Wind Load Design Criteria 3.0

Wind Loads Design Criteria 3.0 is produced and distributed by Engineer Educators, Inc. and is based on information contained in the 5th Edition of the Florida Building Code (2014), effective June 30, 2015 and the ASCE Standard 7-10.

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Preface

The original Wind Load Design Criteria course was published by Engineer Educators, Inc. in 2003. It was based on provisions for wind load design contained in the 2001 Edition of the Florida Building Code and the ASCE Standard 7-98. In 2005, the course was revised to reflect changes made by the 2004 Edition of the Florida Building Code and the ASCE Standard 7-02, some of which were significant.

In April 2009, this course was revised to incorporate revisions made by the 2007 Edition of the Florida building Code, which became effective march 1, 2009, and the ASCE Standard 7-05. Significant changes included the elimination of the simplified procedure for determining wind loads previously allowed under the Florida Building Code and the modification of the wind-borne debris region in the Florida panhandle.

In April 2012 this course was revised to cover provisions for wind load design criteria contained in the 2010 Edition of the Florida Building Code. These revisions contained provisions for wind loads stipulated in the 2010 Edition of the Florida Building Code, which became effective March 15, 2012 and the ASCE Standard 7-10. Significant changes include the following:

1. The wind load provisions in Chapter 6 of ASCE 7-05 have been reorganized into six chapters in ASCE 7-10 to enhance their presentation by locating major subject areas as distinct chapters.
2. Ultimate design wind speeds are selected based on risk category (occupancy) of the building or structure.
3. The use of the Importance Factor (I) has been eliminated from the calculation of design wind pressures.
4. The Florida Building Code permits the use of an "alternate all-heights method" to determine the wind effects on regularly shaped buildings or structures. This is an alternative to Chapters 27 and 30 of ASCE 7-10 and is described in Section 1609.6 of the Florida building Code.

There were no substantive changes to Section 1609, "Wind Loads" in the 2014 Edition of the Florida Building Code, which became effective on June 30, 2015. Accordingly, this course remains unchanged from that of the courses published on May 15, 2012.

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Preface

I. Background

A. **Purpose.** The purpose of this course is to familiarize practitioners with the design parameters for wind loads that are applicable to the methodologies permitted in the Florida Building Code, Section 1609.

B. **History.** Past major storm events throughout the state have caused damage of varying degrees to structures of all types. While many reasons can be cited for the partial or total structural failures which have occurred, the following major weaknesses have been noted:

1. A major portion of the damage to buildings occurred due to weaknesses in windows, doors (particularly garage doors), curtain walls and cladding.

2. Structural components such as anchors, ties, bracing, connections of all types, and other types of fasteners were not adequate.

3. Structures were built without adequate plans and specifications and not under the responsible charge of qualified licensed professionals.

4. Field inspections during construction have been inadequate.

5. In some cases building codes and standards have been weak and not commensurate with the storm events which may be expected to occur.

There are two main elements which comprise a building envelope. They are:

1. Main Wind Force Resisting System (MWFRS). The structural elements necessary to provide support and stability for the overall structure. The MWFRS consists of foundations, columns, beams, trusses, bracing, walls and diaphragms that will resist all applied loads and transfer these forces into the ground. This system usually receives wind loading on more than one surface of the structure.

2. Components and Cladding (C&C). These are elements of the building envelope that do not qualify as part of the MWFRS such as windows, doors, curtain walls or siding, roof sheathing and coverings, soffits and overhangs, and building attachments.

When assessing the cause of structural failures, the element which failed (either MWFRS or C&C or both) should be identified.

With the adoption of the 2010 Florida Building Code, and previous 2001, 2004 and 2007 versions, change has occurred with regard to the design, construction, and inspection of buildings now being built. These changes include:

1.   Building officials and plan reviewers are looking for more information on the plans and in the specifications. In many cases, calculations are being requested from the designer to substantiate structural details shown on the plans.

2.   Field inspectors are requiring more information/detail.

3.   The building industry is becoming more compliance oriented.

II. Characteristics of Hurricanes

A. **General**. Hurricanes consist of high-velocity winds blowing, in the northern hemisphere, counter-clockwise around a low-pressure center, known as the eye of the storm. Wind and atmospheric pressures will vary depending on the strength of the storms, which are rated on a scale of from 1 to 5 (Safir-Simpson Hurricane Scale). A Category 1 hurricane has winds of at least 74 mph while a Category 5 has winds that exceed 155 mph. In the northern hemisphere hurricanes generally move from east to west in the lower latitudes at speeds ranging, generally, from 5 to 35 mph depending on the latitude. These are the storms that affect Florida and the east coast of the United States. However, hurricanes which form in the Gulf of Mexico out of low pressure areas may move westerly, northerly or even northeasterly, approaching Florida from the Gulf coast. Thus, it is evident that Florida is vulnerable to hurricanes approaching from almost any direction.

Hurricane effects include:
- Increased and sustained wind speeds
- Wind gusts that may greatly exceed the sustained wind speed
- Slowly changing wind direction
- Creation of wind-borne debris
- Storm surge along coastlines
- High waves in the open ocean
- Extensive rainfall
- Atmospheric pressure changes
- Tornadoes

Building designs for high wind areas must consider the following elements:

- Main Wind Force Resisting System
- Components and Cladding
- Internal pressures as a result of entry of wind into the building
- Wind-borne debris impacts

The designs should consider wind acting on the structure from any direction as a result of the constantly changing relationship between the structure and the center or "eye" of the approaching (or departing) storm. Obviously, slow-moving hurricanes will result in wind forces on a structure for a greater duration of time.

B. **Records**. There are approximately 125 years of historical records for hurricanes including occurrence, track, intensity, and other properties. Using this data, computer models have been programmed to generate several thousand years of artificial hurricane records that replicate statistically these historic tracks and other hurricane properties. This approach was used to develop the hurricane wind speed contours

depicted on the American Society of Civil Engineers (ASCE) Basic Wind Speed Maps which are shown in this course material

Variations in wind speeds will occur by height (elevation) and exposure categories as discussed in a subsequent chapter of this course.

Data has also been developed to reflect frequency-recurrence intervals of storm events and hurricane occurrence probabilities at selected geographic locations. This data is sometimes used by financial institutions and the insurance industry to assess risks.

The Florida Legislature adopted a modified ASCE Figure 6-1B Basic Wind Speeds as found in the Florida Building Code, Figure 1609, "State of Florida Wind Borne Debris Region and Basic Wind Speed." In addition to delineating wind borne debris regions, the modification increased the wind velocity to be used in structural calculations to 140 miles per hour in Broward County and 146 miles per hour in Miami-Dade County. Figure 1609 is also shown in Chapter IX.

The 2010 Florida Building Code contains the following definitions:

Hurricane-Prone Regions. Areas vulnerable to hurricanes defined as:
1. The U.S. Atlantic Ocean and Gulf of Mexico coast where the basic wind speed for Risk Category II buildings greater than 115 mph and
2. Hawaii, Puerto Rico, Guam, Virgin Islands and American Samoa.

