DESIGN PROGRAM
Revised: 02/12/2019
Author: Katie Faulkner

Date	4/29/2022	Sheet	of
Job	2220003 Building 3		
Subject	South Wind TOW: 42.0ft		

WIND ANALYSIS: ANALYTICAL - ALL HEIGHTS METHOD
ASCE 7-16, Chapters 27 and 30

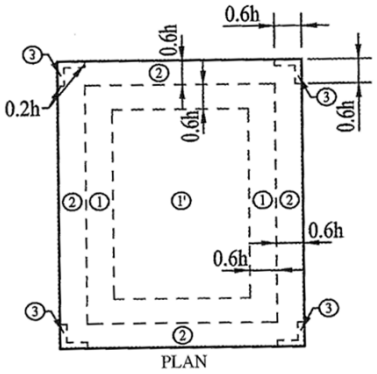


3. Input - Component and Cladding Elements

Tributary Area for Wall Components, 1 =	**1000.00**	square feet
Tributary Area for Wall Components, 2 =	**500.00**	square feet
Tributary Area for Parapet Components, 1 =	**1000.00**	square feet
Tributary Area for Parapet Components, 2 =	**500.00**	square feet
Tributary Area for Roof Components, 1 =	**300.00**	square feet
Tributary Area for Roof Components, 2 =	**10.00**	square feet
Tributary Area for Overhangs or Canopies, 1 =	**50.00**	square feet
Tributary Area for Overhangs or Canopies, 2 =	**10.00**	square feet

4. Calculations - Component and Cladding Elements

Kh, velocity pressure exposure coefficient at hh = 33.58ft =	**1.00**	Table 26.10-1	(use with qh)
Kh, velocity pressure exposure coefficient at hp = 42ft =	**1.05**	Table 26.10-1	(use with qp)
Kzt,topographic factor at hh = 33.58ft =	**1.00**	Figure 26.8-1	(use with qh)
Kzt,topographic factor at hp = 42ft =	**1.00**	Figure 26.8-1	(use with qp)
Kd, wind directionality factor =	**0.85**	Table 26.6-1	
Ke, ground elevation factor at	**1.00**	Table 26.9-1	
G, gust factor =	**0.85**	Section 26.11.4	



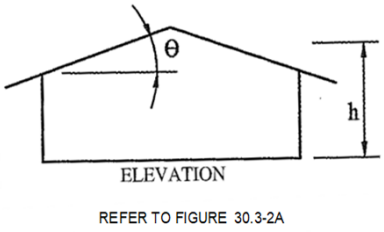
qh, velocity pressure at hh = 33.58ft =	**25.85**	psf (Eq. 26.10-1)
qp, velocity pressure at hp = 42ft =	**27.15**	psf (Eq. 26.10-1)

Walls: trib. Area = 1000 sq. ft.		**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Zone 4	Interior Zone	25.85	-0.72	0.18	**-23.3 psf**	**-14 psf**
Zone 5	End Zone	25.85	-0.72	0.18	**-23.3 psf**	**-14 psf**
Zone 4 and 5		25.85	0.63	-0.18	**20.9 psf**	**12.6 psf**

Walls: trib. Area = 500 sq. ft.		**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Zone 4	Interior Zone	25.85	-0.72	0.18	**-23.3 psf**	**-14 psf**
Zone 5	End Zone	25.85	-0.72	0.18	**-23.3 psf**	**-14 psf**
Zone 4 and 5		25.85	0.63	-0.18	**20.9 psf**	**12.6 psf**

Parapets: trib. Area = 1000 sq. ft.			**qp**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Case A	Zone 4	Interior Zone	27.15	1.89	0.00	**51.3 psf**	**30.8 psf**
	Zone 5	End Zone	27.15	1.89	0.00	**51.3 psf**	**30.8 psf**
Case B	Zone 4	Interior Zone	27.15	1.35	0.00	**36.6 psf**	**22 psf**
	Zone 5	End Zone	27.15	1.35	0.00	**36.6 psf**	**22 psf**

Parapets: trib. Area = 500 sq. ft.			**qp**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Case A	Zone 4	Interior Zone	27.15	1.89	0.00	**51.3 psf**	**30.8 psf**
	Zone 5	End Zone	27.15	1.89	0.00	**51.3 psf**	**30.8 psf**
Case B	Zone 4	Interior Zone	27.15	1.35	0.00	**36.6 psf**	**22 psf**
	Zone 5	End Zone	27.15	1.35	0.00	**36.6 psf**	**22 psf**



REFER TO FIGURE 30.3-2A

Roofs: trib. Area = 300 sq. ft.	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Corner Zone (3)	25.85	-1.64	0.18	**-46.9 psf**	**-28.2 psf**
End Zone (2)	25.85	-1.52	0.18	**-43.9 psf**	**-26.3 psf**
Interior Zone (1)	25.85	-1.09	0.18	**-32.9 psf**	**-19.7 psf**
Interior Zone (1')	25.85	-0.66	0.18	**-21.8 psf**	**-13.1 psf**
Positive (All Zones)	25.85	0.20	-0.18	**16 psf**	**9.6 psf**

Roofs: trib. Area = 10 sq. ft.	**qh**	**GCp**	**GCpi**	**(1.0)P**	**(0.6)P**
Corner Zone (3)	25.85	-3.20	0.18	**-87.4 psf**	**-52.4 psf**
End Zone (2)	25.85	-2.30	0.18	**-64.1 psf**	**-38.5 psf**
Interior Zone (1)	25.85	-1.70	0.18	**-48.6 psf**	**-29.2 psf**
Interior Zone (1')	25.85	-0.90	0.18	**-27.9 psf**	**-16.8 psf**
Positive (All Zones)	25.85	0.30	-0.18	**16 psf**	**9.6 psf**

