



Building Codes





Builder Responsibilities

- Load & Code Data
 - Supplied by the Builder
 - Verify with Engineer of Record
- Pursue most accurate data
 - Assures the most accurate design
 - Assures the most competitive (\$\$) design and pricing
 - Verify with Building Department
- Make VP aware of changing codes!



Model Building Codes

- International Building Code (IBC)
 - International Code Council (ICC)
- Uniform Building Code (UBC)
 - International Conference of Building Officials (ICBO)
- Basic Building Code (BBC)
 - Building Officials and Code Administrators (BOCA)
- Standard Building Code (SBC)
 - Southern Building Code Congress International (SBCCI)



Building Code Screen

Loading for Entire Building

Building Code | Live Load | Wind Load | Snow Load | Seismic | Deflection Conditions | Reference Values | Notes

The Builder is responsible for contacting the local Building Official or project Design Professional to obtain all code and loading information for this specific building site.

Alias Code (Max. 6 Characters)

Concrete Compression Strength psi

Building Code

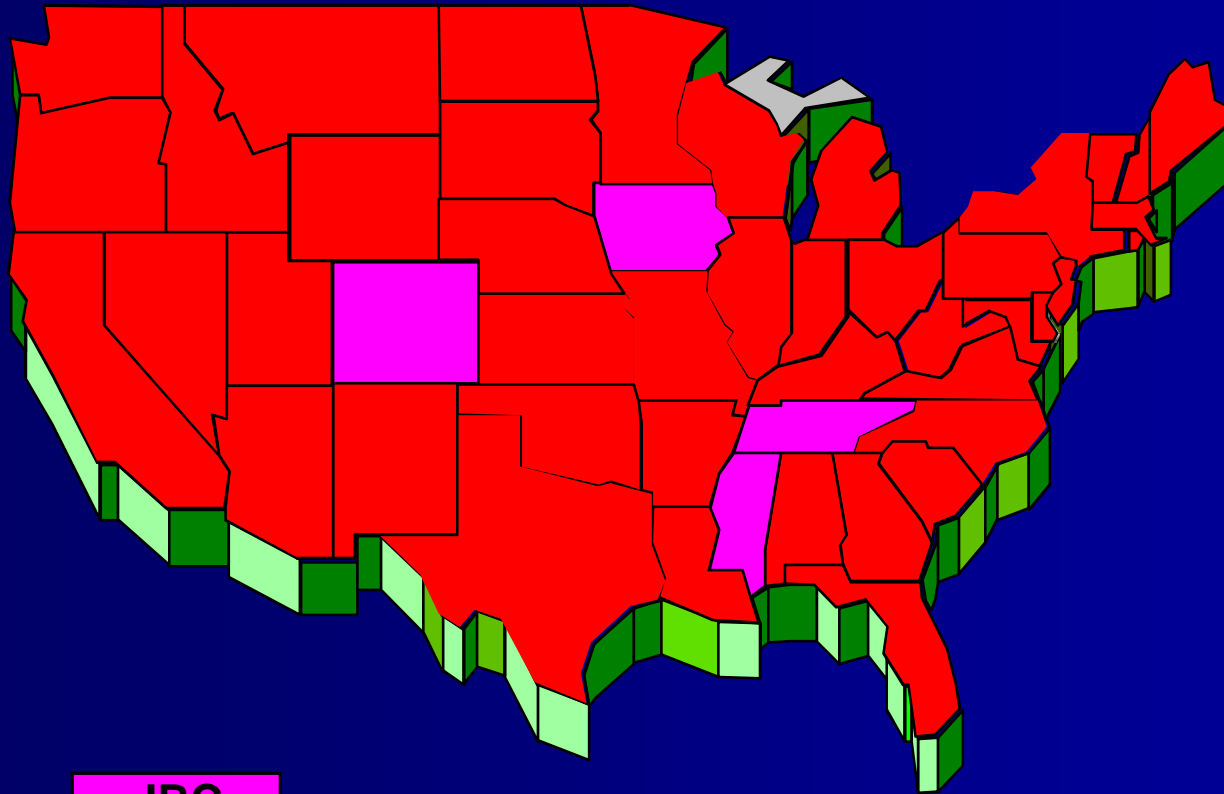
- 2006 International Building Code
- 2009 International Building Code
- 2006 International Building Code
- 2003 International Building Code
- 2000 International Building Code
- 2000 International Building Code (alt.)
- 7-02 American Society of Civil Engineers
- 7-98 American Society of Civil Engineers
- 7-95 American Society of Civil Engineers
- 7-93 American Society of Civil Engineers
- 7-88 American Society of Civil Engineers
- 1982 American National Standards Inst.
- 1999 National Building Code (BOCA)
- 1996 National Building Code (BOCA)
- 1993 National Building Code (BOCA)
- 1990 National Building Code (BOCA)
- 1987 National Building Code (BOCA)
- 1986 Metal Building Manufacturers Assoc.
- 2005 National Building Code of Canada
- 1995 National Building Code of Canada
- 1990 National Building Code of Canada
- 2003 NFPA 5000
- 1999 Standard Building Code
- 1997 Standard Building Code
- 1994 Standard Building Code
- 1991 Standard Building Code w/1993 Revs.
- 1988 Standard Building Code
- 1997 UBC w/ AISC Seismic Provisions
- 1997 Uniform Building Code
- 1994 Uniform Building Code
- 1991 Uniform Building Code

Help

National Building Code of
Canada 2005



Areas of Influence



◇ Alaska

Hawaii

**IBC
State**

**IBC
Local**

State Adoption shown



Standards and Specifications

- **Metal Building Systems Manual**
 - Published by Metal Building Manufacturers Association (MBMA)
- **Manual of Steel Construction**
 - By American Institute of Steel Construction (AISC)
- **Cold-Formed Steel Design Manual**
 - By American Iron And Steel Institute (AISI)



Load Combinations

- Building codes specify how loads are applied to buildings
- And how they are to be combined
 - For determination of critical loading conditions



Building Use

- Building Use Categories are numbered "1" through "4"
- Definitions and severity vary according to Building Code
- "Importance Factors" are determined by Building Use Categories
- Higher "Importance" means stronger building
- Can affect the price (\$\$) by 10% or more



Building Use Category

- The USE CATEGORY represents the level of hazard to human life in the event of failure.
- More severe category results in increased design loads (and building price \$\$)

STANDARD		I	\$
SPECIAL	>300 people (school, church, jail) petrochemical, waste water treatment...	II	\$\$
EMERGENCY	Hospital, police, power, fire station...	III	\$\$\$
LOW HAZARD	Agriculture, temporary...	IV	



Importance Factors

Load Type	Standard Occ.	Special Occ.	Essential Occ.
Snow	1.0	1.1	1.2
Wind	1.0	1.15	1.15
Seismic	1.0	1.25	1.5

Snow Exposure Factor

Fully Exposed = 0.90

Partially Exposed = 1.0

Sheltered = 1.1

Thermal Factor

Ct = 0.85 (heated, green house)

Ct = 1.0 (heated)

Ct = 1.1 (just above freezing)

Ct = 1.2 (unheated)

Ground Snow (P_g)

Roof Snow = $P_g \times$ Snow Exp. Factor

Load Type Definitions

- Dead Load
- Roof Live Load
- Wind Load
- Roof Snow Load
- Partial Span Snow Loads
- Collateral Load
- Seismic Load
- Alternate Span Live Loads



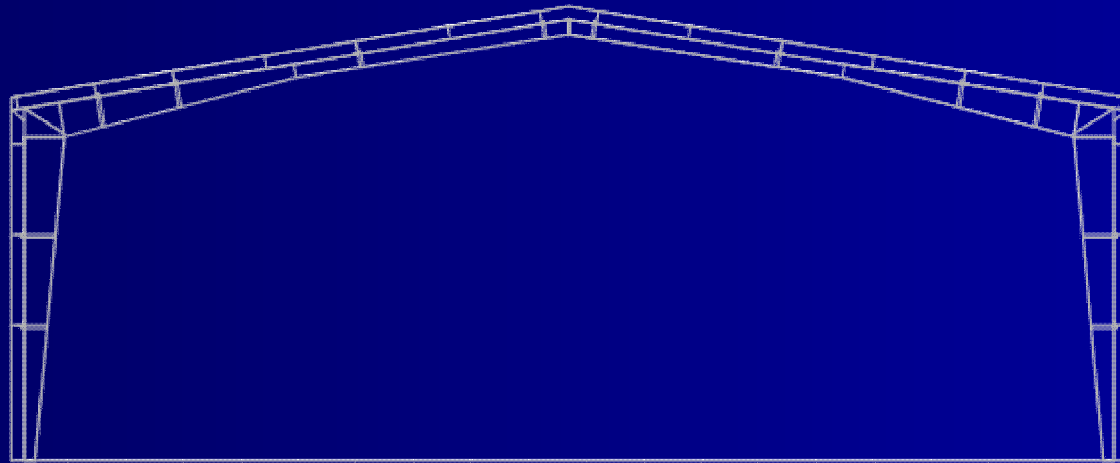
Load Definitions

D1. Notations

- D = dead load of steel framing system furnished by BlueScope (actual steel weight), crane runway systems, and dead weight of floor systems
- C_g, C_u = user specified collateral load including dead weight of ceilings, sprinklers, permanent equipment, piping, ductwork, HVAC systems, etc.
- D_c = dead weight of the crane system: runway, bridge and trolley, as applicable (see D5)
- D_p = dead weight of partitions
- L_c = live load due to crane lifted loads
- L_r = roof live load due to use & occupancy
- L_F = uniform floor live load due to use and occupancy
- S = uniformly distributed snow load (see D3)
- S_d = drifting snow load
- S_p = partial loading snow
- S_r = rain-on-snow surcharge snow load
- S_s = sliding snow load
- S_u = unbalanced roof snow load
- R = rain accumulation load (not rain on snow surcharge)
- W = wind load
- Q_E = earthquake load, base shear (V) or component force (F_p)
- S_{DS} = seismic spectral response acceleration parameter at short periods
- ρ = redundancy coefficient (=1.3, except where specific condition satisfied use 1.0)
- Ω_o = overstrength factor (between 2.0 and 3.0, except 1.25 for cantilevered systems)

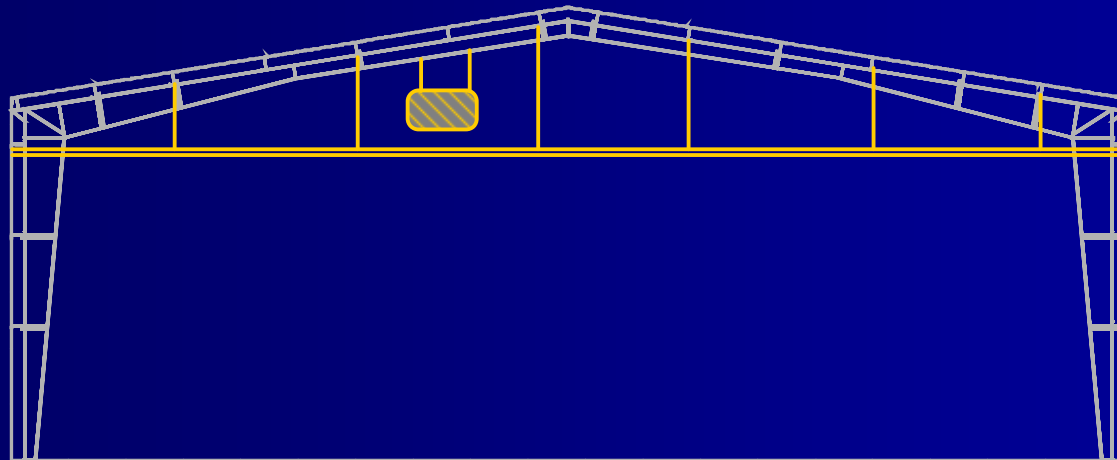
	DESIGN PROCEDURES	Section:	DP 1.2.1
	LOADS & CODES	Page:	4 of 6
	IBC: Load Combinations	Revision & Date:	2 (11/09)

Load Types - Dead



**Dead Load = the weight of the building materials
(Includes Panel, Purlin and Frame weights)**

Load Types - Collateral



Collateral Load = additional dead loads
(ceilings, mechanical equipment - current & future)

Load Types - Collateral

Vertical Deflection Limits for Flexible Ceilings

Select "Ceiling with Flexible Finish" in VP Command's Deflection Condition screen as shown.

The system will design frames and purlins for the required deflections.