Wind-Borne Debris Region. Areas within *hurricane-prone regions* located:
1. Within 1 mile of the coastal mean high water line where the ultimate design wind speed V_{ult} is 130 mph or greater; or
2. In areas where the ultimate design wind speed V_{ult} is 140 mph or greater.

For Risk Category II buildings and structures and Risk Category III building and structures, except health care facilities, the wind borne debris region shall be based on Figure 1609 A. For Risk Category IV buildings and structures and Risk Category III health care facilities, the wind borne debris region shall be based on Figure 1609 B.

Figures 1609 A and 1609 B are shown in Chapter IX.

III. Building and Wind Event Interactions

While there are several loads that contribute to the stresses on a structure (dead, live, impact, etc.) only wind loads are considered herein.

A. **Main Wind Force Resisting System.**

The Main Wind Force Resisting System (MWFRS) is an assemblage of structural elements which provide support and stability for the overall structure. The MWFRS consists of the building foundation, structural floor members (joists, beams, framing systems) columns, roof rafters or trusses, structural bracing, walls and diaphragms that act to transfer loads.

The MWFRS experience external pressure and forces from wind which:

- Affect building surfaces.
- Cause inward-acting pressures on windward walls.
- Cause outward-acting pressures on leeward and side walls and roof.
- May cause collapse of surface due to aerodynamic effects.

B. **Components and Cladding**

Components and Cladding include elements of the building envelope that are not considered as part of the MWFRS. Examples of component elements include fasteners, purlins, girts, studs, roof decking and roof trusses. Examples of cladding include wall coverings, curtain walls, roof coverings, exterior windows and/or doors.

In certain design scenarios, elements of components and/or cladding may be considered as part of the MWFRS.

Components and Cladding experience both general and local external pressures. The air flow separates at the sharp edges (corners, wall and roof junctions, etc.) of structures which cause high turbulence and localized high positive and negative pressures. Aerodynamic effects are complex and depend on the shape of the structure. Accordingly, components and cladding are subject to failures resulting from a variety of factors.

C. **Internal Pressures**

Internal pressures are caused by permeability in a building and/or when wind enters the building through its dominant opening. In the determination of total wind pressures, internal pressures are either additive to or subtracted from the external pressures. The

magnitude of internal pressure depend on whether the building is open, partially enclosed or enclosed according to the following definitions in ASCE 7-10:

1. **Open building:** A building having each wall at least 80% open. An example would be a rigid frame building having no side walls.

2. **Partially enclosed building:** A building which complies with both of the following conditions:

   a. The total area of openings in a wall that receives positive external pressure exceeds the sum of the areas of openings in the balance of the building envelope (walls and roof) by more than 10%, and

   b. The total area of openings in a wall that receives positive external pressure exceeds four (4) square feet or 1.0% of the area of that wall, whichever is smaller, and the percentage of openings in the balance of the building envelope does not exceed 20%

3. **Enclosed building:** A building that does not comply with the requirements for open or partially enclosed buildings.

   Other definitions pertaining to buildings and used in this course include the following:

   a. Building, low rise: Enclosed or partially enclosed buildings that comply with the following conditions:
      (1)   Mean roof height h less than or equal to 60 feet.
      (2)   Mean roof height h does not exceed least horizontal dimension.

   b. Building, simple diaphragm: A building in which both windward and leeward wind loads are transmitted by roof and vertical spanning wall assemblies, through continuous floor and roof diaphragms to the MWFRS.

      Building or other structures, regular shaped; A building or other structures having no unusual geometrical irregularity in spatial form.

D.   Summary

The effects of wind on buildings can be summarized as follows:

1. Windward walls and steep-sloped roofs are acted on by inward-acting or positive pressures.

2. Leeward walls and both steep and low-sloped roofs are acted on by outward-acting or negative pressures.

3. Air flow separates at sharp edges and at points where the building geometry changes

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4. Localized suction or negative pressures at eaves, ridges, and the corners of roofs and walls are caused by turbulence and flow separation. These pressures affect loads on components and cladding.

Wind forces must be evaluated not only for inward and outward acting pressures, but also pressures normal to and parallel to the main roof ridge. Ultimately, the wind load case that results in the greatest pressures, either positive or negative, should be used as the basis for wind-resistant designs. On complex building configurations, it might be necessary for the designer to divide the building into components to determine wind forces on each component separately and then combine the reactions to obtain the total loadings on the entire structure.

IV. Determination of Wind Forces

Figure 26. 1-1 is taken from ASCE Standard 7-10 and is an outline of the process to be followed in determining wind loads.

Chapter 26- General Requirements: Use to determine the basic parameters for determining wind loads on both the MWFRS and C&C. These basic parameters are:

Basic wind speed, V, see Figure 26.5-1A, B or C
Wind directionally factor, K_d, see Section 26.6
Exposure category, see Section 26.7
Topographic factor, K_{zt}, see Section 26.8
Gust Effect Factor, see Section 26.9
Enclosure classification, see Section 26.10
nternal pressure coefficient, (GC_{pi}), see Section 26-11

Wind Loads on the MWFRS may be determined by:

Wind Loads on the C&C may be determined by:

Chapter 27: Directional procedure for buildings of all heights

Chapter 28: Envelope procedure for low rise buildings

Chapter 29: Directional procedure for building appurtenances (roof overhangs and parapets) and other structures

Chapter 31: Wind tunnel procedure for any building or other structure

Chapter 30:
- Envelope Procedure in Parts 1 and 2 or
- Directional Procedure in Parts 3,4 and 5
- Building appurtenances (roof overhang and parapets) in Part 6