Overhangs: trib. Area = 50 sq. ft.	**qh**	**GCpn**	**(1.0)Pp**	**(0.6)Pp**
Corner Zone (3)	25.85	-2.34	**-60.4 psf**	**-36.2 psf**
End Zone (2)	25.85	-1.81	**-46.7 psf**	**-28 psf**
Interior Zone (1)	25.85	-1.63	**-42.1 psf**	**-25.3 psf**
Interior Zone (1')	25.85	-1.63	**-42.1 psf**	**-25.3 psf**
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Overhangs: trib. Area = 10 sq. ft.	**qh**	**GCpn**	**(1.0)Pp**	**(0.6)Pp**
Corner Zone (3)	25.85	-3.20	**-82.7 psf**	**-49.6 psf**
End Zone (2)	25.85	-2.30	**-59.5 psf**	**-35.7 psf**
Interior Zone (1)	25.85	-1.70	**-44 psf**	**-26.4 psf**
Interior Zone (1')	25.85	-1.70	**-44 psf**	**-26.4 psf**
---	---	---	**---**	**---**

a, end zone width = Min. of 10% L and .4H but not < 4% L or 3' = **13.4** feet (Fig. 30.3-1)

Notes:
1. The gust factor of 0.85 is based on a building with a natural frequency of > 1 Hz. For other buildings, the gust factor must be calculated.
2. GCp for walls include a 10% reduction when angle of roof is 10 deg or less. (Figure 30.3-1, Footnote 5)
3. If a parapet equal to 3 ft or higher is provided around the perimeter of a roof with a slope of ≤ 7°, the roof corner zones may be treated as end zones. (Fig. 30.3-2A, Footnote 5)

Hazards by Location

Search Information

Address: NE Tudor Rd & NW Main St, Lee's Summit, MO 64086, USA

Coordinates: 38.9307532, -94.3853697

Elevation: 994 ft

Timestamp: 2022-01-05T13:53:22.471Z

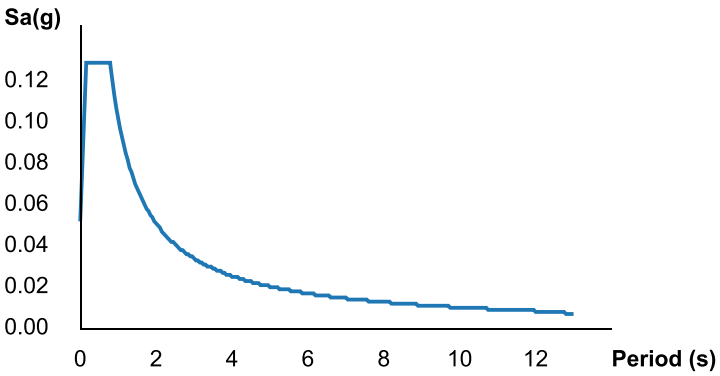
Hazard Type: Seismic

Reference Document: ASCE7-16

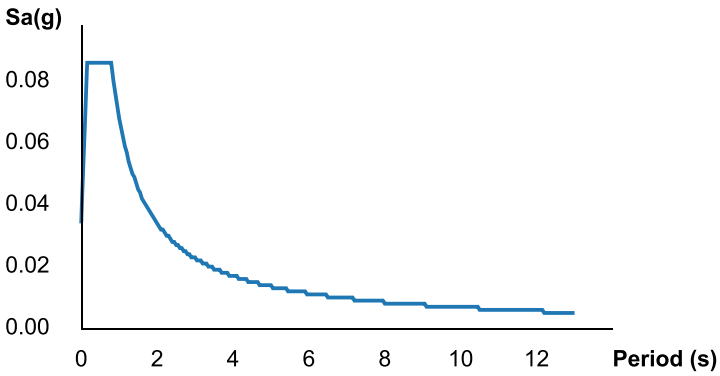
Risk Category: II

Site Class: C

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	0.099	MCE_R ground motion (period=0.2s)
S_1	0.068	MCE_R ground motion (period=1.0s)
S_{MS}	0.129	Site-modified spectral acceleration value
S_{M1}	0.102	Site-modified spectral acceleration value
S_{DS}	0.086	Numeric seismic design value at 0.2s SA
S_{D1}	0.068	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	B	Seismic design category
F_a	1.3	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s

CR_S	0.927	Coefficient of risk (0.2s)
CR_1	0.877	Coefficient of risk (1.0s)
PGA	0.047	MCE_G peak ground acceleration
F_{PGA}	1.3	Site amplification factor at PGA
PGA_M	0.061	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	0.099	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.107	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.068	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.078	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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Date	3/10/2022	Sheet No.	of
Job	2220003		
Subject	Building 3		

SEISMIC LOAD SUMMARY

2018 IBC (Ch: 16) and ASCE 7-16 (Ch: 11 to 13)

1. Input

Spectral Response Acceleration for Short Periods, Ss =		**0.099**	
Spectral Response Acceleration for 1-second Periods, S1 =		**0.068**	
Risk Category =		**II**	(IBC Table 1604.5 & ASCE: Table 1-5-1)
Site Classification (A,B,C,D,E,F) =		**C**	(ASCE 7 Ch.20 Table 20.3-1)
Basic Structural System	**STRUCTURAL STEEL SYSTEMS NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE**		(Table 12.2-1)
Lateral Force Resisting System	**Concrete Shear Walls and Braced Frames**		(Table 12.2-1)
ρx , redundancy in x-dir.=	(Redundancy is either 1.0 or 1.3)	**1.00**	(ASCE 7 Section 12.3.4)
ρy , redundancy in y-dir.=	(Redundancy is either 1.0 or 1.3)	**1.00**	(ASCE 7 Section 12.3.4)

r, =1.0 for Seismic Design Category B and C, RE: ASCE 7 Section 12.3.4.1 for additional exceptions.