Loading for Entire Building

Building Code | Live Load | Wind Load | Snow Load | Seismic | Deflection Conditions | Reference Values

Frames are Vertically Supporting

Ceiling with Flexible Finish

Deflection Limit Override

De...	Lo...	A...	Buildi...
240	L	1...	06IBC
240	S	1...	06IBC
240	W	0...	06IBC

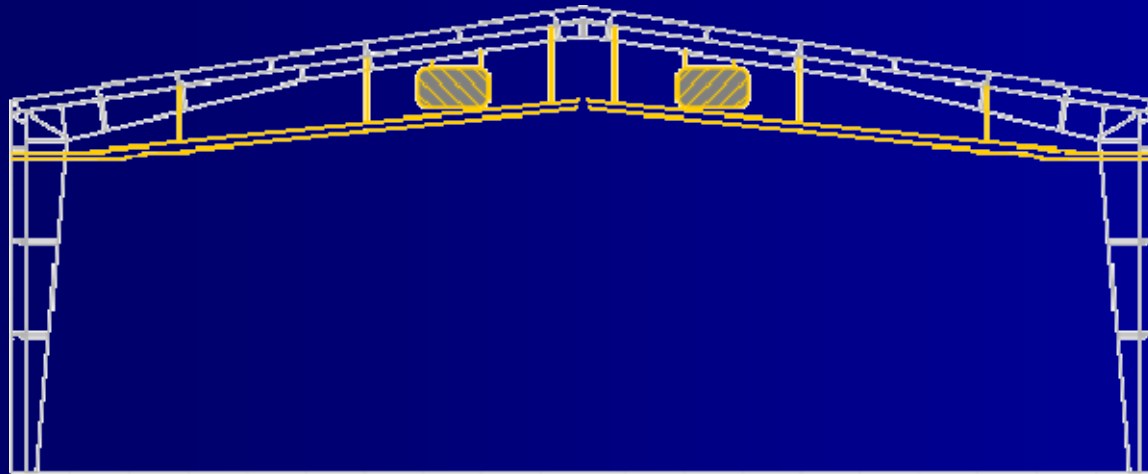
Purlins are Supporting

Ceiling with Flexible Finish

Deflection Limit Override

De...	Lo...	A...	Buildi...
240	W	0...	06IBC
240	S	1...	06IBC
240	L	1...	06IBC

Load Types - Collateral



Collateral Load = Vaulted Ceiling (Plaster)

Load Types - Collateral

Vertical Deflection Limits - Vaulted Ceiling (Plaster)

Select "Ceiling with Flexible Finish" in VP Command's Deflection Condition screen as shown.

The system will design frames and purlins for the required deflections.

Loading for Entire Building

Building Code | Live Load | Wind Load | Snow Load | Seismic | Deflection Conditions | Reference Values

Frames are Vertically Supporting

Ceiling with Brittle Finish (ie. Plaster) ▼

Deflection Limit Override

De...	Lo...	A...	Buildi...
360	L	1...	06IBC
360	S	1...	06IBC
360	W	0...	06IBC

Purlins are Supporting

Ceiling with Brittle Finish (ie. Plaster) ▼

Deflection Limit Override

De...	Lo...	A...	Buildi...
360	S	1...	06IBC
360	W	0...	06IBC
360	L	1...	06IBC



Load Types - Collateral

- Collateral Loads are a form of dead load on the roof or floor of a building. These loads are usually estimated with the help of the Architect or Engineer of Record, and represent the weight of items such as ceilings and mechanical equipment supported by the building.
- Collateral Loads may represent both current and future loads.



Collateral Loading- Sprinkler*

Table 1 - Typical Sprinkler Pipe Loadings

Pipe Diameter	Pipe + Water Wt/ft	Hanger Load 5' Spacing	Hanger Load 10' Spacing	Hanger Load 15' Spacing
	lbs/ft	lbs	lbs	lbs
2"	5.1	25.5	51.0	76.5
3"	10.8	54.0	108.0	162.0
4"	16.3	81.5	163.0	244.5
5"	23.3	116.5	233.0	349.5
6"	31.5	157.5	315.0	472.5
8"	50.2	251.0	502.0	753.0
10"	74.6	373.0	746.0	1119.0
12"	98.6	493.0	986.0	1479.0



	DESIGN PROCEDURES	Section: DP 1.2.2
	LOADS & CODES	Page: 4 of 8
	IBC: Dead Loads	Revision & Date: 0 (10/09)

Collateral Load Screen

Loading for Entire Building

Building Code | Live Load | Wind Load | Snow Load | Seismic | Deflection Conditions | Reference Values | Notes

Live Load psf

Reducible

Collateral

Gravity Cases psf

Uplift Cases psf

User input

VP Command assumed &
Customer revised

Adjust the load for Uplift Cases, as required, to represent all or a portion of the Gravity Case load that will be permanently and evenly distributed in the structure: e.g. ducts, sprinkler, and ceiling systems.

Apply Collateral along Slope of Rafters **(For vaulted Ceilings)**

Apply to Bottom Chord of WideBay

OK

Cancel

Apply

Help



Collateral Load Screen

- Input the Collateral Gravity loads. VPC assumes the Uplift loads = Gravity loads
- Read the "lit-up" message and revise Uplift accordingly.



Collateral Load Input

Ex 1 - Flexible Ceiling

- Collateral load is entered for a Flexible Drop Ceiling, lighting, sprinklers and ducts for an office building.
- Gravity Cases: the user inputs a value of 3 psf.
- Uplift Cases: VPC assumes this entire amount is a permanent, uniformly distributed load similar to dead load on the building, and fills in a value of 3 psf.



Collateral Load Input

Ex 2 – Current & Future Collateral

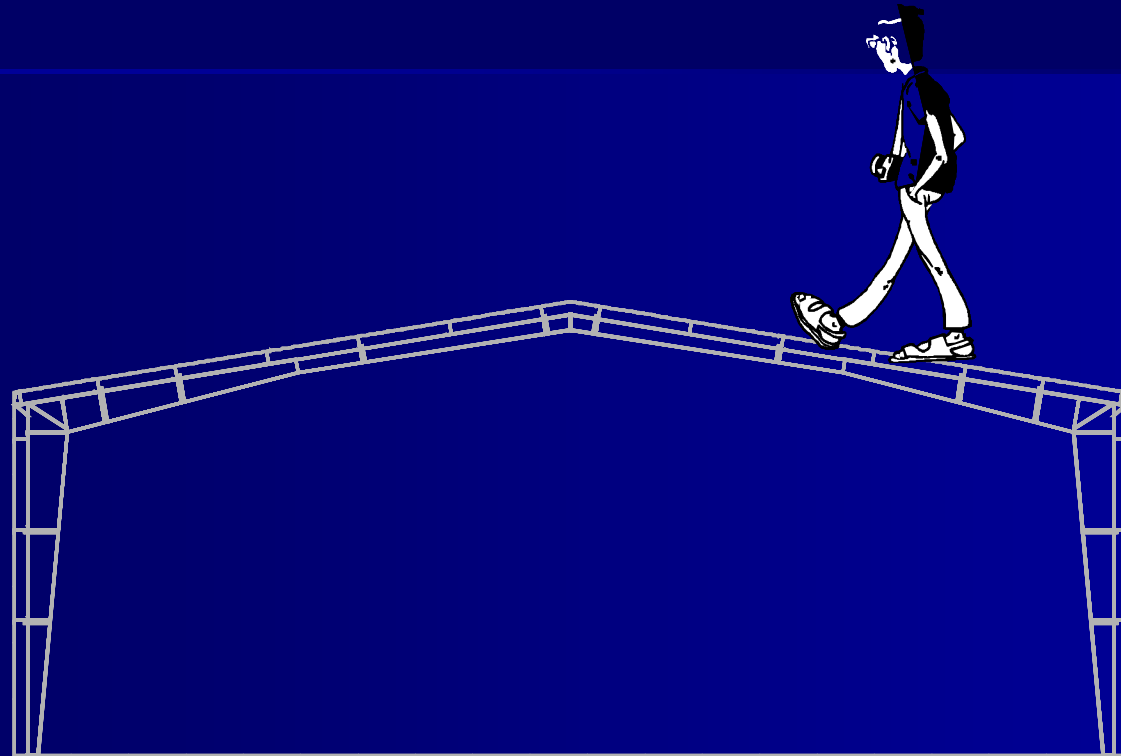
- Collateral load of 5 psf is required for a warehouse that includes sprinklers, lighting and ducts. The owner is unsure of the future building use and wants to design for worst case collateral of 8 psf.
- Gravity Case value of 8 psf is input and VPC assumes that entire amount is a permanent, uniformly distributed load.
- Since only 5 psf is guaranteed to be always in place AND evenly distributed over the floor plan of the building, the user must revise the "Uplift Case" field from 8 psf to 5 psf.
- VPC will then design for worst case gravity and uplift combinations



Live Load vs. Snow Load

- Clear distinction between Live and Snow Loads
- "Live Load" is a "Service Load"
 - A temporary load for erection
 - Independent of project site location

Load Types - Live



Roof Live Load = Temporary applied loads



Live Load Reduction

Tributary
Loaded Area

Minimum Roof
Live Load

0-200 sq. ft.

20 psf *

201-600 sq. ft.

16 psf *

Over 600 sq. ft.

12 psf *

* Varies with Roof pitch

Live Load Screen

Loading for Entire Building ✕

Building Code | **Live Load** | Wind Load | Snow Load | Seismic | Deflection Conditions | Reference Values | Notes

Live Load psf

Reducible

Collateral

Gravity Cases psf

Uplift Cases psf

Adjust the load for Uplift Cases, as required, to represent all or a portion of the Gravity Case load that will be permanently and evenly distributed in the structure: e.g. ducts, sprinkler, and ceiling systems.

