STRUCTURAL CALCULATIONS

FOR

Example 13-3

ASCE 7-16 Guide to Snow Load Provisions

Company
Address
City, State
Phone

JOB TITLE Example 13-3

JOB NO. _____ **SHEET NO.** _____
CALCULATED BY _____ **DATE** _____
CHECKED BY _____ **DATE** _____

Code Search

Code: ASCE 7 - 16

Occupancy:

Occupancy Group = B Business

Risk Category & Importance Factors:

Risk Category =	II
Wind factor =	1.00
Snow factor =	1.00
Seismic factor =	1.00

Type of Construction:

Fire Rating:

Roof =	0.0 hr
Floor =	0.0 hr

Building Geometry:

Roof angle (θ)	4.00 / 12	18.4 deg
Building length (L)	72.0 ft	
Least width (B)	36.0 ft	
Mean Roof Ht (h)	19.0 ft	
Parapet ht above grd	0.0 ft	
Minimum parapet ht	0.0 ft	

Live Loads:

Roof
0 to 200 sf: 20 psf
200 to 600 sf: 24 - 0.02Area, but not less than 12 psf
over 600 sf: 12 psf

Floor:

Typical Floor	100 psf
Partitions	N/A

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JOB NO. _____ SHEET NO. _____
CALCULATED BY _____ DATE _____
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Snow Loads : ASCE 7- 16

Nominal Snow Forces

Roof slope		=	18.4 deg
Horiz. eave to ridge dist (W)		=	18.0 ft
Roof length parallel to ridge (L)		=	72.0 ft
Type of Roof			Hip and gable w/ rafters
Ground Snow Load	Pg	=	46.0 psf
Risk Category		=	II
Importance Factor	I	=	1.0
Thermal Factor	Ct	=	1.10
Exposure Factor	Ce	=	1.2
Pf = 0.7*Ce*Ct*I*Pg		=	42.5 psf
Unobstructed Slippery Surface			yes
Sloped-roof Factor	Cs	=	0.86
Balanced Snow Load		**=**	**36.5 psf**

Near ground level surface balanced snow load = **46.0 psf**

Rain on Snow Surcharge Angle			0.36 deg
Code Maximum Rain Surcharge			5.0 psf
Rain on Snow Surcharge		=	0.0 psf
Ps plus rain surcharge		=	36.5 psf
Minimum Snow Load	Pm	=	0.0 psf
Uniform Roof Design Snow Load		=	**36.5 psf**

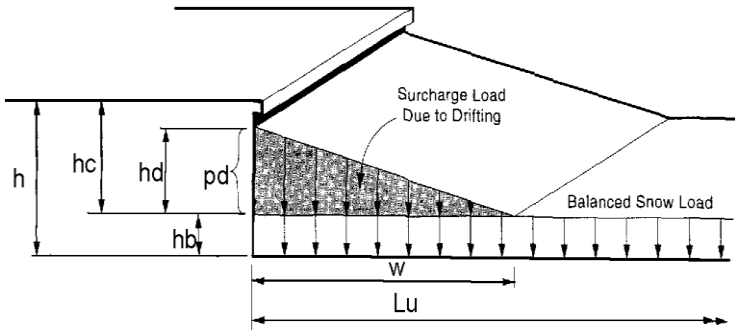
NOTE: Alternate spans of continuous beams shall be loaded with half the design roof snow load so as to produce the greatest possible effect - see code for loading diagrams and exceptions for gable roofs..

Unbalanced Snow Loads - for Hip & Gable roofs only

Required if slope is between 7 on 12 =	30.26 deg	
and 2.38 deg =	2.38 deg	**Unbalanced snow loads must be applied**
Windward snow load =	0.0 psf	
Leeward snow load =	46.0 psf	= I * Pg

Windward Snow Drifts 1 - Against walls, parapets, etc

Upwind fetch	lu	=	15.0 ft
Projection height	h	=	3.0 ft
Snow density	g	=	20.0 pcf
Balanced snow height	hb	=	1.83 ft
	hd	=	1.27 ft
	hc	=	1.17 ft
hc/hb >0.2 = 0.6	**Therefore, design for drift**		
Drift height (hc)		=	1.17 ft
Drift width	w	=	5.50 ft
Surcharge load:	pd = γ*hd	=	**23.4 psf**
Balanced Snow load:		=	36.5 psf
			59.9 psf



Note: If bottom of projection is at least 2 feet above hb then snow drift is not required.