Chapter 31: Wind tunnel procedure for any building or other structure
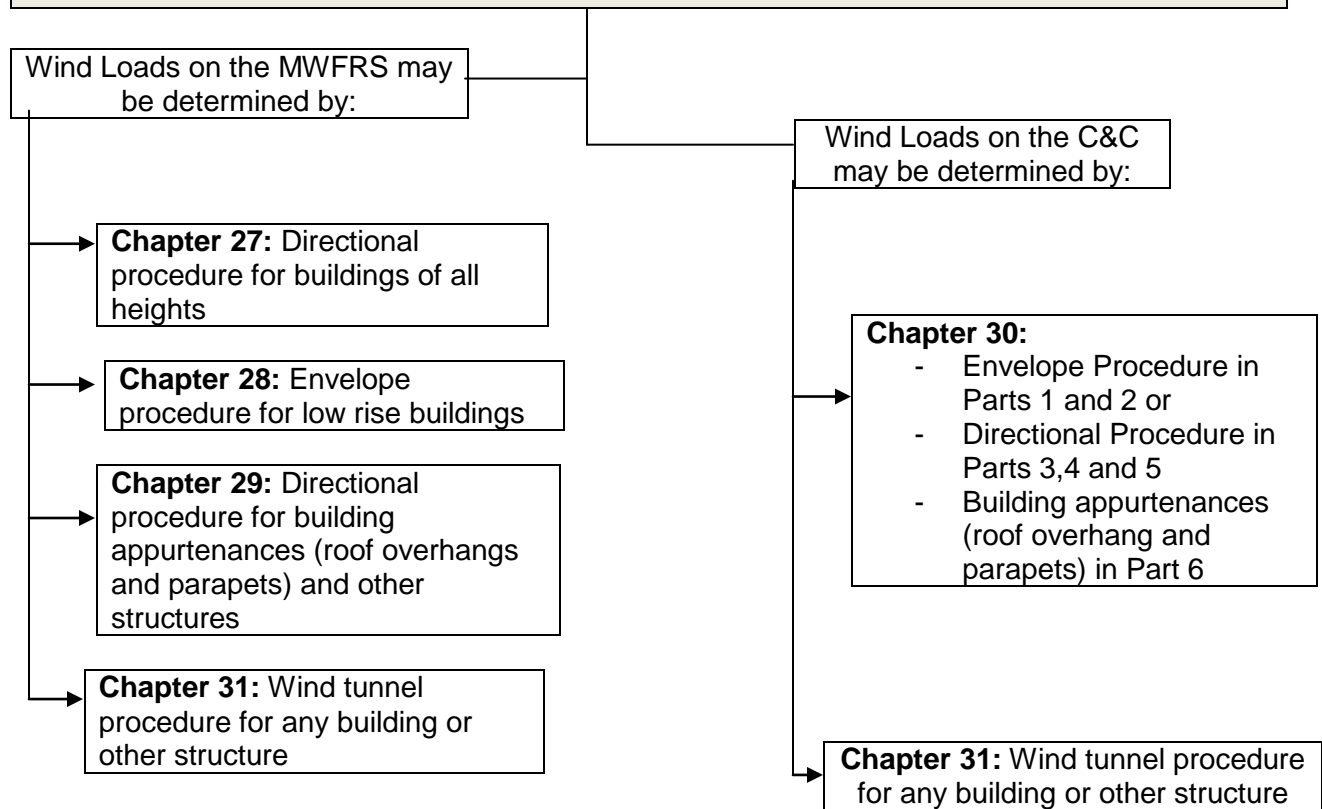
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Figure 26.1-1 Outline of Process for Determining Wind Loads

As seen from the outline, there are several elements to be considered in determining wind loads on buildings or structures. A brief discussion of the General Requirements are as follows:

A. Determine Basic Design Wind Speed

The American Society of civil Engineers (ASCE) in their standard, ASCE 7-10, "Minimum Design Loads for Buildings and other Structures", has developed Basic Wind Speed Maps (Figures 25.5-1A, 25.5-1B and 25.5-1C which are not included in the Exhibits in this course manual) for the United States, including Alaska and Hawaii and all U.S. territories. The maps are based on climatological data gathered over many years from numerous sources. Figures 1609A, 1609B, and 1609C (Section IX) are an enlarged view of the above maps and cover the state of Florida. Pursuant to the 2010 Florida Building Code, ultimate design wind speeds to determine wind forces on buildings shall be selected using these maps. When required ultimate design wind speeds shown on these maps shall be converted to nominal design wind speeds, V_{asd}, using Table 1609.3.1. The specific map to be used is determined by the risk category of the building (structure) being designed. The risk category depends on the nature of occupancy of the building and can be obtained from Table 1604.5 (Section IX). Designers should check with the Building Department in the jurisdiction in which the project lies, since many countries on the map contain more than one velocity line and, in these instances, Building Departments have adopted a single design wind speed for the entire jurisdiction.

B. Wind Directionality Factor

The wind directionality factor, K_d, shall be determined from Table 26.6-1. Note the footnote in the Table regarding application only when used in conjunction with load combinations.

C. Exposure Category

For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed.

C.1 Surface roughness categories.
A ground surface roughness within each 45-degree (0.79 rad) sector shall be determined for a distance upwind of the site as defined in C.2 from the categories defined below in the purpose of assigning an exposure category.

1. Surface Roughness B.
Urban and suburban areas, wooded areas or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.

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2. Surface Roughness C.
Open terrain with scattered obstructions having heights
generally less than 30 feet. This category includes flat open country and grasslands.
This surface roughness shall also apply to any building located within surface roughness
B-type terrain where the building in within 1000 feet horizontally in any direction of open
areas of surface roughness C or D-type terrain that extends more than 600 feet and
width greater than 150 feet in the upwind direction.

3. **Surface Roughness D.**
Flat, unobstructed areas and water surfaces. This category includes smooth mud flats,
salt flats and unbroken ice.

D. C.2 Exposure categories.
An exposure category shall be determined in accordance with the following:

1. Exposure B.
For buildings with a mean roof height of less then or equal to 30 feet. Exposure B shall
apply where the ground surface roughness as defined by Surface Roughness B prevails
in the upwind direction for a distance of at least 1,500 ft. For buildings with a mean roof
height greater than 30 ft, Exposure B shall apply where Surface Roughness B prevails in
the upwind direction for a distance of at least 2,600 feet or 20 times the height of the
building, whichever is greater.

2. Exposure C.
Exposure C shall apply for all cases where Exposure B or D do not apply.

3. Exposure D.
Exposure D shall apply where the ground surface roughness, as defined by Surface
Roughness D prevails in the upwind direction for a distance of at least 5,000feet or 20
times the height of the building, whichever is greater. Exposure D shall extend inland
from the shoreline for a distance of 600 feet or 20 times the height of the building,
whichever is greater from an Exposure D condition as defined in the previous sentence.

E. Topographical Factor

The effect on wind forces due to topographic features is discussed in Section 26.8 of
ASCE standard 7-10. The general topography in Florida does not lend itself to wind
speed-up and the effects thereof. Accordingly, K_{zt} is equal to 1.0.

F. Gust Effect Factor

Gust effects are discussed in Section 26.9 of ASCE standard 7-10. The gust-effect factor
for a rigid building or other structure is permitted to be taken as 0.85.

G. Enclosure Classification

For the purpose of determining internal pressure coefficients, all buildings shall be
classified as enclosed partially enclosed, or open as defined in Section III.C. Glazed
openings in Risk Category II, III or IV buildings located in hurricane-prone regions, and

wind-borne debris regions shall be protected with an impact-protective system or shall be impact-resistant glazing. The protection of openings is discussed in the Florida building code, Section 1609.1.2 and in ASCE standard 7-10, Section 26.10.

H. Internal Pressure Coefficient

Internal pressure coefficient (GCpi) shall be determined from Table 26.11-1 based on building enclosures classifications defined in Section 111.C.

I. Construction Documents

The Florida Building Code stipulates that the following information related to wind loads shall be shown on the construction documents, regardless of whether wind loads govern the design of the lateral-force-resisting system of the building:

1. Ultimate design wind speed V_{ult}, (3-second gust). Miles per hour and nominal design wind speed V_{asd}, as determined in accordance with Section 1609.3.1.
2. Risk category from Table 1604.5 or Table 1.5-1 of ASCE 7.
3. Wind exposure. Where more than one wind exposure is utilized, the wind exposure and applicable wind direction shall be indicated.
4. The applicable enclosure classifications and, if designing with ASCE 7, internal pressure coefficient.
5. Components and cladding, The design wind pressures in terms of psf to be used for the selection of exterior component and cladding material not specifically designed by the *registered design professional.*

V. Basic Reaction to Wind Loads

Wind loads differ from vertical/gravity loads in that they are applied horizontally on the elevation of the structure and they may come from any direction. While all applied loads must be resisted by the structure and ultimately distributed into the ground, the load path for vertical loads is more obvious than that for wind loads. In addition, connections become much more critical in the design of resistance to wind loads. They must be designed to have adequate capacity for forces coming from any direction.