Apply Collateral along Slope of Rafters

Apply to Bottom Chord of WideBay

OK Cancel Apply Help

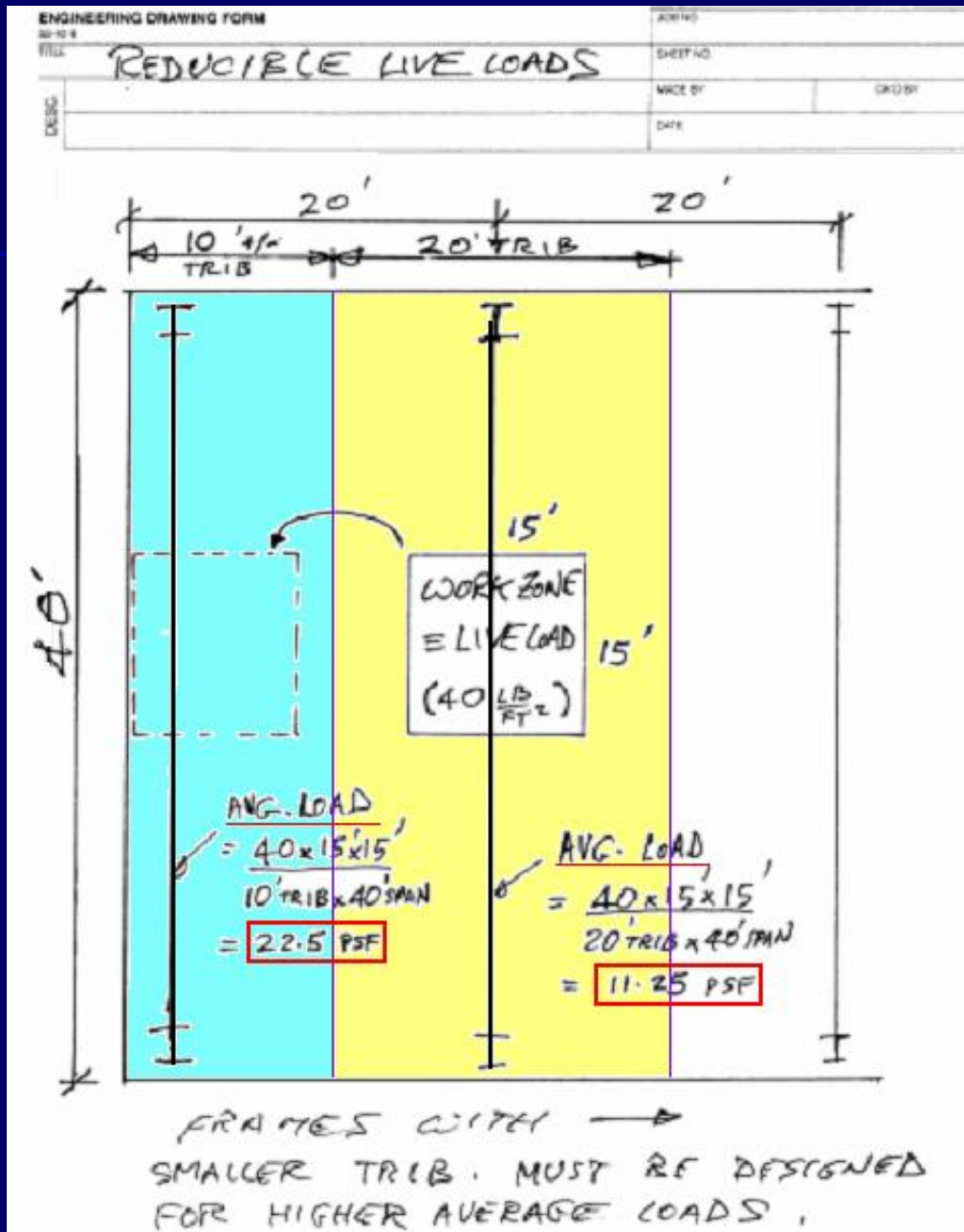


Live Load Input Screen

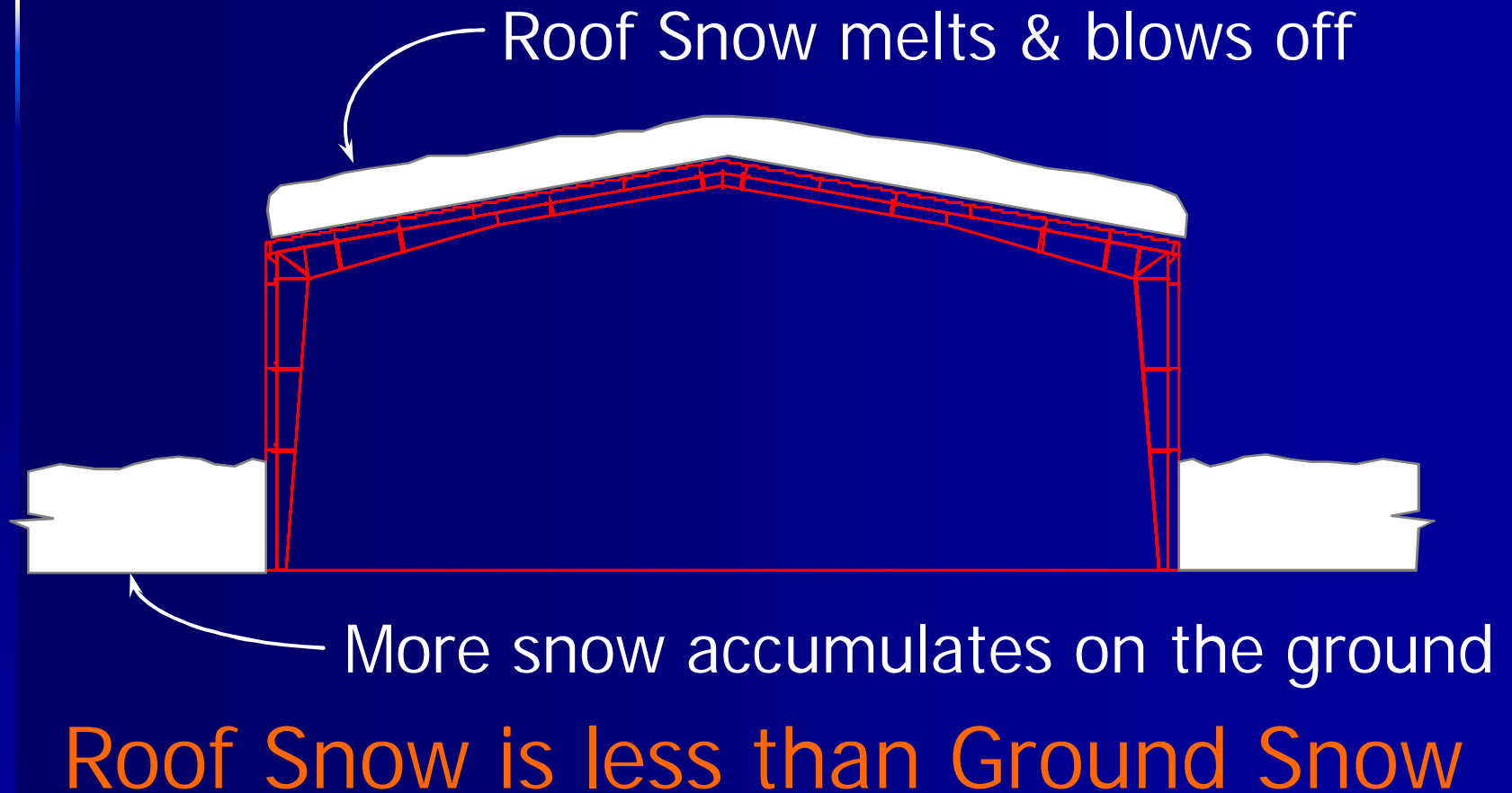
- Input the required Live Load. Reducible live loads may be used if allowed by specs or building officials.
- Enter the maximum roof live load required by the IBC code of 20 psf (VPC will reduce to a minimum of 12 psf where applicable - See IBC 1607.11)

Note: If the State or County or City requires a Minimum Roof Load (this can be a Snow Load or Live load), then input the minimum into the Live Load field in VPCCommand.

Why Reducible ?



Snow Load





Snow



02/08/2010



Some Love Snow!