Is Structure regular with a period < .5 sec?	**Yes**	(Yes or No, ASCE 7 Section 12.8.1.3)
Is Structure short period with a rigid diaphragm?	**No**	(Yes or No, ASCE 7 Section 11.6)
Is Structure short period w/ non-rigid diaphragm & vertical elements of seismic force-resisting system spaced at 40' oc n	**No**	(Yes or No, ASCE 7 Section 11.6)
Does Structure have a flexible diaphragm?	**Yes**	(Yes or No, ASCE 7 Section 11.6)

(For Wall anchorage requirements per Section 12.11.2.1)

Span length of flexible diaphragm -x dir. =	**220.8333333**	feet (input 0 for rigid diaphragm)
Span length of flexible diaphragm -y-dir. =	**1134**	feet

2. Determine Design Spectral Response Accelerations and Seismic Design Category, Section 11.6:

Response Modification Factor, R =	**3**	(Table 12.2-1)
Overstrength Factor, Ωo = (refer to footnote b for .5 reduction for Flexible Diaphragms)	**2.5**	(Table 12.2-1)
Deflection Amplification Factor, Cd =	**3**	(Table 12.2-1)
Acceleration for Short Period		
Site Coefficient, Fa =	**1.30**	(IBC Table 1613.2.3(1), ASCE 7 Table 11.4-1)
Site Adjusted Spectral Response Acceleration for Short Periods, Sms =	**0.129**	(IBC Section 1613.2.3, ASCE 7 Section 11.4.4)
Acceleration for 1-Second Period		
Site Coefficient, Fv =	**1.50**	(IBC Table 1613.2.3(2), ASCE 7 Table 11.4-2)
Site Adjusted Spectral Response Acceleration for 1-second Periods, Sm1 =	**0.102**	(IBC Section 1613.2.3, ASCE 7 Section 11.4.4)
Design Spectral Response Acceleration for Short Periods, Sds =	**0.086**	(IBC Section 1613.2.4 and ASCE 7 Section 11.4.5)
Seismic Design Category based on short period =	**A**	
Design Spectral Response Acceleration for 1-second Periods, Sd1 =	**0.068**	(IBC Section 1613.2.4 and ASCE 7 Section 11.4.5)
Seismic Design Category based on 1-second period =	**B**	
Design Response Spectrum, Ts =	**0.793**	seconds (Section 11.4.6)
Approximate Fundamental Period, Ta =	**0.500**	seconds (Section 12.8.2.1)
Fundamental Period, T, shall not exceed Ta * Cu =	**0.850**	seconds (Section 12.8.2)
Can the Seismic Design Category be based on the short period alone?	**No**	(IBC Section 1613.2.5.1, ASCE 7 Section 11.6)
Seismic Design Category =	**B**	(Most severe case except as allowed by Sect 11.6)

3. Seismic Base Shear for the Lateral Force Resisting System using the Equivalent Lateral Force Procedure, Section 12.8:

a. Calculation of Seismic Base Shear Coefficient:

Seismic Importance Factor, I_e =	**1.00**	(ASCE 7 Table 1.5-2)
Cs = (Sds/(R / I_e)) =	**0.029**	(ASCE Equation 12.8-2, Section 12.8.1.3)

	Strength (1.0E)	ASD (0.7E)
b. Seismic Base Shear, Section 12.8.1:		
V = Cs W =	**0.029 W**	**0.020 W**
c. Horizontal Seismic Load, Section 12.4.2.1=		
For the X-direction: Eh=	**0.029 W**	**0.020 W**
For the Y-direction: Eh=	**0.029 W**	**0.020 W**
d. Vertical Seismic Load Component, Section 12.4.2.2:		
Ev = 0.2 Sds D =	**0.017 D**	**0.012 D**
For structures in SDC B and for the design of foundations using ASD, Ev may be taken as zero. (Section 12.4.2.2)		
e. Find the Design Seismic Shear for the Diaphragm, Section 12.10.1.1:		
Force shall not be less than 0.2*Sds*Ie*wpx =	**0.017 W**	**0.012 W**
but need not exceed 0.4*Ie*Sds wpx =	**0.034 W**	**0.024 W**
For a one story building, Fpx =	**0.029 W**	**0.020 W**
f. For collector elements in Seismic Design Categories C through F, Section 12.10.2		
Emh = Ωo V =	**0.072 W**	**0.050 W**

Notes:

1. A building that is low rise (one or two story) building with a short period is assumed for calculation of Seismic Response Coefficient, Cs.
2. The values for design spectral response acceleration assume a regular structure of 5 stories or less with a period, T < 0.5 seconds
3. The values for design forces for the diaphragm assume no offsets or changes in the stiffness of the vertical components
4. Section 1613.1 of 2018 IBC excludes the detailing requirements of Chapter 14 of ASCE 7.
5. Per Section 1613.2.2 and 11.4.3, if site investigations performed per ASCE 7 Chpt 20 reveal rock conditions consistent with Site Class B, but site-specific velocity measurements are not made, Fa and Fv shall = 1.0.

WALLACE DESIGN PROGRAM

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SEISMIC LOAD SUMMARY

2018 IBC (Ch: 16) and ASCE 7-16 (Ch: 11 to 13)

4. Minimum Continuous Load Path, Interconnection and Connection to supports, Section 12.1.3 and 12.1.4:

a. Continuous Load Path and Interconnections, Section 12.1.3:

	Strength (1.0E)	ASD (0.7E)	
F_p= 0.133 S_{ds} W_p or .05 W_p min. =	**0.050 Wp**	**0.035 Wp**	(Section 12.1.3)

b. Connection to Supports, Section 12.1.4 :

F_p= .05 * dead + live reaction =	**0.050 Rd+l**	**0.035 Rd+l**	(Section 12.1.4)

5. Structural Walls and Anchorage, Section 12.11

a. Minimum Out-of-Plane Forces on Structural Walls, Section 12.11.1:

	Strength (1.0E)	ASD (0.7E)	
F_p= 0.40 Ie Sds wp or .10 wp min =	**0.100 Wp**	**0.070 Wp**	(Section 12.11.1)

b. Minimum anchorage connection of structural walls to supporting construction, Section 12.11.2.1 and 12.11.2:

Per 12.11.2.2, the strength design force for steel elements with the exception of anchor bolts and reinforcing steel shall be increased by 1.4 times.