The design of structures to resist lateral (wind) loads involves certain structural elements which merit definition, as follows:

Diaphragm
A horizontal or nearly horizontal system designed to transmit lateral forces to shearwalls or other vertical resisting elements.

Shearwall
A wall, load bearing or non-load bearing, designed to resist forces acting on the plane of the wall.

Base Shear
Total design lateral force at the base of the structure.

Overturning Moment
The reaction created at the base of a vertical projection as a result of a lateral force (wind) acting on the face of the projection.

These elements are shown graphically in the sketch provided below.

Diaphragm spans as thin web deep beam between shear walls

Wall Reaction at Roof

Diaphragm

N

Wall Reaction at Foundation

Shear Wall

Wind Direction

Wall spans vertically from foundation to diaphragm

Shear wall provides reaction for diaphragm
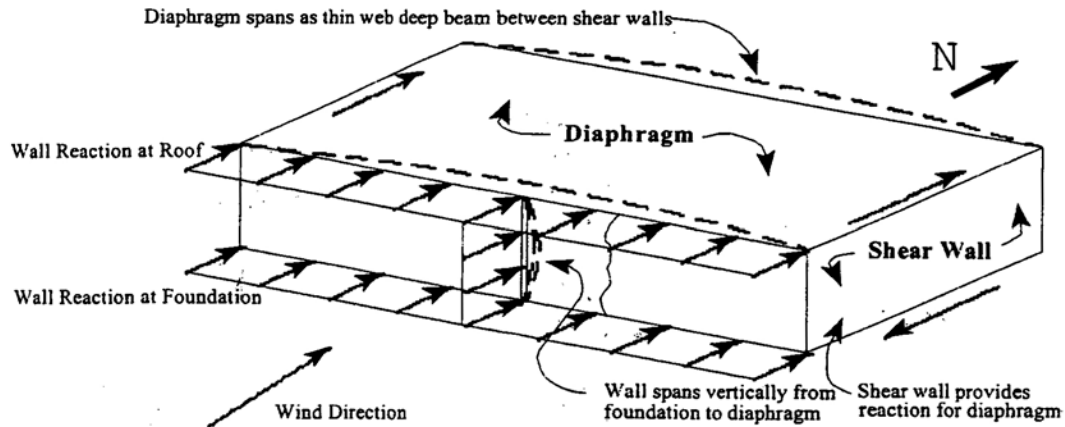
The wind, acting on the windward side of the wall, exerts a force on the wall sheathing (components and cladding) which is distributed into the vertical wall framing members (MWFRS). This force is distributed about equally into the foundation below and roof diaphragm above. Along the foundation line resistance to the wind load acting on the lower half of the wall framing members is accommodated by connections which distribute the load directly into the foundation or slab.

At the top of the wall resistance to the applied wind load is provided by the strength and stiffness of the roof diaphragm. The loads from the top of the framing members are transferred to the roof diaphragm by properly designed connections. The roof diaphragm acts like a long deep beam supported by the two walls (shear walls) parallel to the wind direction. The roof diaphragm is attached to the shear walls with fasteners of sufficient capacity to transfer the loads into the shear walls. The diaphragm reaction applied to the top of the shear walls is transferred to the bottom of the wall through shear in the plane of the wall. Like the roof diaphragm, the shear wall must have sufficient strength and stiffness to carry the applied loads to the foundation without undue deformation of the structure. Shear wall segments suitable for resisting shear are dependent upon door and window openings which break up continuity of the wall. The shear wall (or wall segments) must be tied to the foundation with connectors of sufficient capacity to resist the base shear and prevent the shear wall from sliding off the foundation under the applied wind load.

In addition to resisting the base shear, it is usually necessary to restrain the ends of each shear wall segment to resist the overturning moment. In some structures, the weight of the structure acting at the point of connection may offset the uplift force making a special connection unnecessary. Usually, however, a tension connection connecting each end of the shear wall to the foundation will be required.

Once this analysis is complete, it is necessary to redesign the structure with the wind blowing at right angles to its original position. The same procedure, as described above, should be used. While this example was for a simple box structure, the same load path and analysis applies to buildings of other shapes and roof types.

The importance of designing adequate connections between the structural elements cannot be over-emphasized. Historical wind event data has shown that most building failures have occurred as a result of improper connection design or installation.

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VI. Design Criteria

A.   **Florida Building Code (FBC)**

1. Determination of Wind Loads
   According to section 1609.1.1 FBC wind loads on every building or structure shall be determined in accordance with Chapters 26 though 30 of ASCE 7 or the provisions of the alternate all heights method in Section 1609.6, which in discussed in Section VIII. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.

   There are several exceptions to Section 1609.1.1 as follows:
   a. Subject to certain limitations, the provisions of International Code Council, Inc., ICC 600, Standard for Residential Construction in High Wind Regions, shall be permitted for applicable Group R-2 and R-3 buildings
   b. Subjects to certain limitations, provisions of ANSI/AF&PA (American Forest & Paper Association) WFCM (Wood Frame Construction Manual) for one or two-family dwellings shall be permitted for applicable wood frame buildings of Group R-3 occupancy where nominal design wind speeds are 150 mph or less.
   c. Subject to the limitations described hereafter under "Applicability" residential structures using the provisions of AISI S230.
   d. Designs using NAAMM EP1001, Specification for Design Loads of Metal Flagpoles.
   e. Designs using TIA-222 for antenna supporting structures and antennas shall be permitted for communication tower and steel antenna support structures.
   f. Wind tunnel tests in accordance with chapter 31 of ASCE 7.
   g. Designs using AASHTO LT5-4 structural Specifications for Highway Signs Luminaries, and Traffic Signals.
   h. Wind loads for screened enclosures shall be determined in accordance with Section 2002.4 FBC

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The wind speeds in Figure 1609A, 1609B and 1609C shall be converted to nominal wind speeds, V_{asd} in accordance with Section 1609.3.1 when the provisions of the standards referenced in exception a though e and g are used unless the wind provisions in the standards are based on Ultimate Wind Speeds as specified in Figures 1609A 1609B or 1609C or chapter 26 of ASCE 7.

2. **Applicability.**
   The provisions of ICC 600 are applicable only to buildings located within Exposure B or C as defined in Section 1609.4. The provisions of ICC 600, AF&PA WFCM, and AISI S230 shall not apply to buildings sited on the upper half of an isolated hill, ridge or escarpment meeting the following conditions:
   a. The hill, ridge or escarpment is 60 feet or higher if located in Exposure B or 30 feet or higher if located in Exposure C;
   b. The maximum average slope of the hill exceeds 10 percent; and
   c. The hill, ridge or escarpment is unobstructed upwind by other such topographic features for a distance from the high point of 50 times the height of the hill or 1 mile, whichever is greater.