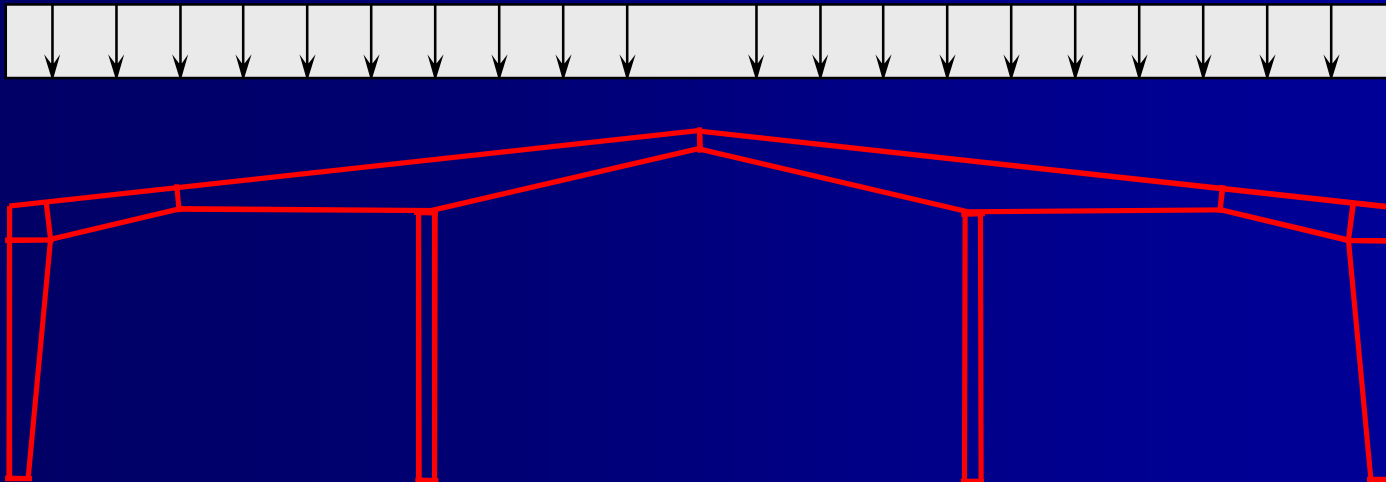


02/06/2010

Snow Load

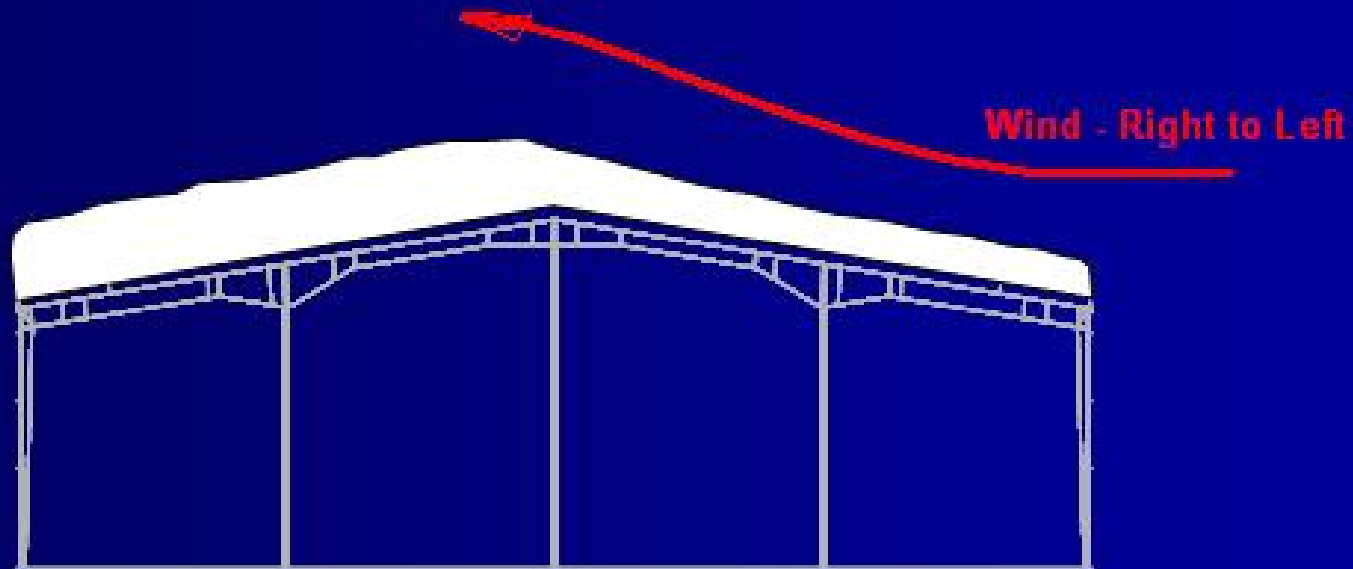
Case I: Balanced Snow Load

Dead + Collateral + Snow Load



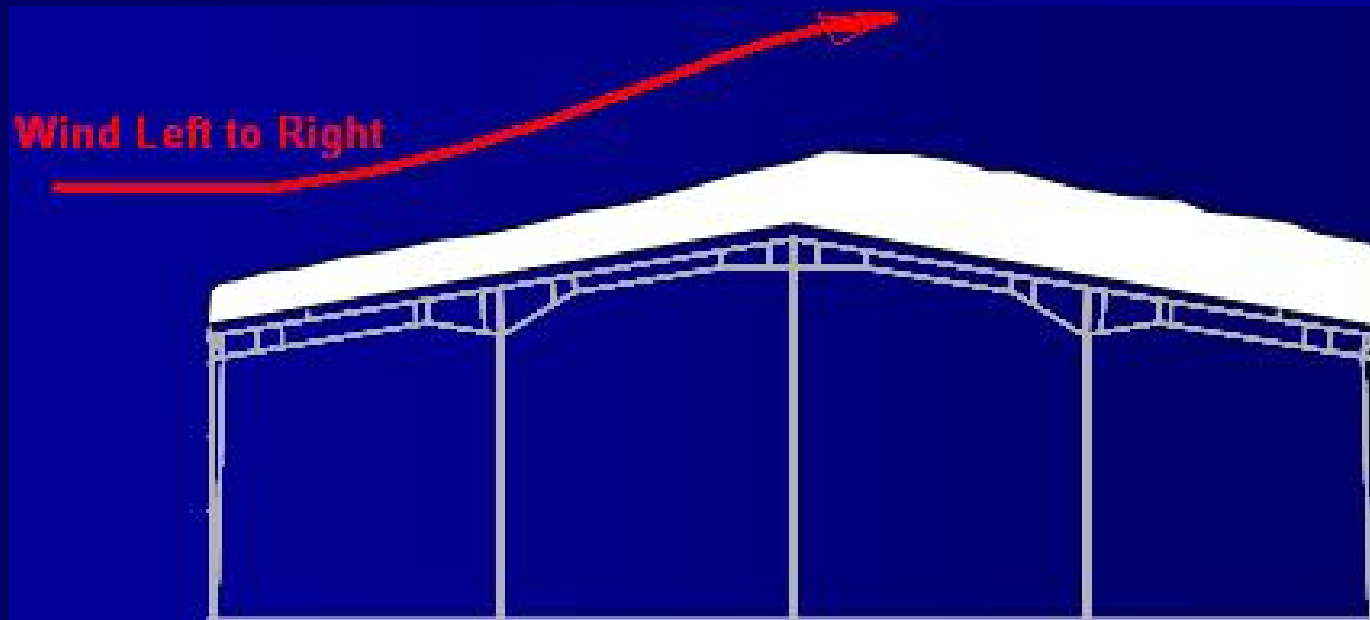
Snow Load

Case II: Unbalanced Snow Left = *US1



Snow Load

Case III: Unbalanced Snow Right = US1*





Unbalanced Snow





Watch for Snow Build Up at Walls

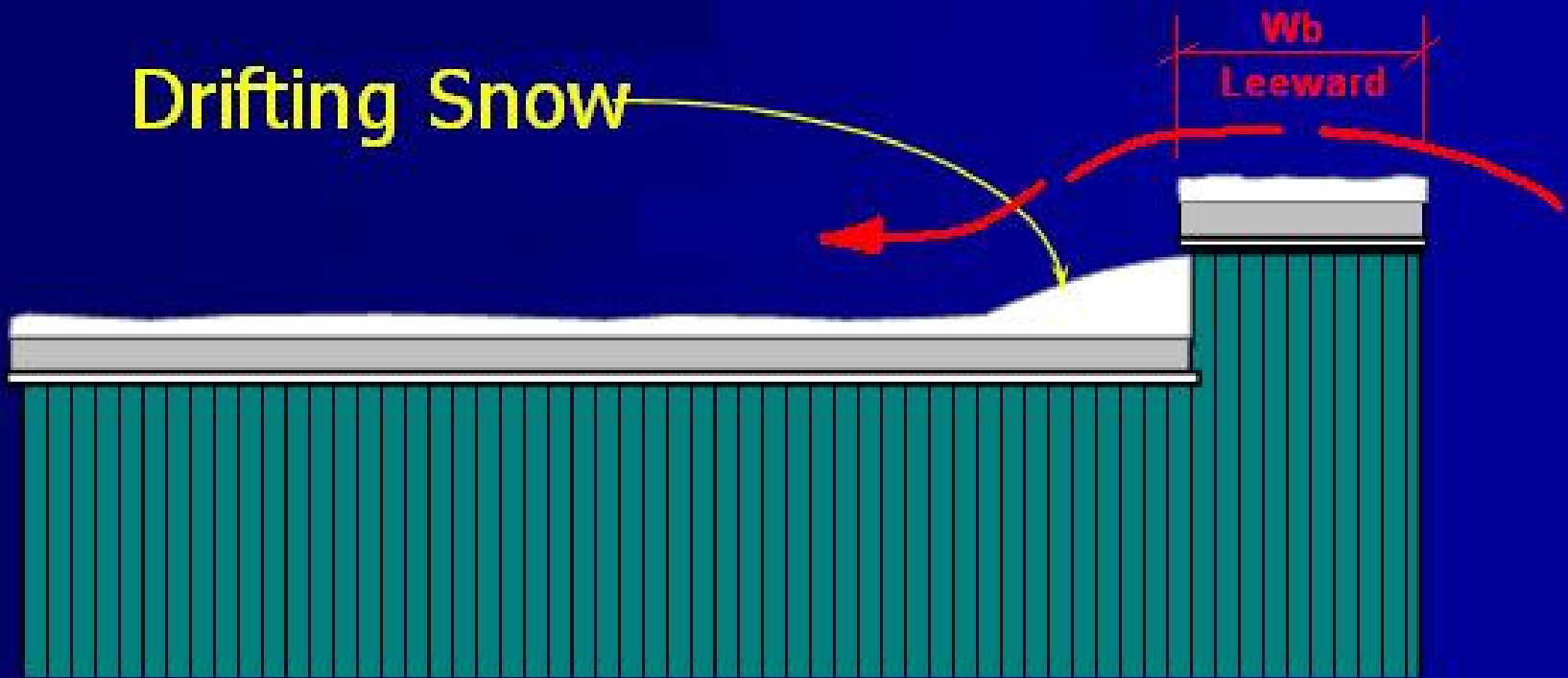


Snow Build-Up



Snow Build-Up

Drifting Snow





BLU
S





Sliding Snow





Sliding Snow





OOPS!



Watch out for those Existing or Future Buildings

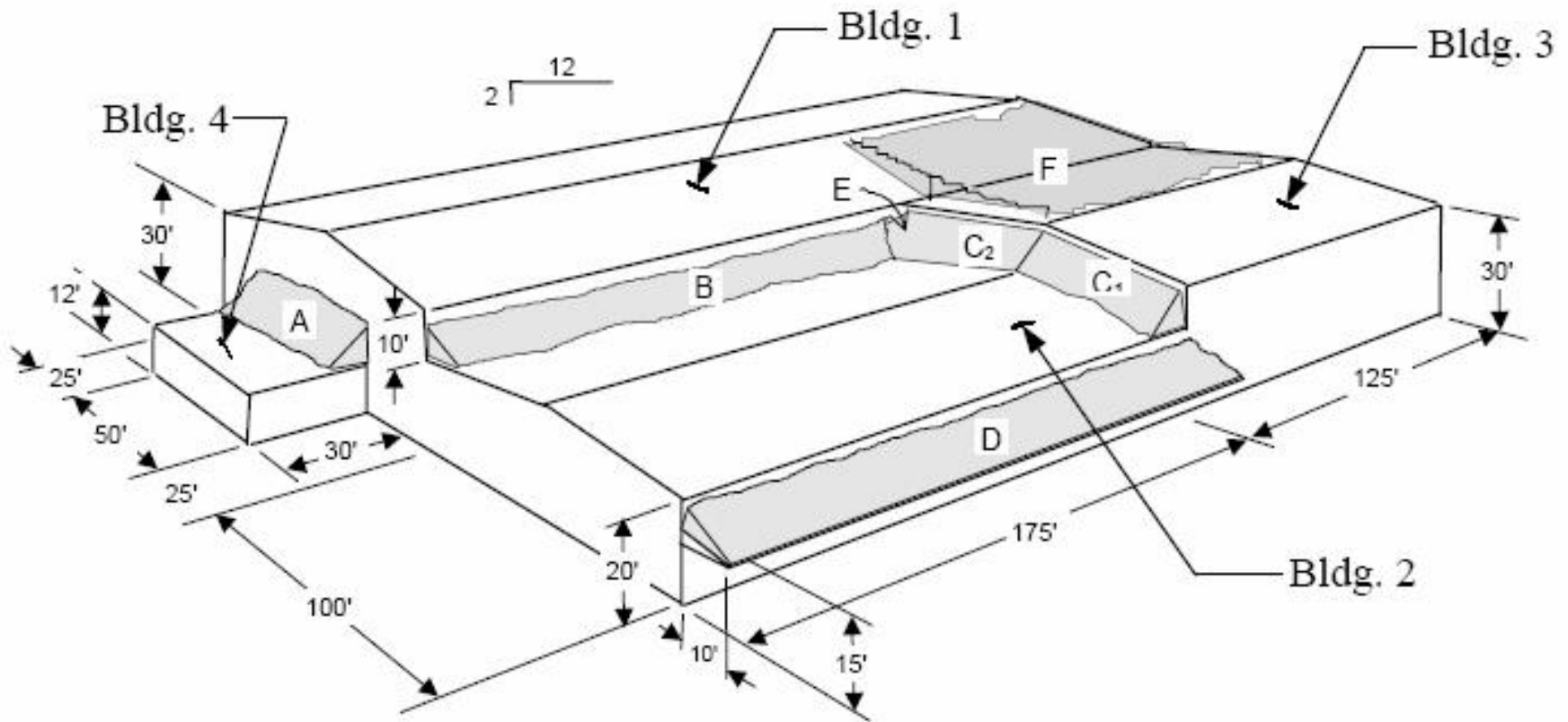


Figure 1.5.14(c)-1
Building Geometry and Drift Locations



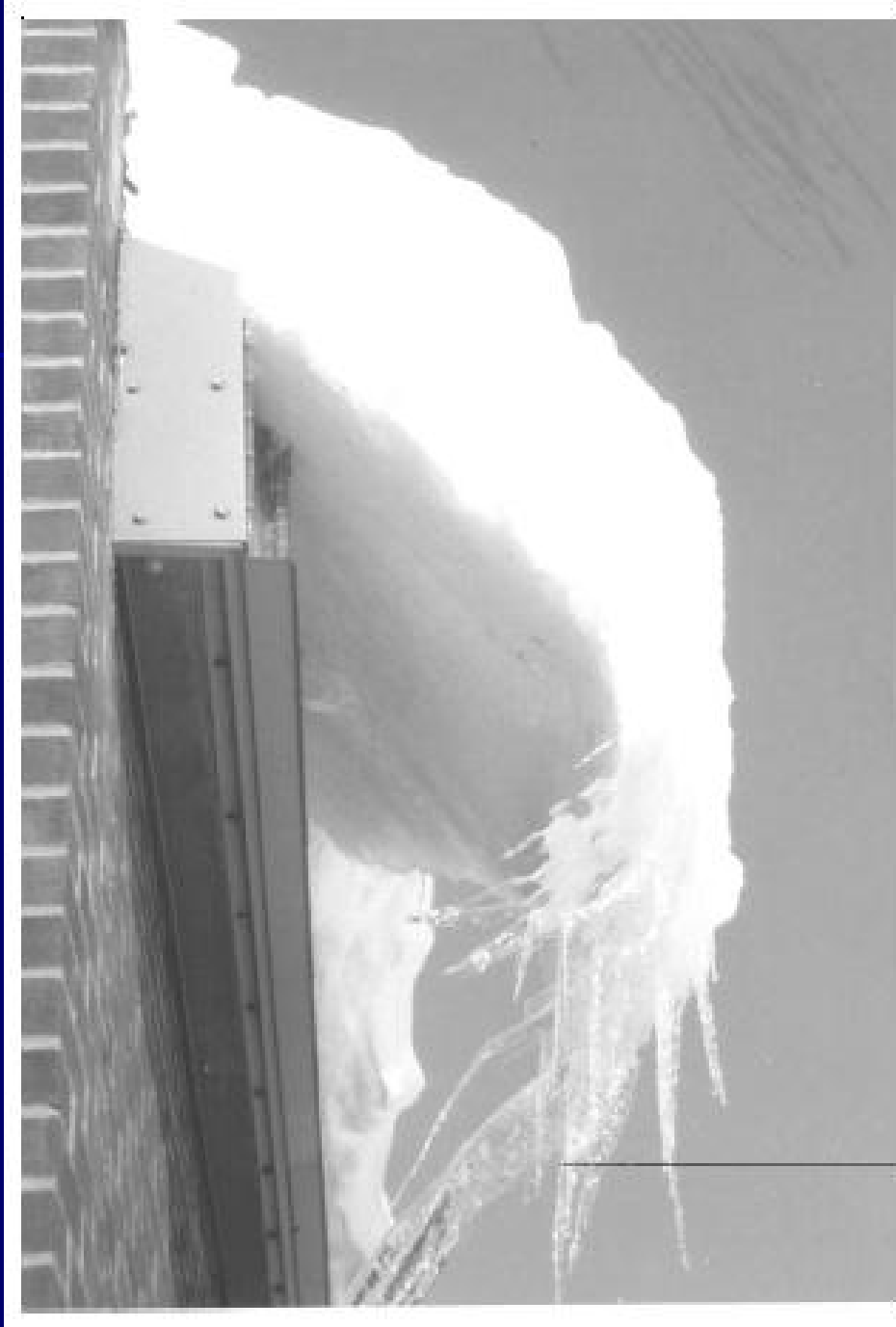
Watch out for those Existing Buildings

- The Building Code does not "*KNOW*" actual ground conditions. For instance, are you building within 20' of an existing building? Do you know of a future building that will sit beside this one?
- Existing or Future building dimensions must be clearly defined for purposes of determining Code Required snow Drift and Unbalanced loads



New Building placed beside Existing w/o re-engineering







Snow Guards (Not By VP)





Snow Guards

"Obstructed Roof"

Loading for Entire Building

Building Code | Live Load | Wind Load | Snow Load | Seismic | Deflection Conditions | Reference Values | Notes

Ground Snow psf

Calculated Sloped Roof Snow psf

Specified Min. Roof Snow psf

Miscellaneous

Snow Exposure

Thermal Factor

Unobstructed, Slippery Roof

Rain Surcharge

OK Cancel Apply Help



Without Snow Guards



With Snow Guards

Photo from:
<http://www.metalroofsnowguards.com/>



Snow Guards (Not By VP)





Snow-damaged Gutter





Snow Load Screen

Loading for Entire Building



Building Code | Live Load | Wind Load | Snow Load | Seismic | Deflection Conditions | Reference Values | Notes

Ground Roof Both

Ground Snow psf

Roof Snow psf

Miscellaneous

Snow Exposure

Thermal Factor

Unobstructed, Slippery Roof

Rain Surcharge

OK

Cancel

Apply

Help



Snow Load Input Screen

- For Ground Snow, input the larger of the values shown on the attached IBC Snow Map or the value shown under the Reference Values tab.
- Use the drop down menu to input Thermal Factor.