		Strength (1.0E)	ASD (0.7E)
For loading in the x-direction:			
k_a= 1.0+L_r/100 or max 2.0 =	**2.00**		
Fp= 0.4 S_{ds} k_a I_e W_p or .2 k_a I_e Wp min. =	For Connections at Flexible Diaphragms:	**0.400 Wp**	**0.280 Wp**
F_p * 1.4 for steel elements per 12.11.2.2.2		**0.560 Wp**	**0.392 Wp**
k_a= 1.0			
Fp= 0.4 S_{ds} k_a I_e W_p or .2 k_a I_e Wp min. =	For Connections not at Flexible Diaphragms:	**0.200 Wp**	**0.140 Wp**
Fp * 1.4 for steel elements per 12.11.2.2.2		**0.280 Wp**	**0.196 Wp**
For loading in the y-direction:			
k_a= 1.0+L_r/100 or max 2.0 =	**2.00**		
Fp= 0.4 S_{ds} k_a I_e W_p or .2 k_a I_e Wp min. =	For Connections at Flexible Diaphragms:	**0.400 Wp**	**0.280 Wp**
Fp * 1.4 for steel elements per 12.11.2.2.2		**0.560 Wp**	**0.392 Wp**
k_a= 1.0			
Fp= 0.4 S_{ds} k_a I_e W_p or .2 k_a I_e Wp min. =	For Connections not at Flexible Diaphragms:	**0.200 Wp**	**0.140 Wp**
Fp * 1.4 for steel elements per 12.11.2.2.2		**0.280 Wp**	**0.196 Wp**

The minimum wall anchorage load for concrete or masonry walls is 0.2* the wall weight or 5 psf per 1.4.4.

6. Horizontal Seismic Design Force on Nonstructural Architectural Components, Section 13.3:

	For Ip =1.0	For Ip=1.5	
Fp max = 1.6 Sds Ip Wp=	**0.137 Wp**	**0.206 Wp**	(Equation 13.3-2)
Fp min = 0.3 Sds Ip Wp=	**0.026 Wp**	**0.039 Wp**	(Equation 13.3-3)

The Seismic Design Force is based on Equation 13.3-1, with the minimum and maximum limits noted above.
Fp= 0.4 ap Sds Wp (1 + 2 z/h)/(Rp/Ip)

Seismic Design Force Summary on Architectural Components, Section 13.5:

	ap=	Rp=	Ip=	z/h=	Strength (1.0E)	ASD (0.7E)	
1. Cantilevered (Unbraced) Parapets and Chimneys	**2.50**	**2.50**	**1.00**	**1.00**	**0.103 Wp**	**0.072 Wp**	(Table 13.5-1)
2. Braced Interior Non-masonry walls and partitions							
Fp at floor=	**1.00**	**2.50**	**1.00**	**0.00**	**0.026 Wp**	**0.018 Wp**	(Table 13.5-1)
Fp at roof=	**1.00**	**2.50**	**1.00**	**1.00**	**0.041 Wp**	**0.029 Wp**	(Table 13.5-1)
Fp average at roof and floor:					**0.033 Wp**	**0.023 Wp**	
3. Braced Interior Unreinforced masonry walls and partitions							
Fp at floor=	**1.00**	**1.50**	**1.00**	**0.00**	**0.026 Wp**	**0.018 Wp**	(Table 13.5-1)
Fp at roof=	**1.00**	**1.50**	**1.00**	**1.00**	**0.069 Wp**	**0.048 Wp**	(Table 13.5-1)
Fp average at roof and floor:					**0.047 Wp**	**0.033 Wp**	
4. Cantilevered (Unbraced) Interior Nonstructural walls	**2.50**	**2.50**	**1.00**	**0.00**	**0.034 Wp**	**0.024 Wp**	(Table 13.5-1)
5. Braced Parapets and Chimneys	**1.00**	**2.50**	**1.00**	**1.00**	**0.041 Wp**	**0.029 Wp**	(Table 13.5-1)
6. Exterior Nonstructural Wall Elements							
Fp at floor=	**1.00**	**2.50**	**1.00**	**0.00**	**0.026 Wp**	**0.018 Wp**	(Table 13.5-1)
Fp at roof=	**1.00**	**2.50**	**1.00**	**1.00**	**0.041 Wp**	**0.029 Wp**	(Table 13.5-1)
Fp average at roof and floor:					**0.033 Wp**	**0.023 Wp**	
For the Body of the Wall Panel Connection:							
Fp at floor=	**1.00**	**2.50**	**1.00**	**0.00**	**0.026 Wp**	**0.018 Wp**	(Table 13.5-1)
Fp at roof=	**1.00**	**2.50**	**1.00**	**1.00**	**0.041 Wp**	**0.029 Wp**	(Table 13.5-1)
For the fasteners of the connecting system:							
Fp at floor=	**1.25**	**1.00**	**1.00**	**0.00**	**0.043 Wp**	**0.030 Wp**	(Table 13.5-1)
Fp at roof=	**1.25**	**1.00**	**1.00**	**1.00**	**0.129 Wp**	**0.090 Wp**	(Table 13.5-1)
7. Appendages and Ornamentation	**2.50**	**2.50**	**1.00**	**1.00**	**0.103 Wp**	**0.072 Wp**	(Table 13.5-1)

Notes:

1. Refer to Section 13.4.2 for additional requirements for anchors in concrete and masonry.
2. Section 1613.1 of 2018 IBC excludes the detailing requirements of Chapter 14 of ASCE 7.

WALLACE DESIGN PROGRAM
Revised 12/27/18, Sheila Butcher

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SEISMIC LOAD SUMMARY

2018 IBC (Ch: 16) and ASCE 7-16 (Ch: 11 to 13)

Table 11.4-1 and IBC 1613.2.3(1)
Site Coefficient, Fa

Site	Mapped Spectral Response Acceleration at Short Periods (Ss)						Distance
Class	Ss<=0.25	0.5	0.75	1	1.25	Ss>=1.5	Value
A	0.80	0.80	0.80	0.80	0.80	0.80	0.80
B	0.90	0.90	0.90	0.90	0.90	0.90	0.90
C	1.30	1.30	1.20	1.20	1.20	1.20	1.30
D	1.60	1.40	1.20	1.10	1.00	1.00	1.60
E	2.40	1.70	1.30	1.20	1.20	1.20	2.40
F	---	---	---	---	---	---	---

Minimum of 1.2 per Section 11.4.4 considered. Exceptions per Section 11.4.8 included.