B.   ASCE Standard 7-10

1. Wind loads on the MWFRS may be determined by:

   a. Directional Procedure for buildings of all heights as described in Chapter 27 Part 1 applies to buildings of all heights where it is necessary to separate applied wind loads onto the windward, leeward, and side walls of the building to properly assess the internal forces in the MWFRS members and Part 2 applies to a special class of buildings designated as enclosed simple diaphragm buildings having a height of 160 feet or less.
   b. Envelope Procedure for low-rise buildings as described in Chapter 28.
   c. Directional Procedure for building appurtenances (roof overhangs and parapets) and other structures as described in Chapter 29.
   d. Wind Tunnel Procedure for any building or other structure as described in chapter 31.

2. Wind loads on the components and cladding may be determined by:

   a. Envelope Procedure in Parts 1 and 2 or
   b. Directional Procedure in Parts 3, 4, and 5
   c. Building appurtenances such as roof overhangs and parapets and rooftop equipment in Part 6 all as described in chapter 30.
   d. Wind Tunnel procedure for any building or other structure as described in chapter 31

C.   Florida Building Code – Alternate all-heights method.

The alternate wind design provisions in Section 1609.6 of the FBC are simplifications of chapter 27, Part 1- Directional Procedure of ASCE 7-10. The Provisions of Section 1609.6 are permitted to be used to determine the wind effects on regularly shaped buildings or other structures provided they meet the conditions described in Section 1609.6.1 of the FBC. The building or other structure must have a height of 75 feet or less in order to use this simplified method.

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D.   Criteria for using ASCE Standard 7-10

1. **Conditions**
A building whose design wind loads are determined in accordance with ASCE 7 shall comply with all of the following conditions:
   a. The building is a regular-shaped building as defined in Section 26.2.
   b. The building does not have response characteristics making it subject to across wind loading, vortex shedding, or instability due to galloping or flutter; or it does not have a site location for which channeling effects of buffeting in the wake of upwind obstructions warrant special consideration

2. **Limitations**
The provisions of ASCE 7 take into consideration the load magnification effect caused by gusts in resonance with along-wind vibrations of flexible buildings. The loads on buildings not meeting the requirements of ASCE 7 Sections 27-30, or having unusual shapes or response characteristics, shall be determined using recognized literature documenting such wind load effects or shall use the wind tunnel procedure specified in Chapter 31.

3. **Shielding**
There shall be no reductions in velocity pressure due to apparent shielding afforded by buildings and other structures or terrain features.

VII. Design Procedures

Selected Procedure

In determining the design wind loads for buildings and other structures, the procedure to be utilized shall be selected in accordance with the criteria described in Chapter VI. The design methods will be described in this chapter.

A.   Wind Loads on Buildings, MWFRS (Directional Procedure)

1   Building of all Heights
a.   Enclosed, Partially Enclosed, and Open Buildings

The steps to determine the wind loads on the MWFRS for enclosed, partially enclosed and open buildings of all heights are shown in the following Table 7-B.1.

Table 7-B.1 Steps to Determine MWFRS Wind Loads for Enclosed, Partially Enclosed and Open Buildings or all Heights

Step 1: Determine risk category of building or other structure, see Table 1604.5

Step 2: Determine the basic wind speed, *V*, for the applicable risk category, see Figure 1609A, B or C

Step 3: Determine wind Load parameters:
Wind directionality factor, K_d, see Section IV.B and Table 26.6-1
Exposure category, see Section IV.C.
Topographic factor, K_{zt}, see Section IV.D

Gust Effect Factor, G, see Sections IV.E
Enclosure classification, see Section IV.F
Internal pressure coefficient, (GC_{pi}), see Section 1V.g and Table 26.11-1

Step 4: Determine velocity pressure exposure coefficient, K_z or K_h, see Table 27.3-1

Step 5: Determine velocity pressure q_z or q_h Eq. 27.3-1

Step 6: Determine external pressure coefficient, C_p or C_N
Fig. 27.4-1 for walls and flat, gable, hip, monoslope or mansard roofs
Values for other roof types shown in Chapter 27, ASCE 7-10

Step 7: Calculate wind pressure, *p*, on each building surface
Eq. 27.4-1 for ridge buildings
Eq. 27.4-2 for flexible buildings
Eq. 27.4-3 for open buildings

Velocity Pressure
Velocity pressure, q_z, evaluated at height z shall be calculated by the following equation:

$$q_z = 0.00256K_zK_{zt}K_dV^2 \text{ (lb/ft}^2) \qquad (27.3\text{-}1)$$

Where

K_d = wind directionality factor
K_z = velocity pressure exposure coefficient
K_{zt} = topographic factor defined
V = basic wind speed

q_z = velocity pressure calculated using Eq. 27.3-1 at height *z*
q_h = velocity pressure calculated using Eq. 27.3-1 at mean roof height *h*.

The numerical coefficient 0.00256 shall be used except where sufficient climatic data are available to justify the selection of a different value of this coefficient for a design application.

b.   Enclosed and Partially Enclosed Rigid buildings

Design wind pressure for the MWFRS of buildings of all heights shall be determined by the following equation:
$$p = qGC_p - q_i(GC_{pi}) \text{ (lb/ft}^2) \qquad (27.4\text{-}1)$$
Where

$q = q_z$ for windward walls evaluated at height z above ground
$q = q_h$ for leeward walls, side walls and roofs evaluated at heights h
$q_i = q_h$ for windward walls, side walls, leeward walls, and roofs of enclosed buildings and for negative internal pressure evaluation in partially enclosed buildings

$q_i = q_z$ for positive internal pressure evaluation in partially enclosed buildings where height z is defined as the level of the highest opening in the building that could affect the positive internal pressure. For buildings sited in wind-borne debris regions, glazing that is not impact resistant or protected with an impact resistant covering shall be treated as an opening. For positive internal pressure evaluation, qi may conservatively be evaluated at height $h(q_i = q_h)$
G = gust-effect factor
C_p = external pressure coefficient from Figs. 27.4-1, 27.4-2 and 27.4-3
(GC_{pi}) = internal pressure coefficient from Table 26.11-1

q and q_i shall be evaluated using exposure defined in Section IV.C.2. Pressure shall be applied simultaneously on windward and leeward walls and on roof surfaces as defined in Figs. 27.4-1, 27.4-2 and 27.4-3.