Note: If the State or County or City requires a Minimum Roof Load (this can be a Snow Load or Live load), then input the minimum into the Live Load field in VPCCommand.



Snow Load Input Screen

- Input the Snow Exposure as defined below (VPC will generate the appropriate coefficients):
 - Snow Exposure 1 – Fully Exposed
 - Snow Exposure 2 - Partial Exposed
 - Snow Exposure 3 – Sheltered

TABLE 7-2 EXPOSURE FACTOR, C_e

Terrain Category (Wind Exposure)	1 - Fully Exposed	2 - Exposure of Roof ^a Partially Exposed	3 - Sheltered
B (see Section 6.5.6)	0.9	1.0	1.2
C (see Section 6.5.6)	0.9	1.0	1.1
D (see Section 6.5.6)	0.8	0.9	1.0
Above the treeline in windswept mountainous areas.	0.7	0.8	N/A
In Alaska, in areas where trees do not exist within a 2-mile (3 km) radius of the site.	0.7	0.8	N/A

The terrain category and roof exposure condition chosen shall be representative of the anticipated conditions during the life of the structure. An exposure factor shall be determined for each roof of a structure.

^aDefinitions: Partially Exposed: All roofs except as indicated in the following text. Fully Exposed: Roofs exposed on all sides with no shelter^b afforded by terrain, higher structures, or trees. Roofs that contain several large pieces of mechanical equipment, parapets that extend above the height of the balanced snow load (h_b), or other obstructions are not in this category. Sheltered: Roofs located tight in among conifers that qualify as obstructions.

^bObstructions within a distance of $10h_o$ provide “shelter,” where h_o is the height of the obstruction above the roof level. If the only obstructions are a few deciduous trees that are leafless in winter, the “fully exposed” category shall be used. Note that these are heights above the roof. Heights used to establish the terrain category in Section 6.5.3 are heights above the ground.



Washington D.C. February 2010
(the following is not a VP building)





Washington D.C. February 2010
(the following is not a VP building)





Washington D.C. February 2010





Washington D.C. February 2010





Washington D.C. February 2010





Washington D.C. February 2010





Washington D.C. February 2010





Washington D.C. February 2010





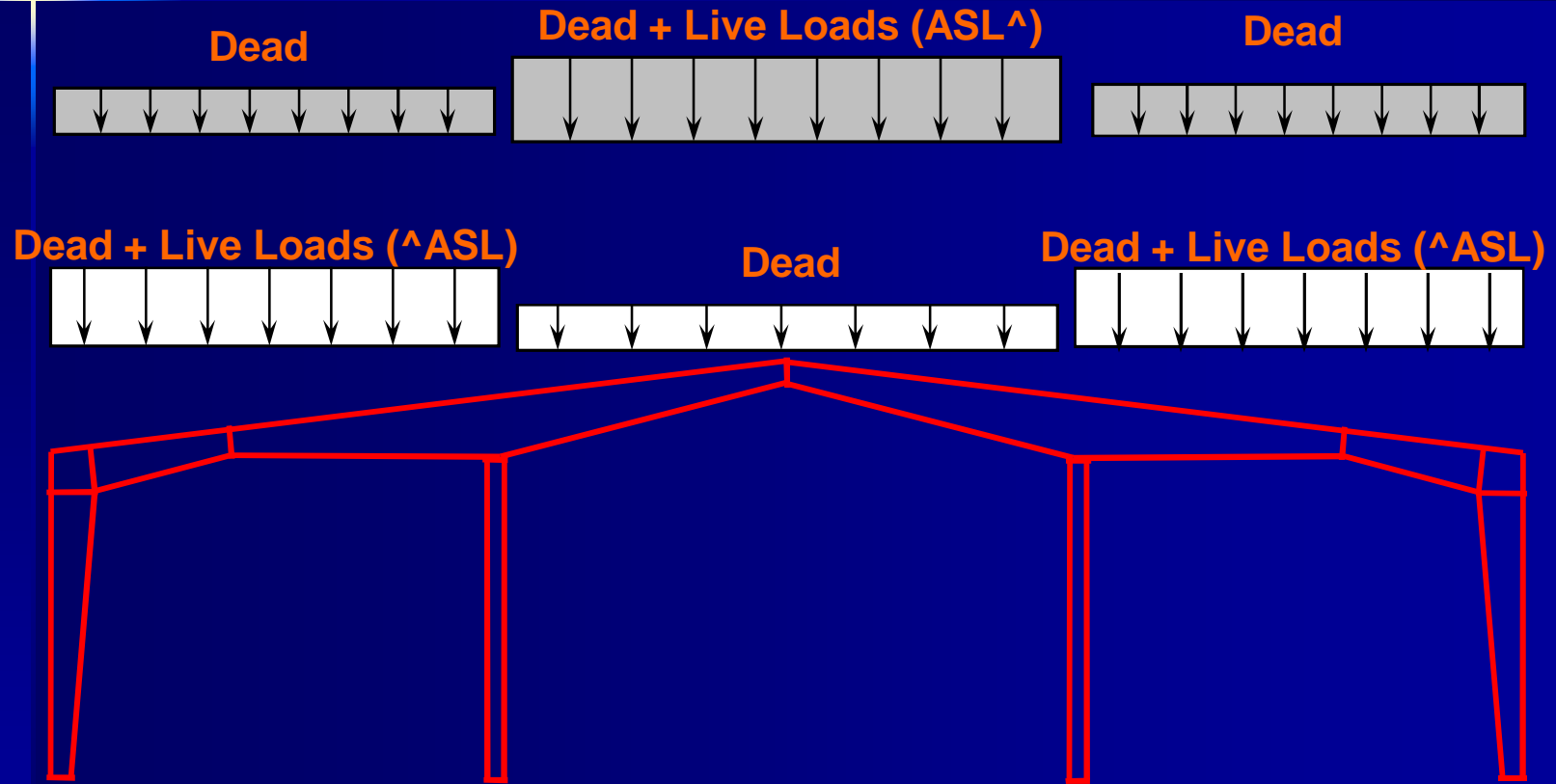
Washington D.C. February 2010





Alternate Span Live Loading

Continuous Rafter Loading Only

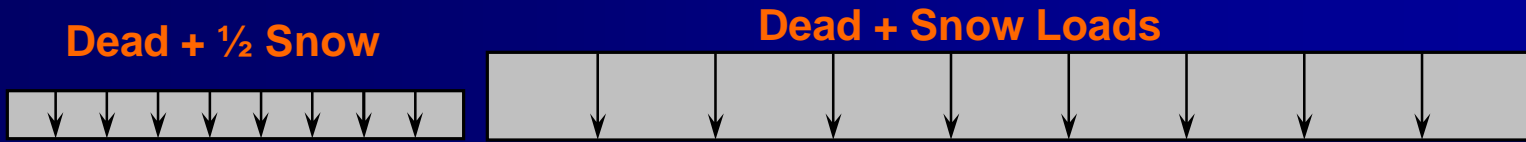




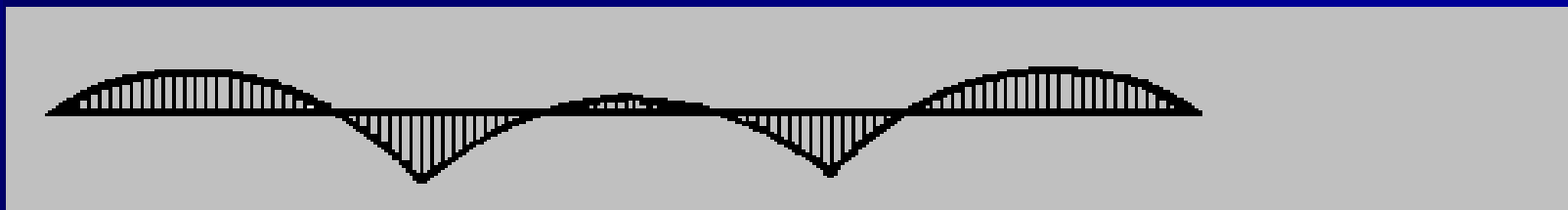
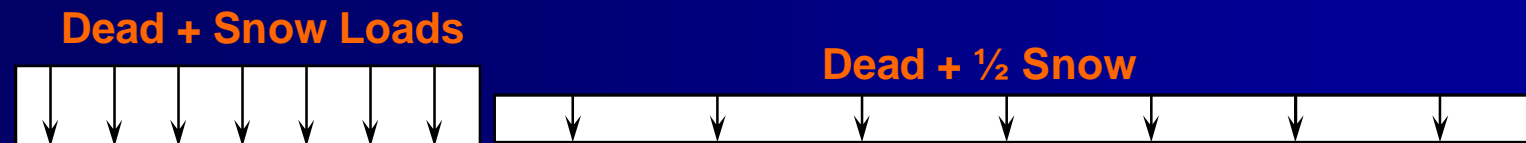
Partial Span Snow Loading

Continuous Secondary Only

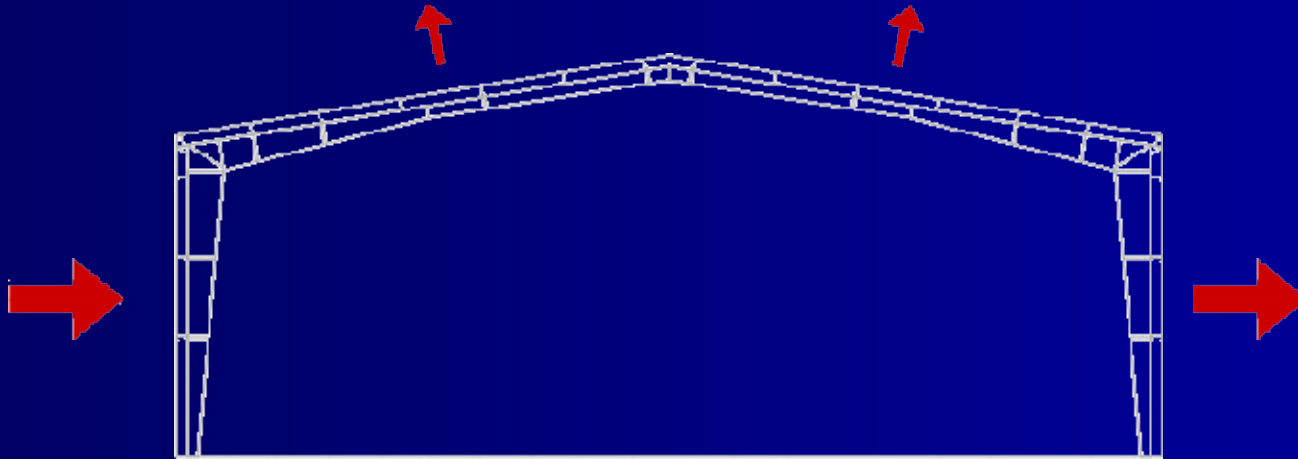
Case 1
(PH1)



Case 2
(PF1)



Load Types

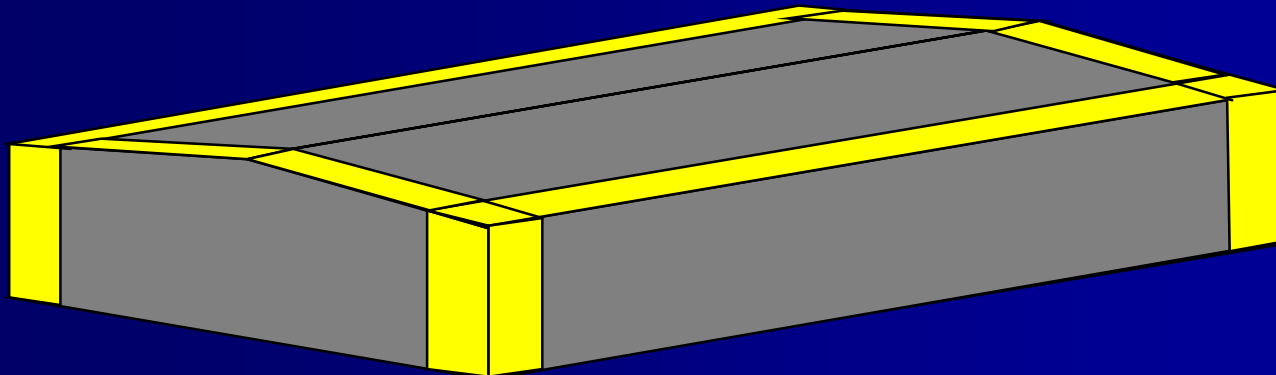


Wind Load = Wind pressure and suction

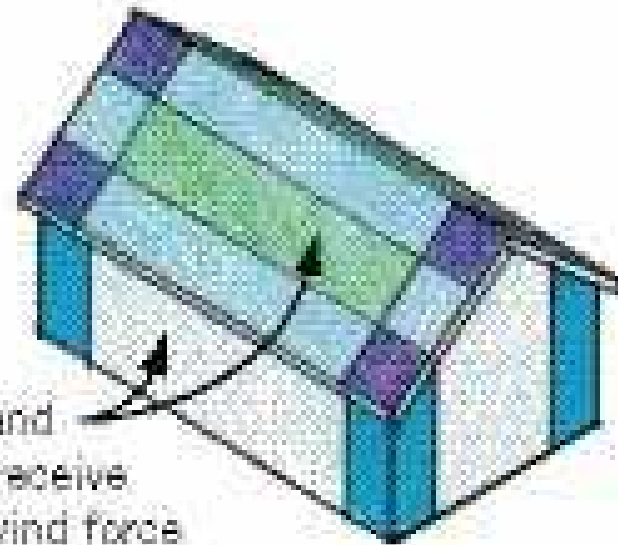


Wind Loads

Wind pressure has a greater effect on the "EDGE ZONES" of the building.