Table 11.4-2 and IBC 1613.2.3(2)
Site Coefficient, Fv

Site	Mapped Spectral Response Acceleration at 1 Second Period (S1)						Distance
Class	S1<=0.1	0.2	0.3	0.4	0.5	S1>=0.6	Value
A	0.80	0.80	0.80	0.80	0.80	0.80	0.80
B	0.80	0.80	0.80	0.80	0.80	0.80	0.80
C	1.50	1.50	1.50	1.50	1.50	1.40	1.50
D	2.40	2.20	2.00	1.90	1.80	1.70	2.40
E	4.20	3.30	2.80	2.40	2.20	2.00	4.20
F	---	---	---	---	---	---	---

IBC Table 1613.2.5(1) and 11.6-1
eismic Design Category based on Short Period Response Acceleratio

Value of	Occupancy Category			Design	
Sds	I or II	III	IV	Category	Category
Sds <= 0.167	A	A	A	A	A
0.167 <= Sds < 0.33	B	B	C	B	
0.33 <= Sds < 0.5	C	C	D	C	
0.5 <= Sds	D	D	D	D	
S1 >= 0.75	E	E	F	E	

Table 1613.2.5(2) and 11.6-2
Seismic Design Category Based on 1-Second Period Response Acceleration

Value of	Occupancy Category			Design	
Sd1	I or II	III	IV	Category	Category
Sd1 <= 0.067	A	A	A	A	B
0.067 <= Sd1 < 0.133	B	B	C	B	
0.133 <= Sd1 < 0.2	C	C	D	C	
0.2 <= Sd1	D	D	D	D	
S1 >= 0.75	E	E	F	E	

wallace design collective

Date 4/26/22 Sheet No. of

Job 222003 - BUILDING 3

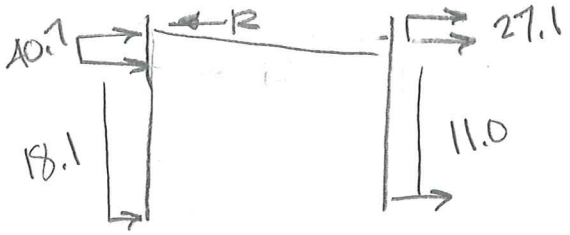
Subject MWFRS - NIS

Reference

ROOF REACTIONS (1.0W)

SOUTH WIND

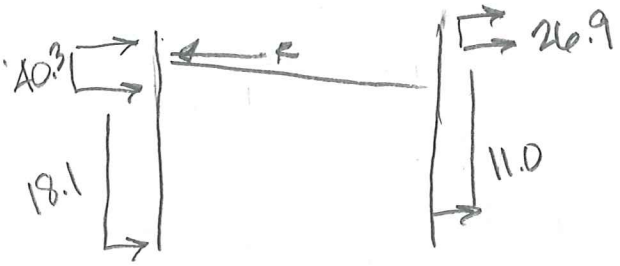
42'0"



R = 854 PLF (1.0W)

SOUTH WIND

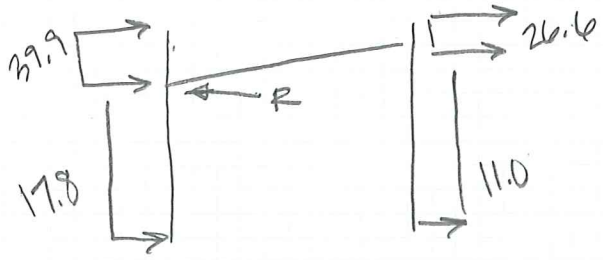
40'0"



R = 705 PLF (1.0W)

NORTH WIND

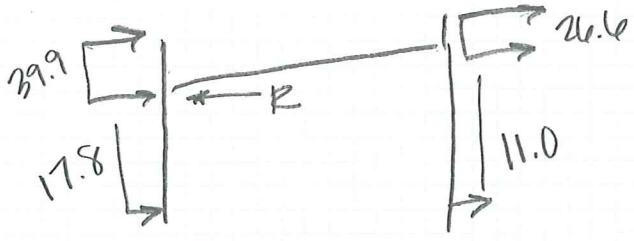
38'6"



R = 816 PLF (1.0W)

NORTH WIND

37'6"



R = 798 PLF (1.0W)

wallace design collective

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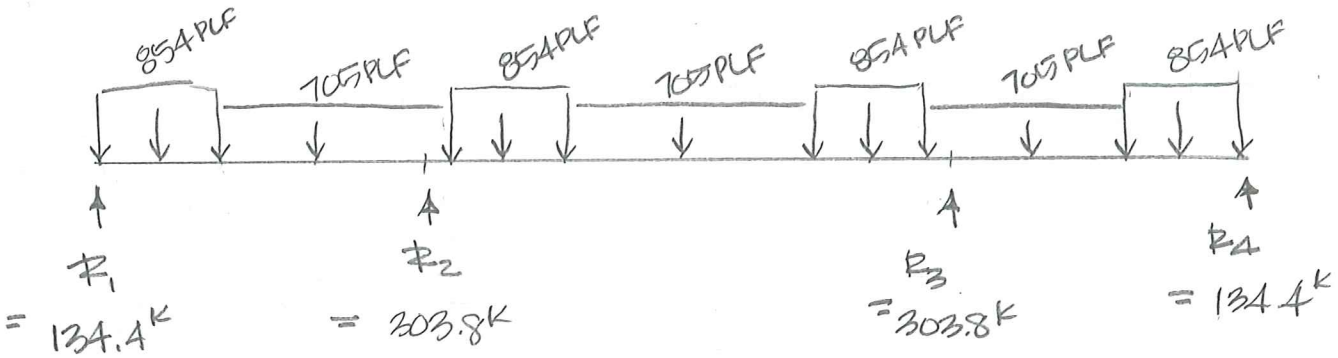
Job 222003 - BLDG 3