Windward Snow Drifts 2 - Against walls, parapets, etc

Upwind fetch	lu	=	24.0 ft
Projection height	h	=	4.0 ft
Snow density	g	=	20.0 pcf
Balanced snow height	hb	=	1.83 ft
	hd	=	1.42 ft
	hc	=	2.17 ft
hc/hb >0.2 = 1.2	**Therefore, design for drift**		
Drift height (hd)		=	1.42 ft
Drift width	w	=	5.68 ft
Surcharge load:	pd = γ*hd	=	**28.4 psf**
Balanced Snow load:		=	36.5 psf
			64.9 psf

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Snow Loads - from adjacent building or roof:

ASCE 7- 16

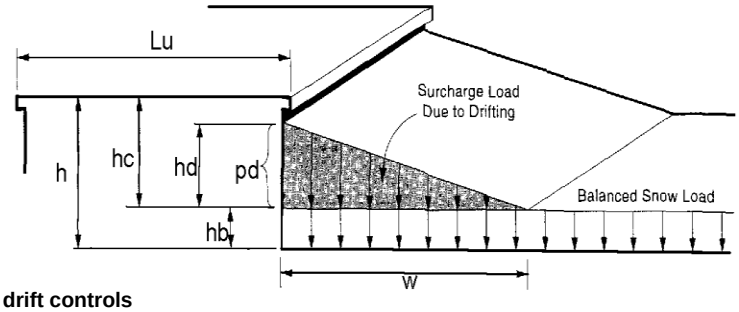
Nominal Snow Forces

		Higher Roof	Lower Roof
Roof slope	=	18.4 deg	4.00 / 12 = 18.4 deg
Horiz. eave to ridge dist (W)	=	18.0 ft	12.0 ft
Roof length parallel to ridge (L)	=	72.0 ft	24.0 ft
Projection height (roof step) h	=		10.0 ft
Building separation s	=		0.0 ft
Type of Roof		Hip and gable w/ rafters	Hip and gable w/ rafters
Ground Snow Load	Pg =	46.0 psf	46.0 psf
Risk Category	=	II	II
Importance Factor	I =	1.0	1.0
Thermal Factor	Ct =	1.10	1.20
Exposure Factor	Ce =	1.2	1.2
Pf = 0.7*Ce*Ct*I*Pg	=	42.5 psf	46.4 psf
Unobstructed Slippery Surface		yes	yes
Sloped-roof Factor	Cs =	0.86	0.94
Balanced Snow Load	**Ps =**	**36.5 psf**	**43.5 psf**
Rain on Snow Surcharge Angle		0.36 deg	0.24 deg
Code Maximum Rain Surcharge		5.0 psf	5.0 psf
Rain on Snow Surcharge	=	0.0 psf	0.0 psf
Ps plus rain surcharge	=	36.5 psf	43.5 psf
Minimum Snow Load	Pm =	0.0 psf	0.0 psf
Uniform Roof Design Snow Load	=	**36.5 psf**	**43.5 psf**
Building Official Minimum	=		

NOTE: Alternate spans of continuous beams and other areas shall be loaded with half the design roof snow load so as to produce the greatest possible effect - see code.

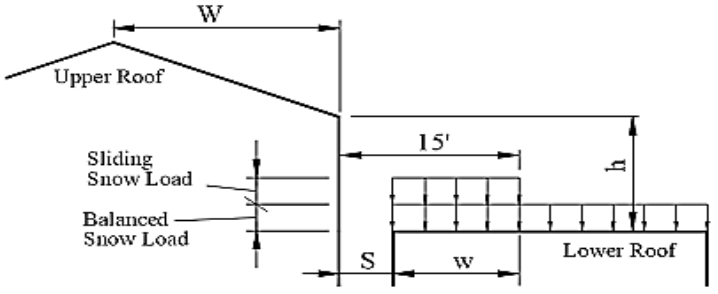
Leeward Snow Drifts - from adjacent higher roof

Upper roof length	lu =	48.0 ft
Snow density	ɣ =	20.0 pcf
Balanced snow height	hb =	2.18 ft
	hc =	7.82 ft
hc/hb >0.2 = 3.6	**Therefore, design for drift**	
Adj structure factor	=	1.00
Drift height (hd)	=	2.77 ft
Drift width	w =	11.10 ft
Surcharge load:	pd = ɣ*hd =	**55.4 psf**
Balanced Snow load:	=	43.5 psf
		98.9 psf **Leeward drift controls**



Windward Snow Drifts - from low roof against high roof

Lower roof length	lu =	24.0 ft
Adj structure factor	=	1.00
Drift height	hd =	1.42 ft
Drift width	w =	5.68 ft
Surcharge load:	pd = ɣ*hd =	**28.4 psf**
Balanced Snow load:	=	43.5 psf
		71.8 psf



Sliding Snow - onto lower roof

Sliding snow = 0.4 Pf W =	306.0 plf
Distributed over 15 feet =	20.4 psf
hd + hb =	3.20 ft
hd + hb < =h therefore sliding snow =	**20.4 psf**
Balanced snow load =	43.5 psf
Uniform snow load within 15' of higher roof =	63.9 psf
w =	12.00 ft