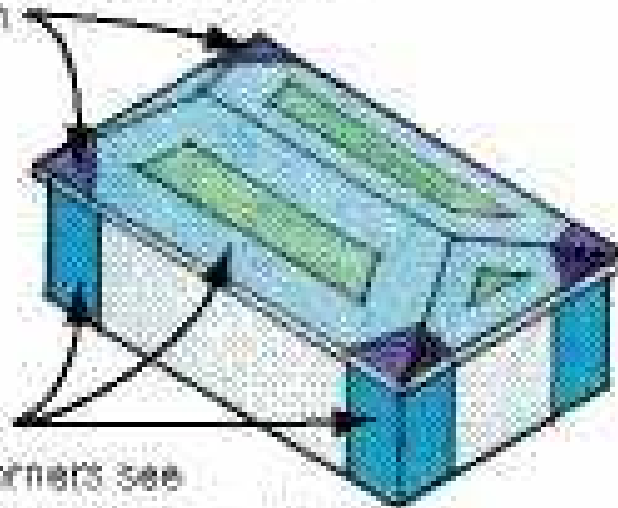


Wind Load is normally expressed in miles per hour



Main roof and wall areas receive moderate wind force

Hip and gable end corners experience the most extreme wind action



Roof edges and wall corners see increased pressure or suction



Wind Exposure

- Wind loads are rated according to the building's EXPOSURE to wind.



Wind Exposure "D"

- Represents Flat, unobstructed areas exposed to wind flowing over open water (excluding shore-lines in hurricane prone regions) for a distance of at least 1 mi.
- Exposure "D" produces the most severe wind loading and therefore, the most costly (\$\$) building design of all exposures. Verify with Local Building Official that this is truly required.
- Shorelines in Exposure D include inland waterways, the Great Lakes and coastal areas of California, Oregon, Washington and Alaska.



Wind Exposure "D" \$\$\$





Wind Exposure "C"

- Represents Open terrain with scattered obstructions having heights generally less than 30 ft.
- This category includes flat open country, grasslands and shorelines in hurricane prone regions.
- Exposure "C" produces the 2nd most severe wind loading and is a more costly requirement than Exposure "B". Verify with Local Building Official whether Exposure "B" would not be acceptable



Wind Exposure "C"

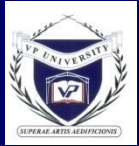
\$\$





Wind Exposure "B"

- Represents Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.
- Most areas in the US may qualify for Exposure "B" wind loading. Verify with Local Building Official and use Exposure "B" when applicable to produce most cost (\$\$) effective designs.



Wind Exposure "B"

\$





When the Wind "blows harder" than the Code Specified



Wind loads (suction) are higher in the Side and Corner Zones



09.30.2004



Wind Load Screen

Loading for Entire Building



Building Code | Live Load | **Wind Load** | Snow Load | Seismic | Deflection Conditions | Reference Values | Notes

Wind Load mph Speed Pressure

Wind Exposure Use 'All Heights' Method

Wind Enclosure

Distance to Coast Miles Hurricane Prone Region

Building Base Elev. ft Windborne Debris Region

Topographic Factor All ext. doors, windows, skylights, etc. are designed with impact resistant covering and for the Code prescribed wind forces.

Step Height

Regional Information

Temp Correction Typhoon Normal

OK

Cancel

Apply

Help



Wind Load Screen Input

- The Wind load in miles per hour.
- Determine what the building Wind Exposure is. The typical definitions are B, C or D with the least cost impact derived from "B" (= \$) and the most from "D" (=\$\$\$).
- Determine the Wind Enclosure per the attached definitions. The most severe designs result from Partially Enclosed buildings.
- Enter 1 for Topographic Factor if the building is located in a flat area. Contact a VP Engineer for the appropriate factor if the building is sitting on or near a hill, ridge, or escarpment.

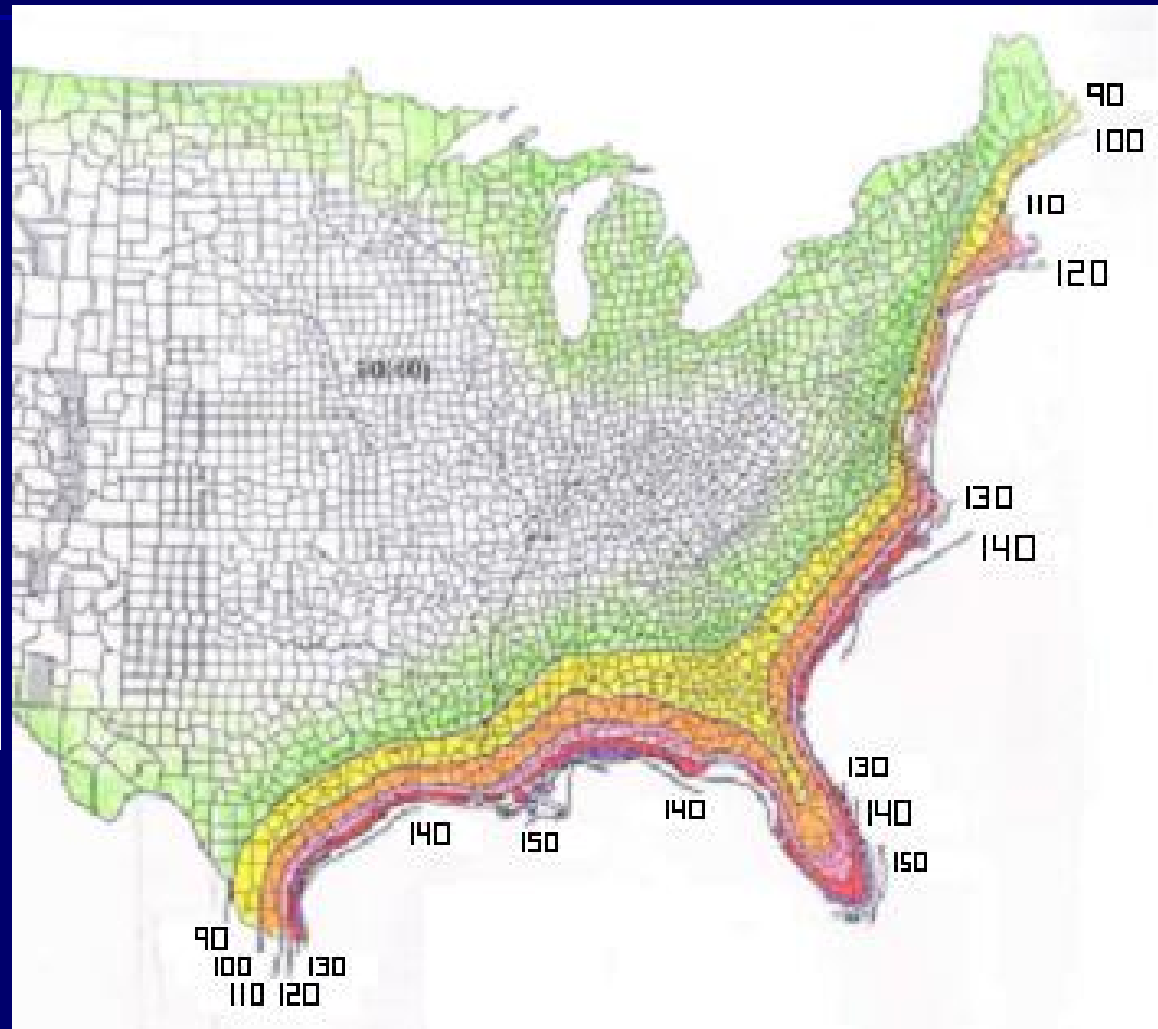
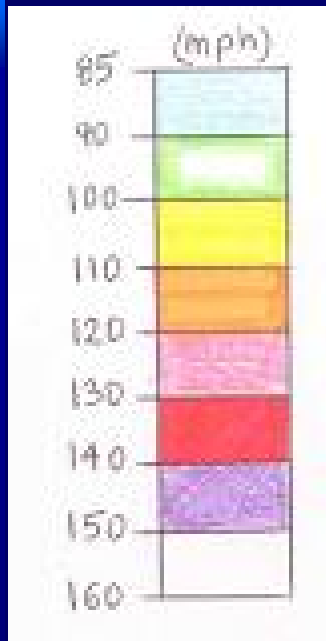


Wind Load Screen Input

- If the building is located on the Atlantic Ocean or Gulf of Mexico, and the basic wind load is greater than 90 mph, then you are in a Hurricane Prone region.
- Wind-borne Debris Regions: areas within Hurricane Prone Regions located within 1 mile of the coastal mean high water line where wind speed ≥ 110 mph and in Hawaii
- Wind-borne Debris Regions: areas within Hurricane Prone Regions when the wind speed ≥ 120 mph
- Glazing in Wind-borne Debris Regions shall be impact resisting or be covered by impact resisting material per ASTM or other approved test methods



Wind Map (IBC-ASCE 7)





Wind Enclosure

- Open – Each wall having at least 80% open
- Partially Enclosed (PENC)
 - Total area of openings in a wall exceeds the sum of the areas of openings in the balance of the building envelope by more than 10%
 - Percentage of openings in the balance of the building envelope does not exceed 20%.
- Enclosed – Buildings not Open or PENC
- Consult with VP's Estimating Department if there are permanent openings (exposed to wind) in your walls or roofs.



Wind Enclosure

Loads and Codes / Wind Load – Wind Enclosure: Three new wind enclosures were added to VPCCommand.

The Free Roof options use coefficients from ASCE7-05 figures 6-18A and 6-18B for the main wind force resisting parts of the structure and figures 6-19A and 6-19B for component and cladding. Load and design of troughed free roofs ASCE7-05 figures 6-18C, 6-18D, and 6-19C are not included at this time.

- Free Roof – Clear
- Free Roof – Clear/Obstructed
- Open – All Heights Method

Free Roof – Clear option will only use the “Clear Wind Flow” coefficients from the referenced figures

Free Roof – Clear/Obstructed will use a combination of “Clear Wind Flow” and “Obstructed Wind Flow” coefficients in order to produce the worst case of the 2 coefficients.

A building is considered **OBSTRUCTED** and should use the Clear/Obstructed option when more than 50% of the open walls will be obstructed with objects inside the building. If less than a 50% obstruction will be caused by objects inside the building the Clear option should be used.