Subject DIAPHRAGM SHEAR (N/S)

Reference

SOUTH WIND CONTROLLED (1.0W)



DIAPHRAGM SHEAR

GRID A & Z $\quad \frac{134.4^K}{220.83'} = 609$ PLF (1.0W) ; 365 PLF ASD

GRID H & S $\quad \frac{303.8^K}{220.83'} = 1376$ PLF (1.0W) ; 825 PLF ASD

DIAPHRAGM CHORD, EXT E/W

$M = 11{,}609\ k\text{-}ft$ $\quad \frac{M}{e} = P_{max} = \frac{11{,}609\ k\text{-}ft}{220.83'} = 52.6^k$ (LRFD)

$= 31.5^k$ (ASD)

TENSION

$$A_{req.} = \frac{P \cdot \Omega}{F_y} = \frac{31.5^k \cdot 1.67}{36 ksi} = 1.46 in^2 \quad L4 \times 4 \times 3/8$$

COMPRESSION

$KL = 6' - 0''$

$L4 \times 4 \times 3/8$ $\quad \frac{P_n}{\Omega} = 39.3^k > 31.5^k$

SPLICE

$$t_{req} = \frac{A_{req}}{WIDTH} = \frac{1.46 in^2}{5''} = 0.292'', \text{ SAY } 3/8''$$

WELD

$$l_w = \frac{31.5^k}{(0.928 \times 3 \times 2)} = 5.66'' \rightarrow 6'' \text{ WELD}$$

BIRKDALE

DIAPHRAM CHORD (MIDDLE SPAN)

$M = 19330\ k\text{-}ft$ (1.0W)

$P = \frac{19330\ k\text{-}ft}{220.83'} = 87.53k$ (LRFD); 52.52^k (ASD)

TENSION

$A_{req} = \frac{P \cdot \Omega}{F_y} = \frac{52.52^k \cdot 1.67}{36ksi} = 2.44in^2$

NEED L6x6x5/16 MIN

COMPRESSION

$KL = 6'-0"$ L6x6x5/16 $\frac{P_n}{\Omega} = 72.2^k > 52.52^k$ ✓

SPLICE

$t_{req} = \frac{A_{req}}{WIDTH} = \frac{2.44in^2}{5} = .488" \rightarrow \frac{1}{2}"$

WELD

$L_w = \frac{52.52^k}{(0.928 \times 3 \times 2)} = 9.43"$ WELD $\rightarrow$ 10"

Date 3/14/2022 Sheet No. 1 of

Job 2220003 BUILDING 3

Subject ROOF DECK

1½" DECK x 22 GA TYPE B F_y = 50 KSI (G60)

L = 6'-0" TRIPLE SPAN

w_{Allow} = 87 PSF

w_{DL} = 3.2 PSF

w_{SL} = 20 PSF

MAX DRIFT = 87 - (20 + 3.2 PSF) = 63.8 PSF

CAPACITY OF DOUBLE LAYER

w_{Allow} = 174 PSF

MAX DRIFT = 150.8 PSF

Date 3/14/2022 Sheet No. 2 of

Job 2220003 BUILDING 3

Subject ROOF STRUCTURE

TYP. ROOF JOISTS
SPACING 6'-0"

w_{DL} = 11.7 PSF → USE 12.0 PSF

w_{SL} = 20 PSF

w_{LL} = (12.0 + 20 PSF)(6.0') = 192.0 PLF

w_u = [1.2(12.0 PSF) + 1.6(20 PSF)](6.0') = 278.4 PLF

JOIST REACTIONS

L = 60' → V = wL/2 = 5.760 k (ASD), 8.352 k (LRFD)

L = 53'-4" → V = wL/2 = 5.120 k (ASD), 7.424 k (LRFD)

TYP. GIRDER POINT LOADS (ASD)

END BAY NORTH P = 60'[192.0 PLF] = 11.520 k

END BAY SOUTH P = 53.33'[192.0 PLF] = 10.240 k

AT SP1 P = 4.859 LBS + 53.33/2 [192.0 PLF] = 9.979 k (ASD)

AT SP2 P = 4.404 LBS + 53.33/2 [192.0 PLF] = 9.524 k (ASD)

AT SP3 P = 4.914 LBS + 53.33/2 [192.0 PLF] = 10.034 k ASD

Date 3/17/2022 Sheet No. 1 of

Job 222003 BUILDING 3

Subject COLUMN DESIGN

Reference

COLUMNS : GRIDS B/W; 2-4

KL : 36.880' MAX

MAX LOAD : 112.692 K

HSS 12x12x1/4 P_n/Ω_c = 165 K OK

TYP. COL :

KL : 36.880' MAX

MAX LOAD : 108.8 K

HSS 12x12x1/4 P_n/Ω_c = 165 K OK

Date 3/17/2022 Sheet No. 1 of

Job 2220003 BUILDING 3

Subject LOAD BEARING FOOTING

Reference

FROM JOIST PARALLEL CONDITION (ASD)

AT 42'-0" WALL

$w = 224.8 \text{ PLF} + (42+1)(9.25/12)(150 \text{ PSF}) = 5196.68 \text{ PLF}$

AT 40'-0" WALL

$w = 228.9 \text{ PLF} + (40+1)(9.25/12)(150 \text{ PCF}) = 4969.53 \text{ PLF}$

AT 38'-6" WALL

$w = 209.0 \text{ PLF} + (38.5+1)(9.25/12)(150 \text{ PSF}) = 4776.19$

FROM JOIST BEARING CONDITION

AT CORNER SP1, GRID 2, 38'-6" WALL

$w = (81.768\text{k} / 54 \text{ FT}) + (38.5+1)(9.25/12)(150 \text{ PSF}) = 6081.41 \text{ PLF}$

TYP. NORTH, SP3, GRID 2, 37'-6" WALL + 5'