Design wind pressures for the MWFRS of flexible buildings shall be determined from the following equation:
$$p = qG_fC_p - q_i(GC_{pi}) \text{ (lb/ft}^2) \quad (27.4-2)$$

where q, q_i, C_p and (GC_{pi}) are as defined above 27.4.1 and G_f (gust-effect factor) is determined in accordance with section IV.E.

c.   Open buildings with Monoslope, Pitched, and Troughed Free Roofs
The net design pressure for the MWFRS of open buildings with monoslope, pitched, or troughed roofs shall be determined by the following equation:

$$p = q_hGC_N \quad (27.4-3)$$

Where

q_h = velocity pressure evaluated at mean roof height *h* using exposure as defined in Section IV.C.2 that results in the heights wind loads for any wind direction at the site
G = gust-effect factor from Section IV.E
C_N = net pressure coefficient determined from Figs. 27.4-4 through 27.4-7 (ASCE 7-10)

Net pressure coefficients, C_N include contributions from top and bottom surfaces. All Load cases shown for each roof angle shall be investigated. Plus and minus signs signify pressure acting toward and away from the top surfaces of the roof, respectively.
For free roofs with an angle of plane of roof from horizontal θ less than or equal to 5° and containing fascia panels, the fascia panel shall be considered an inverted parapet. The contribution of loads on the fascia to the MWFRS loads shall be determined using Section 27.4.5 with q_p equal to q_h.

d.   Roof Overhangs
The positive external pressure on the bottom surface of windward roof overhangs shall be determined using $C_p = 0.8$ and combined with the top surface pressures determined using Fig. 27.4-1

e.   Parapets

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The design wind pressure for the effect of parapets on MWFRS of rigid or flexible buildings with flat, gable, or hip roofs shall be determined by the following equation:

$$p_p = q_p(GC_{pn}) \text{ (lb/ft2)} \quad (27.4\text{-}4)$$

where

p_p = combined net pressure on the parapet due to the combination of the net pressures from the front and back parapet surfaces. Plus (and minus) signed signify net pressure acting toward (and away from) the front (exterior) side of the parapet
q_p = velocity pressure evaluated at the top of the parapet
(GC_{pn}) = combined net pressure coefficient
  = +1.5 for windward parapet
  = -1.0 for leeward parapet

f.   Design Wind Load Cases
The MWFRS of buildings of all heights, whose wind loads have been determined under the provisions of this chapter, shall be designed for the wind load cases as defined in Fig. 27.4-8.

g.   Minimum Design wind Loads
The wind load to be used in this design of the MWFRS for an enclosed or partially enclosed building shall not be less than 16 lb/ft^2 multiplied by the wall area of the building and 8 lb/ft^2 multiplied by the roof area of the building projected onto a vertical plane normal to the assumed wind direction. Wall and roof loads shall be applied simultaneously. The design wind force for open buildings shall be not less than 16 lb/ft^2 multiplied by the area A_f.

2.   Enclosed Simple Diaphragm Buildings with *h* ≤ 160 ft

a.   Design Procedure
The procedure specified herein applies to the determined of MWFRS wind loads of enclosed simple diaphragm buildings, with a mean roof height *h* ≤ 160 ft. the   steps required for the determination of MWFRS wind loads on enclosed simple diaphragm buildings are shown in Table 7.B.2

Note: Part 2 is a simplified method for determining the wind pressured for the MWFRs of enclosed, simple diaphragm buildings whose height *h* in ≤ 160 ft. The wind pressures are obtained *directly from a table.* The building may be of any general plan shape and roof geometry that matched the specified figures. This method is a simplification of traditional "all heights" method (Directional Procedure) contained in Part 1.

Table 7.B.2 Steps to Determine MWFRS Wind Loads Enclosed Simple Diaphragm

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Buildings (*h* ≤ 160 ft.)
Step 1: Determine risk category of building of other structure, see Table 1604.5
Step 2: Determine the basic wind speed, *V*, for applicable risk category, see Figure 1609-1A, B or C
Step 3: Determine wind load parameters: Wind directionality factor, K_d, see section IV.B and Table 26.6-1 Exposure category B, C or D, see Section IV.C Topographic factor, K_{zt}, see Section IV.D Enclosed classification, see Section IV.F
Step 4: Enter table to determine net pressures on walls at top and base of building respectively, p_h, p_0, Table 27.6-1
Step 5: Enter table to determine net roof pressures, p_z, Table 27.6-2
Step 6: Determine topographic factor, K_{zt}, and apply factor to wall and roof pressure (if applicable), see Section IV.D
Step 7: Apply loads to walls and roof simultaneously.

b. Conditions
In addition to the requirements in Section 27.1.2 of ASCE 7-10, a building whose design wind loads are determined in accordance with this section shall meet all of the following conditions for either a Class 1 or Class 2 building (see Fig. 27.5-1):

(1) **Class 1 Building:**
(a)The building shall be an enclosed simple diaphragm building.
(b)The building shall have a mean roof height *h* ≤60 ft
(c)The ratio of *L/B* shall not be less than 2.0 nor more than 5.0 (0.2 ≤*L/B* ≤ 5.0).
(d)The topographic effect factor K_{zt} = 1.0

(2) **Class 2 Buildings:**

(a)The building shall be an enclosed simple diaphragm building.
(b)The building shall have a mean roof height 60 ft < *h* ≤ 160 ft
(c)The ratio of *L/B* shall not be less than 0.5 nor more than 2.0 (0.5 ≤ *L/B* ≤ 2.0)
(d)The fundamental natural frequency (Hertz) of the building shall not be less 75/*h* where *h* is in feet.
(e)The topographic effect factor K_{zt} = 1.0

c. Wind Load Parameters Specified in chapter 26

Refer to Chapter 26 for determination of Basic Wind Speed V (Section 26.5) and exposure category (Section 26.7) and topographic factor K_{zt} (Section 26.8)

d. Diaphragm Flexibility

The design procedure specified herein applies to buildings having either rigid or flexible diaphragms. The structural analysis shall consider the relative stiffness of diaphragms and the vertical elements of the MWFRS.

Diaphragms constructed of wood panels can be idealized as flexible. Diaphragms constructed of untopped metal deck, concrete filled metal decks, and concrete slabs, each having a span-to-depth ratio of 2 or less, are permitted to be idealized as rigid for consideration of wind loading.

e. Wall and Roof Surfaces – Class 1 and 2 buildings

Net wind pressures for the walls and roof surfaces shall be determined from Tables 27.6-1 and 27.6-1, respectively, for the applicable exposure category as determined by Section 26.7.

For Class 1 building with L/B values less then 0.5, use wind pressures tabulated for L/B = 0.5. For Class 1 buildings with L/B values greater than 2.0, use wind pressures tabulated for L/B = 2.0

Net wall pressures shall be applied to the projected area of the building walls in the direction of the wind, and exterior side pressures shall be applied to the projected area of the building walls normal to the direction of the wind acting outward according to Note 3 of Table 27.6-1, simultaneously with the roof pressures from Table 27.6-2 as shown in Fig. 27.6-1.