Building Enclosure

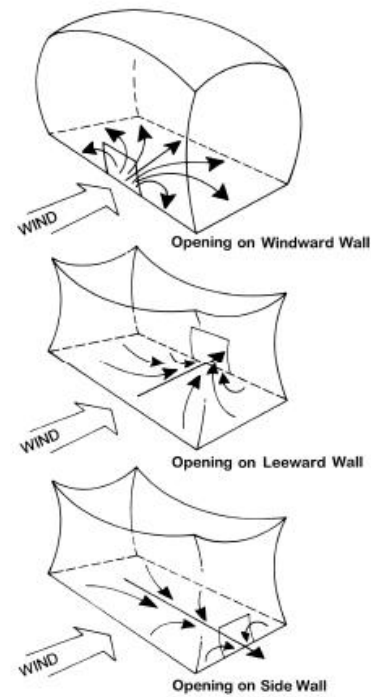


Figure 7.2.3(b)
Influences of Openings on Internal Pressure

Wind Speed - Height

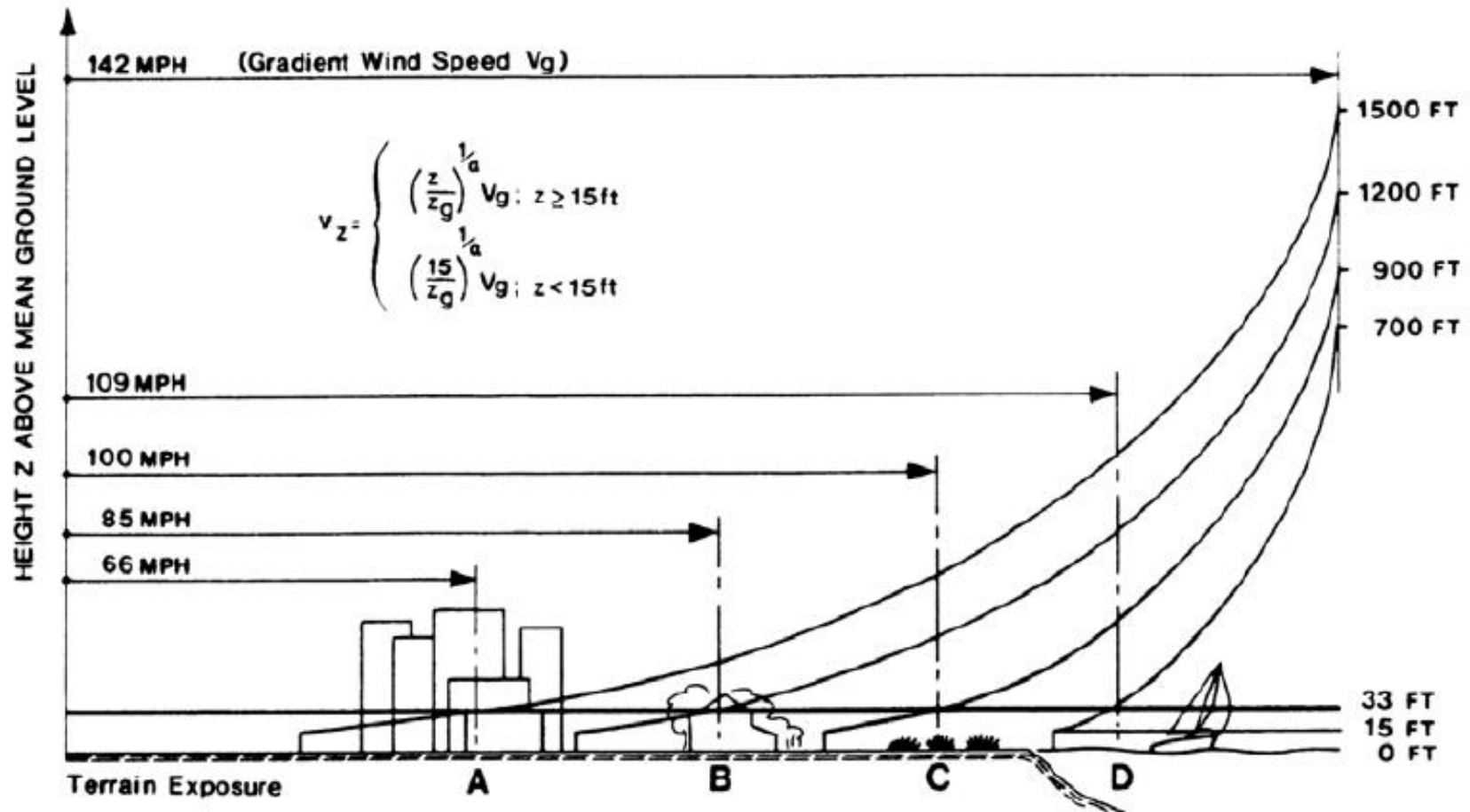


Figure A7.2.1(a)
Mean Wind Speed Variation With Height



Wind Enclosure

Loading for Entire Building

Building Code | Live Load | **Wind Load** | Snow Load | Seismic | Deflection Conditions | Reference Values | Notes

Wind Load: mph Speed Pressure

Wind Exposure: Use 'All Heights' Method

Wind Enclosure: Hurricane Prone Region

Distance to Coast: _____ Windborne Debris Region

Building Base Elev.: _____

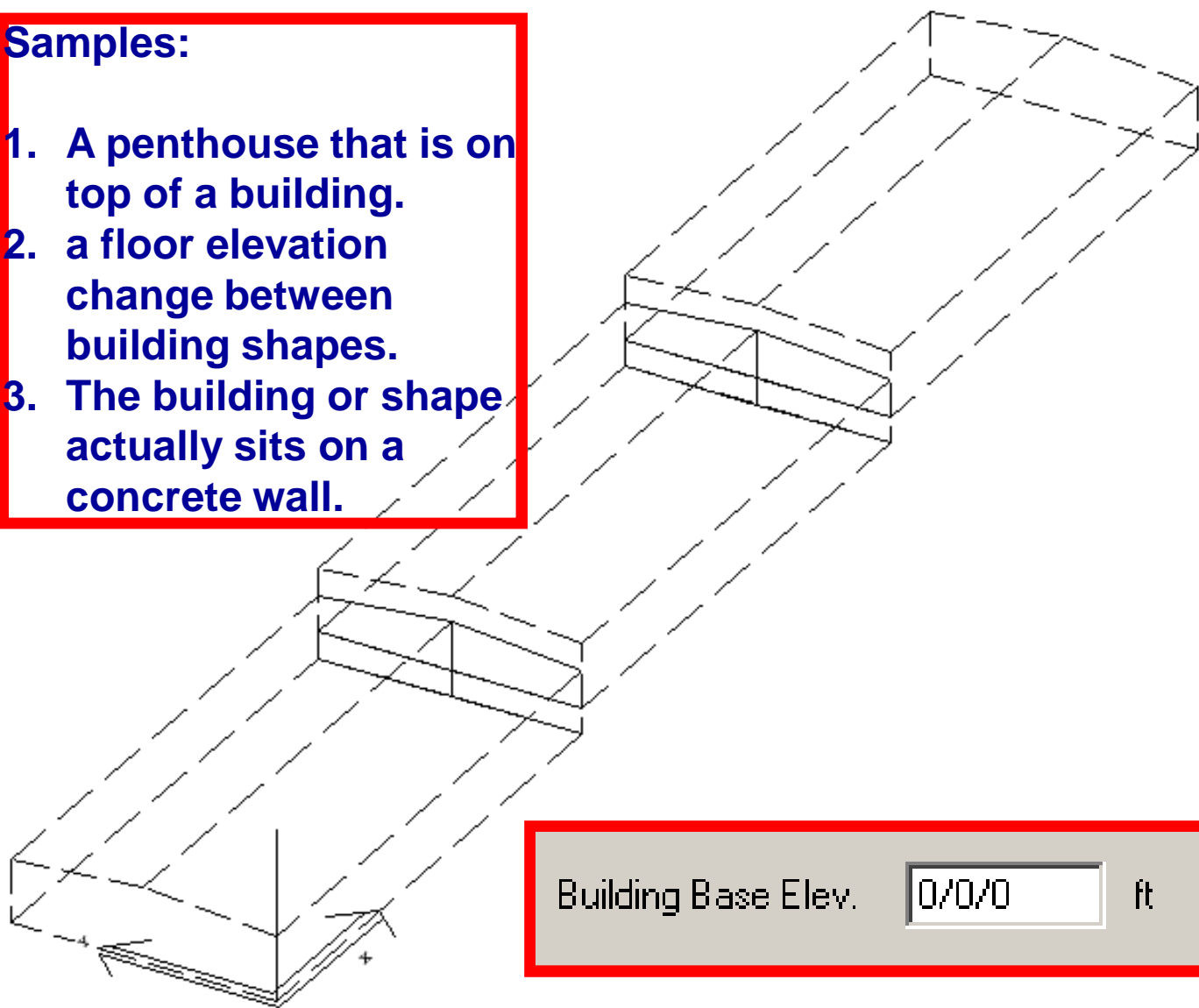
Enclosure Options:
Enclosed
Partially Enclosed
Free Roof - Clear
Free Roof - Clear/Obst
Open - All Heights Meth



Building Base Elevation Change

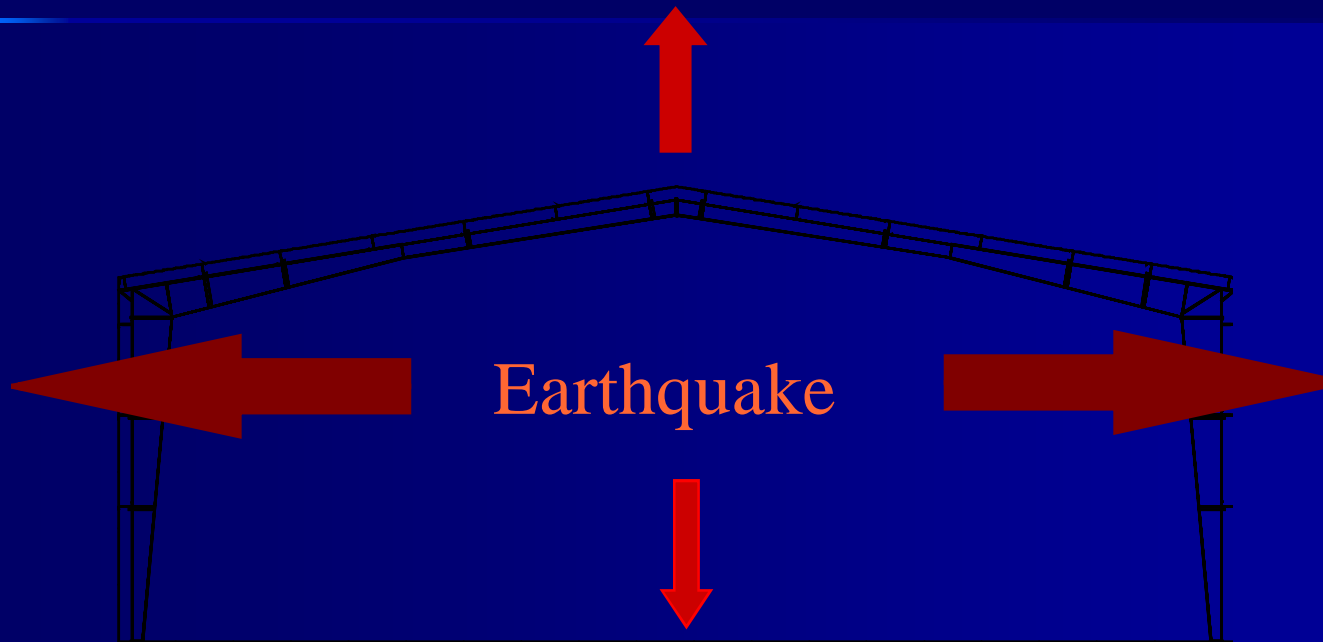
Samples:

1. A penthouse that is on top of a building.
2. a floor elevation change between building shapes.
3. The building or shape actually sits on a concrete wall.



Building Base Elev. ft

Load Types



Seismic Load = Horizontal & Vertical loads due to earthquake



Seismic

- Two site specific parameters called S_s and S_1 are required to determine the seismic loading on a building.
 S_s – is the chance that the building will be subject to a seismic event
 S_1 – is the height of the ground motion caused by the seismic event
- These values are determined by the US Geological Society



Seismic

- CAUTION: S_s and S_1 values may vary significantly within a given zip code, so it's recommended that you use the site coordinates (Longitude/Latitude) to determine S_s and S_1 more precisely.
- One way to determine site coordinates is to use Google/Maps/ web site, enter the job site address, or if not available, one that's close by. Click on Search Maps, then zoom and center the actual job site on the map. Now click on "Link to this Page" and locate the coordinates in the address bar of your browser.



Seismic

The screenshot shows a Windows Internet Explorer browser window displaying the USGS website. The address bar shows the URL <http://earthquake.usgs.gov/research/hazmaps/design/index.php>. The page features the USGS logo and navigation links. The main content area is titled "Seismic Design Values for Buildings" and includes a section for "Earthquake Ground Motion Parameter Java Application". A note indicates that the application requires Java(TM) Runtime Environment version 1.5.0 or higher. A link for "Java Ground Motion Parameter Calculator - Version 5.0.8 (4.6 MB)" is provided. The page also includes a sidebar with various navigation options and a footer with "Local intranet | Protected Mode: Off" and a zoom level of 100%.