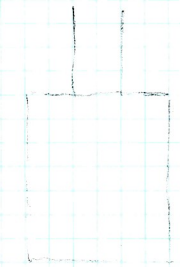
$w = (70.794\text{k} / 54 \text{ FT}) + (37.5+5)(9.25/12)(150 \text{ PSF}) = 6225.06 \text{ PLF}$

AT CORNER SP2, GRID 4, 42'-0" WALL

$w = (110.24\text{k} / 84 \text{ FT}) + (42.0+1)(9.25/12)(150 \text{ PSF}) = 6284.26 \text{ PLF}$

TYP. SOUTH., GRID 4, 40'-0" WALL

$w = (192 \text{ PLF} \cdot 53.33/2 \cdot 9 \text{ JOISTS})/54' + (40+1)(9.25/12)(150 \text{ PCF}) = 5594.00 \text{ PLF}$



$B_{PTG} =$

→ USE 36"

$f'_c = 3000 \text{ PSI}$

$\sigma = 2500 \text{ PSF}$

$B_{MIN} = 24"$

WIDTH	ALLOW. LOADS
3 FT	7.5 KLF

CHECK FTG REQUIREMENTS

$h_{eff} = 36" - 3" = 33"$

MOMENT CAPACITY

$\phi M_n = 0.6 (5)\sqrt{3000} \left(\frac{36"(33")^2}{6}\right) 1/12 = 89470.5 \text{ K-FT}$

SHEAR CAPACITY

$\phi V_c = \phi 4/3 \sqrt{f'_c} b_w h = 0.6 (4/3)\sqrt{3000} (36")(33") = 52.1 \text{ k}$

CHECK SPAN

$w_u = 1.6 (6.284 \text{ k}) = 10.054 \text{ k}$ ← VERY CONSERVATIVE

$L_{max} = \sqrt{\frac{89.47(8)}{10.054}} = 8.4375 \text{ FT}$

Date 3/17/2022 Sheet No. 2 of

Job 2220003 BUILDING 3

Subject JOIST GIRDER FOOTINGS

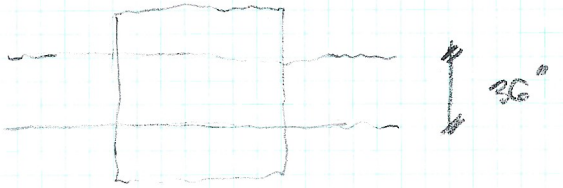
Reference

SPOT FOOTINGS

P_{max} = 60.818 K

P_{min} = 57.529 K

* ASSUME CONT. FTG HAS NO RESERVE CAPACITY



A_{REQ} = 60.818K / 2.5 KSF = 24.327 FT^2

A = B^2 - 3 FT (B)

TRY : M7.0 → A = 28.0 FT^2 → USE FOR ALL JOIST GIRDER FOOTINGS

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Date 3/18/22 Sheet No. of

Job 2220003 BLDG 3

Subject NET UPLIFT

ROOF UPLIFT

$a = 0.6h = 20.17'$

~~DECK~~

$A_T = 10 ft^2$ $DL = 3psf$

	0.6W	0.6W - 0.6D
ZONE 1'	16.3 psf	14.5 psf
ZONE 1	29.2 psf	27.4 psf
ZONE 2	38.5 psf	36.7 psf
ZONE 3	52.4 psf	50.6 psf
POSITIVE		-

ROOF JOISTS

$DL = 10psf$

$A_T = MAX(6'-0" \cdot 53'-4", (53'-4")^2/3) = 948 ft^2$

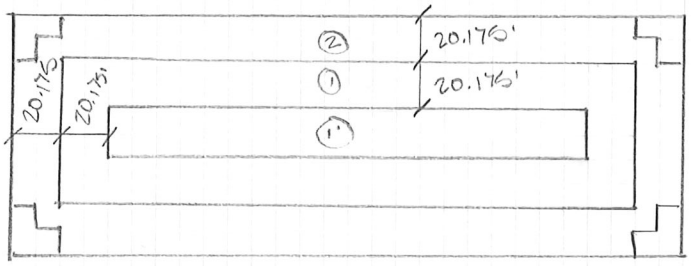
	0.6W	0.6W - 0.6D
ZONE 1'	12.8 psf	11.0 psf
ZONE 1	19.5 psf	17.7 psf
ZONE 2	26.1 psf	24.3 psf
ZONE 3	27.7 psf	25.9 psf
POSITIVE		-

ROOF GIRDERS

$DL = 12psf$

$A_T = MAX(54' \cdot 53'-4", (64')^2/3) = 2880 ft^2$

	0.6W	0.6W - 0.6D
0 TO 33.63	14.7 psf	7.5 psf
33.63 TO 67.25	9.4 psf	2.2 psf
>67.25	6.7 psf	NO NET UPLIFT



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Date 3/18/22 Sheet No. of

Job 2220003 BLDG 3

Subject WALL ANCHORAGE

PANEL ANCHORAGE

$P = MAX(0.2W_T, 5psf)$

$W_T = 0.2 \cdot 150pcf \cdot (9.25"/12") = 23.125psf$

$P = 23.125psf$

150pcf = WALL WEIGHT

9.25" = WALL THICKNESS

WIND WALL PRESSURE

$A_T = 500ft^2$

$W_{WALL} = 14.2psf$

$W_{PARA} = 43.9pcf$

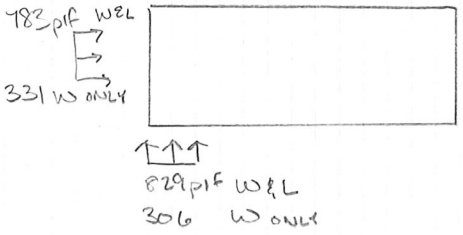
LATERAL LOADS (WALL PULLOUT)

WIND = 306 plf (N/S WIND CORNER)

= 331 plf (E/W WIND MIDDLE)