Where two load cases are shown in the table of roof pressures, the effects of each load case shall be investigated separately. The MWFRS in each direction shall be designed for the wind load cases as defined in fig. 27.4-8

f. Parapets

The effect of horizontal wind loads applied to all vertical surfaces of roof parapets for the design of the MWFRS shall be based on the application of an additional net horizontal wind pressure applied to the projected area of the parapet surface equal to 2.25 times the wall pressures tabulated in Table 27.6-1 for L/B = 1.0. The net pressures specified accounts for both the windward and leeward parapet loading on both the windward and leeward building surface. The parapet pressure shall be applied simultaneously with the specified wall and roof pressures shown in the table as shown in fig. 27.6-2. The height h used to enter Table 27.6-1 to determine the parapet pressure shall be the height to the top of the parapet as shown in Fig. 27.6-2 (use $h = h_p$)

g. Roof Overhangs

The effect of vertical wind loads on any roof overhangs shall be based on the application of a positive wind pressure on the underside of the windward overhang equal to 75% of the roof edge pressure from Table 27.6-2 for Zone 1 or Zone 3 as applicable. This pressure shall be applied to the windward roof overhang only and shall be applied simultaneously with other tabulated wall and roof pressures as shown in fig. 27.6-3.

B. Wind Loads on Buildings, MWFRS (Envelope Procedure)

1. Enclosed and Partially Enclosed Low Rise (h less than or equal to 60 ft) Buildings

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The steps to determine the wind loads on the MWFRS on low-rise buildings are shown in Table 7-C.1

Table 7-C.1 Steps to Determine wind Loads on MWFRS Low-Rise Buildings

Step 1: Determine risk category of building or other structure, see Table 1604.5

Step 2: Determine the basic wind speed, v for applicable risk category, see Fig 1609A, B or C

Step 3: Determine wind load parameters:
Wind directionality factor, K_d, see Section IV.B and Table 26.6-1
Exposure category B, C or D, see Section IV.C.
Topographic factor, K_{zt}, see Section IV.D.
Enclosure classification, see Section IV.F.
Internal pressure coefficient, (GC_{pi}), see Section IV.G.

Step 4: Determine velocity pressure exposure coefficient, K_z or K_h, see Table 28.3-1

Steps 5: Determine velocity pressure, q_z or q_h, Eq. 28.3-1

Step 6: Determine external pressure coefficient, (GC_p), using Fig. 28.4-1 for flat and gable roofs.

Step 7: Calculate wind pressure, p, from Eq. 28.4-1

Velocity Pressure
Velocity pressure, q_z, evaluated at height z shall be calculated by the following equation:

$$q_z = 0.00256 \, K_z K_{zt} K_d V^2 \text{ (lb/ft2)} \quad (28.3\text{-}1)$$

K_d = Wind directionality factor
K_z = velocity pressure exposure coefficient taken from Table 28.3-1
K_{zt} = topographic factor
V = basic wind speed
q_h = velocity pressure q_z calculated using Eq. 28.3-1 at mean roof height h

The numerical coefficient 0.00256 shall be used except where sufficient climatic data are available to justify the selection of a different value of this factor for a design application.

a. **Design Wind Pressure for Low-Rise Buildings (heights less than 60 ft.**
Design wind pressure for the MWFRS of low-rise buildings shall be determined by the following equation:
$$p = q_h[(GC_{pf}) - (GC_{pi})] \quad \text{(lb/ft}^2) \quad (28.4\text{-}1)$$

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where

q_h = velocity pressure evaluated at mean roof height *h*
(GC_{pf}) = external pressure coefficient from Fig. 28.4-1
(GC_{pi}) = internal pressure coefficient from Table 26.11-1

The combined gust effect factor and external pressure coefficients for low-rise buildings, (GC_{pf}), are not permitted to be separated.

b.   Parapets
The design wind pressure for the effect of parapets on MWFRS of low-rise buildings with flat gable, or hip roofs shall be determined by the following equation:

$$p_p = q_p(GC_{pn}) \ (lb/ft^2) \quad (28.4\text{-}2)$$

where

pp = combined net pressure on the parapet due to the combination of the new pressure from the front and back parapet surfaces. Plus (and minus) signs signify net pressure acting toward (and away from) the front (exterior) side of the parapet
q_p = velocity pressure evaluated at the top of the parapet
GC_{pn} = combined net pressure coefficient
           +1.5 for windward parapet
           -1.0 for leeward parapet

c.   Roof Overhangs
The positive external pressure on the bottom surface of windward roof overhangs shall be determined using $Cp = 0.7$ in combination with the top surface pressures determined using fig. 28.4-1

d.   Minimum Design Wind Loads
The wind load to be used in the design of the MWFRS for an enclosed or partially enclosed building shall not be less than 16 lb/ft^2 multiplied by the wall area of the building and 8 lb/ft2 multiplied by the roof area of the building projected onto a vertical plane normal to the assumed wind direction.

2. Enclosed Simple Diaphragm Low-Rise Buildings

General Requirements
The steps required for the determination of MWFRS wind loads on enclosed simple diaphragm buildings are shown in Table 7.C.2

User Note: Part 2 of Chapter 28 is a simplified method to determine the wind pressure on the MWFRS of enclosed simple diaphragm *low-rise buildings* having a flat, gable, or hip roof. The wind pressures are *obtained directly from a table* and applied on horizontal and vertical projected surfaces of the building. This method is a simplification of the Envelope Procedure contained in Part 1.

Table 7.C.2 Steps to Determine Wind Loads on MWFRS Simple Diaphragm Low-Rise Buildings

Step 1: Determined risk category of building of other structure, see Table 1604.5

Step 2: Determine the basic wind speed, *V*, for applicable risk category, see Fig. 1609A, B or C

Step 3: Determine wind load parameters:
Exposure category B, C or D, see Section IV.C.
Topographic factor, K_{zt}, see Section IV.D.

Step 4: Enter figure to determine wind pressures for $h = 30$ ft, p_{s30}, see Fig. 28.6-1

Step 5: Enter figure to determine adjustment for building height and exposure, λ, see Fig. 28.6-1

Step 6: Determine adjusted wind pressures, p_s, see Eq. 28.6-1

a. **Scope**
   A building whose design wind loads are determined in accordance with this section shall meet all the conditions of Section C.2.b below. If a building does not meet all the conditions described, then its MWFRS wind loads shall be determined by Part 1 of this chapter, by the Directional Procedure of Chapter 27, or by the Wind Tunnel Procedure of Chapter 31 of ASCE 7-10

b. **Conditions**
   For the design of MWFRS the building shall comply with all of the following conditions:
   1. The building is a simple diaphragm building.
   2. The building is a low-rise building.
   3. The building is enclosed and conforms to the wind-borne debris provisions of Section 26.10.3. ASCE 1-10
   4. The building is a regular-shaped building or structure.
   5. The building is not classified as a flexible building.
   6. The building does not have response characteristics making it subject to across wind loading, vortex shedding, instability due to galloping or flutter; and it does not have a site location for which channeling effects or buffeting in the wake of upwind obstructions warrant special consideration.
   7. The building has an approximately symmetrical cross-section in each direction with either a flat roof or a gable or hip roof with θ ≤ 45°.
   8. The building is exempted from torsional load cases as indicated in Note 5 of Fig. 28.4-1, or the torsional load cases defined in Note 5 do not control the design of any of the MWFRS of the building.