Seismic Design Values for Buildings - Windows Internet Explorer

<http://earthquake.usgs.gov/research/hazmaps/design/index.php>

Seismic Design Values for Buildings

USGS
science for a changing world

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Earthquake Hazards Program

Home | **Earthquake Center** | Regional Information | About Earthquakes | **Research & Monitoring** | Other Resources

You are here: [Home](#) » [Research & Monitoring](#) » [Seismic Hazard Mapping](#)

NSHM Home

Products and Data

Seismic Design Values for Buildings

Custom Mapping Analysis Tools

Quaternary Faults

Urban Maps

Earthquake Hazards 101

Scenario Maps

Time-Dependent Maps

Project Information and News

Related Links

NSHM FAQ

NSHM Site Map

7 Site Index

Seismic Design Values for Buildings

Earthquake Ground Motion Parameter Java Application

The Java Application includes hazard curves, uniform hazard response spectra, and design parameters for sites in the 50 states of the United States, Puerto Rico, and the U.S. Virgin Islands. Design parameters are also available for Guam and American Samoa. Parameters are searchable by zip code or latitude and longitude, can be graphed, saved, and printed for later use.

Note: The Ground Motion Parameter Calculator is a Java(TM) Application and requires the [Java\(TM\) Runtime Environment version 1.5.0 or higher](#). This application also requires an active internet connection to retrieve data from our servers.

[Java Ground Motion Parameter Calculator - Version 5.0.8 \(4.6 MB\)](#)

Please read our [Frequently Asked Questions](#) for answers to common problems.

Ground motion parameters available in the new application

Local intranet | Protected Mode: Off | 100%



Seismic Calculator

Seismic Hazard Curves and Uniform Hazard Response Spectra

File Help

Step 1

Select Analysis Option: **International Building Code** Description

Region and DataSet Selection

Step 2

Geographic Region: **Conterminous 48 States**

Step 3

Data Edition: **2006 International Building Code**

Select Site Location

Step 4

Lat-Lon (Recommended) Zip-Code

Latitude (Degrees): **35.062294** Longitude (Degree): **-89.791753**

(24.7,50.0) (-125.0,-65.0)

Basic Parameters

Step 5

Ground Motion: **MCE Ground Motion**

Calculate Ss & S1 Calculate SM & SD Values

Response Spectra

Map Spectrum Site Modified Spectrum
Design Spectrum View Spectra

Output for All Calculations

Conterminous 48 States
2006 International Building Code
Latitude = 35.062294
Longitude = -89.791753
Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0
Data are based on a 0.01 deg grid spacing

Period (sec)	Sa (g)	
0.2	0.992	Ss, Site Class B — Ss = 99.2
1.0	0.276	S1, Site Class B — S1 = 27.6

View Maps Clear Data

Available Code Options:

- 2006 International Building Code
- 2004 International Building Code - Supplement
- 2003 International Building Code
- 2000 International Building Code



Seismic - Site Coordinates

Address <http://www.google.com/maps?hl=en&tab=wl&q=>

Google Maps

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3200 Players Club Circle, Memphis, TN

Search Maps

Search the map Find businesses Get directions

Maps

Did you mean: [3200 Player's Club Circle, Memphis, TN](#)

Print Email **Link to this page**

Map Satellite Hybrid

50 200

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Address [om/maps?f=q&hl=en&q=3200+Players+Club+Circle,+Memphis,+TN&ie=UTF8&z=17&ll=35.063031,-89.792612&spn=0.002002,0.007446&om=0](http://www.google.com/maps?f=q&hl=en&q=3200+Players+Club+Circle,+Memphis,+TN&ie=UTF8&z=17&ll=35.063031,-89.792612&spn=0.002002,0.007446&om=0)



S_s Always Larger

Loading for Entire Building

Building Code | Live Load | Wind Load | Snow Load | **Seismic** | Deflection Conditions | Reference Values | Notes

Seismic Zone: Zone 0
Hazard / Use Group: Group 1
Soil Profile: Stiff soil (D, 4)
Seismic Source: Other than A and C
Distance to the Source: 0.00 km

Spectral Response Accelerations (Ss): 99.2000 %
(S1): 27.6000 %

Velocity-Related Acceleration (Av): 33.0000
Acceleration (Aa): 66.0000
Velocity-Related Zone (Zv): 2
Acceleration-Related Zone (Za): 2
Zonal Velocity Ratio (v): 0.00

Reliability / Redundancy Factor
Frames: 1.3000 Bracing: 1.3000
Acceleration Ratio
Frames: 0.2085 Bracing: 0.2245

Percent of Snow Load Included With Seismic Loading: 0.0000
Estimated Frame Weight: 2.5000 psf

System Derived

OK Cancel Apply Help



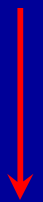
Soil Profile

- A classification assigned to a site based on the types of soil present and their engineering properties
- Applies to the upper 100 ft. of the soil

Site Class	Description
A	Hard rock
B	Rock
C	Very dense soil or soft rock
D	Stiff soil
E	Soil
F	Vulnerable soils (clays...)

VPC Default

\$



\$\$\$

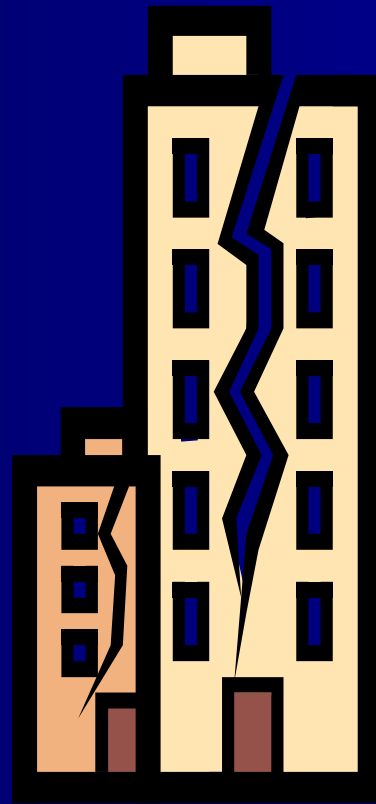


Soil Profile

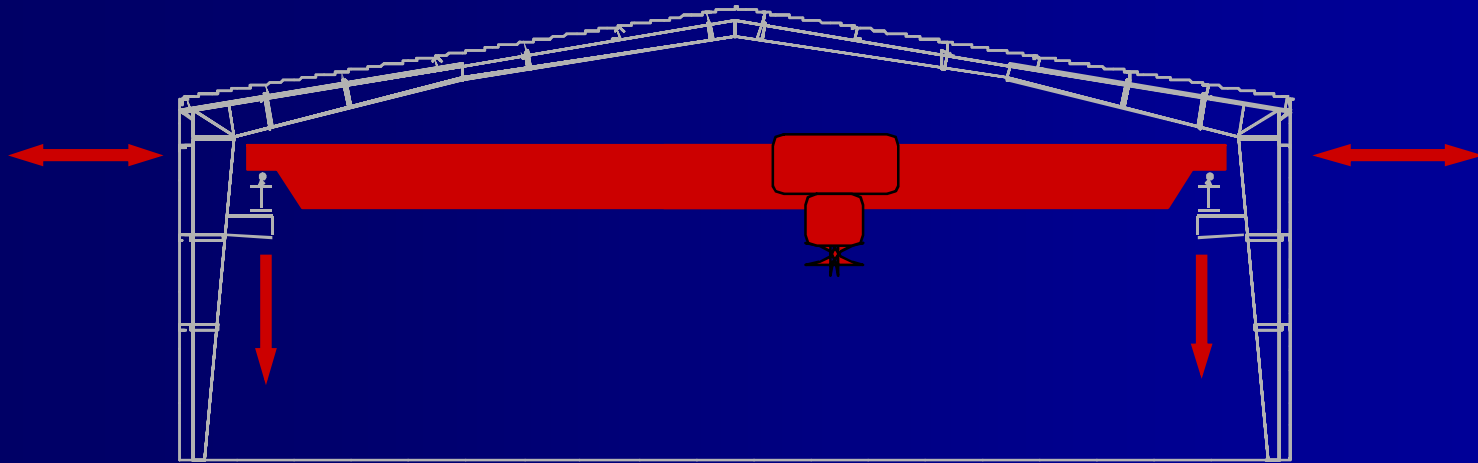
- Seismic loading can be significantly impacted by the selection of soil type.
- Major projects usually have soils reports.
- Engineer of Record should be pressed for accurate information for these projects.

Seismic

- Pay special attention to the weight of your materials (masonry walls in particular).

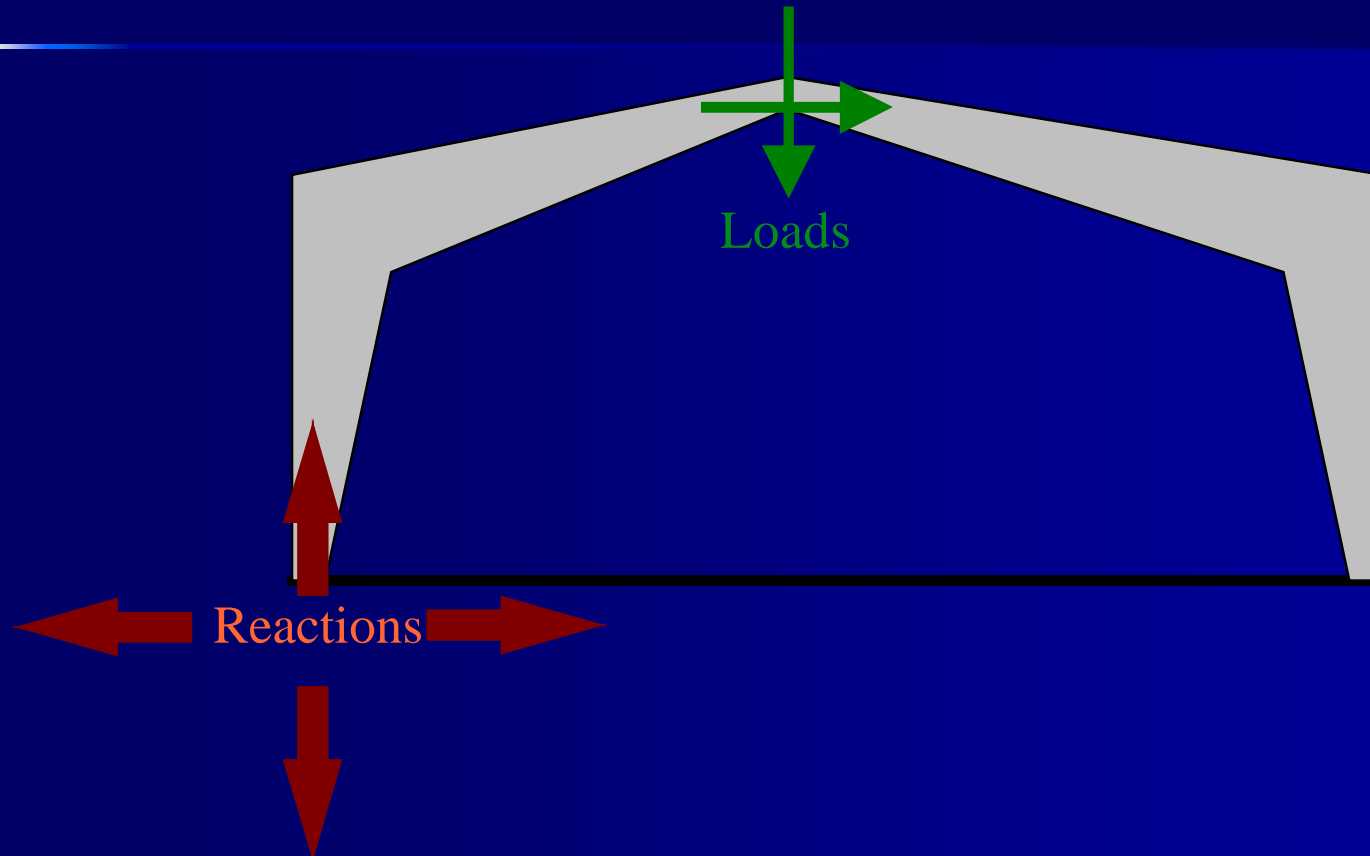


Load Types



Auxiliary Live Load = Dynamic loads

Loads to the Foundation



Loads In = Reactions Out