SEISMIC =

=



GRAVITY LOADS

JOIST PARALLEL - 265plf

JOIST PERPENDICULAR - SEE PLAN

JOIST BEARING CONDITION

- MAX SPACING - 6'-0"
- MAX DIAPHRAGM SHEAR - 127plf (GRIDS) · 6'-0" = 0.76K
- ANCHORAGE OF WALLS - 829 plf (CORNER) · 6'-0" = 5.0K
- STD SEAT WELD

$R = 5.76K$

$R_n/\Omega = 0.928 \cdot 2 \cdot 2 \cdot 2 = 7.4K$ OK

JOIST PARALLEL CONDITION

- ANCHORAGE EMBEDMENT - 2'-0" MAX FOR L4x4x3/8

$W_{GRAV} = 265plf$

$W_{AXIAL} = 410plf$

$W_{ANCHOR} = 783plf$

→ L4x4x3/8 GOOD

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Date 3/18/22 Sheet No. of

Job 22200303 BLDG 3

Subject WALL ANCHORAGE

ATTACHMENT TO EMBEDMENT

3/16" FILLET $R_n/\Omega = 1.896\ K/in$

$P_{GRAV} = 1.1\ K$

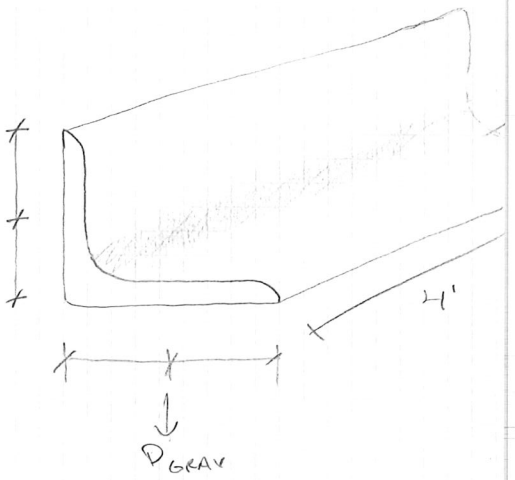
$P_{AXIAL} = 1.6\ K$

$P_{ANCHOR} = 3.1\ K$

$P_{MOMENT} = \frac{P_{GRAV} \cdot 3"\ ecc}{4} + \frac{P_{ANCHOR} \cdot 3"\ ecc}{41"} = 3.2\ K$

TOTAL $P = 9.0\ K$

WELD LENGTH $= \frac{9.0K}{1.896K/in} = 4.75\ in \rightarrow$ USE 6"



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Date 3/21/22 Sheet No. of

Job 2220003 BLDG 3

Subject BRACE FRAME GRADE BEAM

WEIGHT ON SYSTEM

(3) 10x10x3 FTG

- (150pcf)(10')(10')(3') = 135.0K (1.0D)
  81.0K (0.6D)

SLAB ABOVE -7"

- (7/12)(150pcf)(1.4) = 122.5psf

$\phi M_n = 0.6(5 \cdot 1.0 \cdot \sqrt{4{,}000psi})\left(\frac{12 \cdot 6^2}{6}\right) = 9486.8 lb\text{-}in = 0.79 K\text{-}ft$

- $L_{ALLOW} = \sqrt{\frac{0.79 K \cdot ft \cdot 2}{122.5 psf}} = 3.59'$

- 3(10' + 3.59' · 2)² (7/12")(.150) = 77.5K (1.0D)
  46.5K (0.6D)

COL LOADS

- RISA LC #5 0.6D + 0.6W = 76.6K

PASSIVE PRESSURE

- (1/2)(3')(10')$\left(\frac{250psf}{1000}\right)$ · 3 = 11.3K

TOTAL RESISTANCE

81.0K + 46.5K + 76.6K + 11.3K = 215.4K

TOTAL SHEAR

V = 182.1K

WEIGHT REQD

F = μN ≥ V_u

6.30(204.1K) + 11.3K = 12.63K

182.0K - 12.63K = 109.5K REQ

$\frac{109.5K}{0.3}$ = 364.9 K = 0.15kcf · 3' · 2.43.33 · x

X = 9.36' ≈ 9'-6" GB

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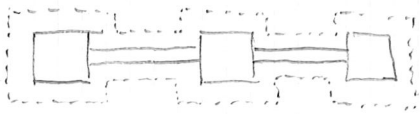
Date 3/21/22 Sheet No. of

Job 2220003 BLDG 3

Subject BRACED FRAME GRADE BEAM



WEIGHT ADDED

INCLUDE SLAB ABOVE GRADE BEAM. ASSUME 1'-6"

- 3.6' · 2 + 1.5' = 8.7'
- (53.33' - 10' - 3.59' · 2) = 36.15'
- $\left(\frac{150\,pcf}{1000}\right)(7/12')(8.7')(36.15') = 27.5K\ (1.0D)$

$16.5K\ (0.6D)$

NEW WEIGHT

DEAD 81.0K + 46.5K + 76.6K + 16.5K = 220.6K

PP 11.3K

WEIGHT REQD

0.30(220.6K) + 11.3K = 77.48 1K

180.2K - 77.5K = 102.7K

$\frac{102.7K}{0.30} = 342.3K = 0.15KCF \cdot 3' \cdot 2 \cdot 43.33' \cdot x$

$8.48' = x \approx 9'-0''$

DOWEL INTO CONC

V = 102.7K

TRY #4 BARS - A = 0.2 in²
- fy = 36 ksi

$\frac{V}{\Omega} = 0.6(36ksi)(0.2in^2) = 4.3K$

$\frac{93.5K}{4.3K/BAR} = 23.9\,BARS$

USE #4 DOWELS AT 3'-6"

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Date 4/4/22 Sheet No. of

Job 2220003

Subject BLDG 3 GB/FND DOWELS

DOWELS FOR SHEAR SLIDING

$342.3K = 3(0.15)(3' \cdot 2' \cdot 43.33') + x$

$342.3K - 116.991K = 225.3K$

#4 DOWELS - 41.3K

$\frac{225.3K}{41.3K} = 52.39$ DOWELS

(4) 10' FDN = 16D/FT = 16.4 = 64 DOWELS

NO DOWELS IN GB