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c. Design Wind Loads

Simplified design wind pressures, p_s, for the MWFRS of low-rise simple diaphragm buildings represent the net pressures (sum of internal and external) to be applied to the horizontal and vertical projections of building surfaces as shown in Fig. 28.6-1. For the horizontal pressures (Zones A, B, C, D), p_s is the combination of the windward and leeward net pressures. p shall be determined by the following equation:

$$p_s = \lambda \ K_{zt}p_{S30} \quad (28.6\text{-}1)$$

where

λ = adjustment factor of building height and exposure from Fig. 28.6-1
K_{zt} = topographic factor as defined in Section 26.8 evaluated at mean roof height, h
p_{S30} = simplified design wind pressure for Exposure B, at h = 30ft from Fig. 28.6-1

d. Minimum Design Wind Loads

The load effects of the design wind pressures from Section 28.6.3 shall not be less than a minimum load defined by assuming the pressures, p_s, for zones A and C equal to +16 psf, Zones B and D equal to +8 psf, while assuming p_s for Zones E, F, G, and H are equal to 0 psf.

C.   Wind Loads on Other Structures and Building Appurtenances – MWFRS

The steps required for the determination of wind loads on building appurtenances (such as rooftop structures and equipment) and other structure of all heights (such as solid freestanding walls and freestanding solid signs, chimneys, tanks, open signs, lattice frameworks, and trussed towers) using the Directional Procedure are shown in Table 7-0.1

Table 7-0.1 Steps to Determine Wind Loads on MWFRS Rooftop Equipment and Other Structures

Step 1: Determine risk category of building or other structure, see Table 1604.5

Step 2: Determine the basic wind speed, V, for applicable risk category, see Figure 1609A, B or C

Step 3: Determine wind load parameters:
Wind directionality factor, K_d, see Section IV.B and Table 26.6-1
Exposure category B, C or D, see Section IV.C.
Topographic factor, K_{zt}, see Section IV.D
Gust Effect Factor, G, see Section IV.E

Step 4: Determine velocity pressure exposure coefficient, K_z or K_h, see Table 29.3-1

Step 5: Determine velocity pressure q_z or q_h, see Eq. 29.3-1

Step 6: Determine force coefficient, C_f.
Solid freestanding signs or solid freestanding walls. Fig 29.4-1
Chimneys, tanks, rooftop equipment Fig 29.5-1
Open signs, lattice frameworks Fig. 29.5-2
Trussed towers Fig. 29.5-3

Step 7: Calculate wind force, F:
Eq. 29.4-1 for signs and walls
Eq. 29.6-1 and Eq. 29.6-2 for rooftop structure and equipment
Eq. 29.5-1 for other structures

Note: The figures in step 6 and equations in step 7 can be found in Chapter 29 of ASCE 7-10, and are not included in this course material.

Velocity Pressure Exposure Coefficient
Based on the exposure category determined in Section IV.C, a velocity pressure exposure coefficient K_z or K_h as applicable shall be determined from Table 29.3-1. For a site location in a transition zone between exposure categories that is near to a change in ground surfaces roughness, intermediate values of K_z or K_h, between those shown in Table 29.3-1, are permitted provided that they are determined by a rational analysis method defined in the recognized literature.

Velocity Pressure
Velocity pressure, q_z evaluated at height z shall be calculated by the following equation:

$$q_z = 0.00256\ K_z K_{zt} K_d V^2\ (lb/ft^2)\quad (29.3\text{-}1)$$

where

K_d = Wind directionality factor
K_z = velocity pressure exposure coefficient
K_{zt} = topographic factor
V = basic wind speed
q_h = velocity pressure calculated using Eq. 29.3-1 at height h

The numerical coefficient 0.00256 shall be used except where sufficient climatic data are available to justify the selection of a different value of this factor for a design application.

a. Parapets
Wind loads on parapets are specified in Section V!!.B for buildings of all heights designed using Directional Procedure and in Section VII.C for low-rise buildings designed using the Envelope Procedure.

b. Roof Overhangs

Wind Loads on roof overhangs are specified in Section VII.B for buildings of all heights designated using the Directional Procedure and in Section VII.C low-rise buildings designed using the Envelope Procedure.

c. Minimum Design Wind Loading
The design wind force for other structures shall be not less than 16 lb/ft^2 multiplied by the area A_f.

D.   Wind Loads – Components and Cladding (C&C)

1. Scope

Building Types
This section applies to the determination of wind pressures on components and cladding (C&C) on buildings

   a.   Part 1 is applicable to an enclosed or partially enclosed:
      (1)   Low-rise building
      (2)   Building with h ≤ 60 ft
      The building has a flat roof, gable roof, multispan gable roof, hip roof, monoslope roof, stepped roof, or sawtooth roof and the wind pressures are calculated from a wind pressure equation.

   b.   Part 2 is a simplified approach and is applicable to an enclosed:
      (1)   Low-rise building
      (2)   Building with h ≤60 ft
      the building has a flat roof, gable roof, or hip roof and the wind pressures are determined directly from a table.

   c.   Part 3 is applicable to an enclose or partially enclosed:
      Building with h ≥ 60 ft
      The building has a flat roof, pitched roof, gable roof, hip roof, mansard roof, arched roof, or domed roof and the wind pressures are calculated from a wind pressure equation.

   d.   Part 4 is a simplified approach and is applicable to an enclosed
         (1)   Building with h ≤ 160 ft
      The building has a flat roof, gable roof, hip roof, monoslope roof, or mansard roof and the wind pressures are determined directly from a table.

   e.   Part 5 is applicable to an open building of all heights having pitched free roof, monoslope free roof, or trough free roof.

   f.   Part 6 is applicable to building appurtenances such as roof overhangs and parapets and rooftop equipment.

Conditions
      A building whose design wind loads are determined in accordance with this chapter shall comply with all of the following conditions:

   a.   The building is a regular-shaped building

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b. The building does not have response characteristics making it subject to across wind loading, vortex shedding, or instability due to galloping or flutter; or it does not have a site location for which channeling effects of buffeting in the wake of upwind obstructions warrant special consideration.

Limitations

The provisions of this section take onto consideration the load magnification effect caused by gusts in resonance with along-wind vibrations of flexible buildings. The loads on buildings not meeting the requirements of the conditions described above, or having unusual shapes or response characteristics, shall be determined using recognized literature documenting such wind load effects or shall use the wind tunnel procedure specified in Section VII.F.

Shielding

There shall be no reduction in velocity pressure due to apparent shielding afforded by buildings in other structures or terrain features.

Air-Permeable Cladding

Design wind loads determined from this section shall be used for air-permeable cladding unless approved test data or recognized literature demonstrates lower loads for the type of air-permeable cladding being considered.

2. General Requirements

Wind Load Parameters Specified in Section IV

The following wind load parameters are specified in Section IV
a. Basic Wind Speed v
b. Wind directionality factor K_d
c. Exposure category
d. Topographic factor K_{zt}
e. Gust Effect Factor
f. Enclosure classification
g. Internal pressure coefficient

Minimum Design Wind Pressure

The design wind pressure for components and cladding of building shall not be less than a net pressure of 16 lb/ft^2 acting in either direction normal to the surface.

Tributary Areas Greater than 700 ft^2

Component and cladding elements with tributary areas greater than 700 ft^2 shall be permitted to be designed using provisions for MWFRS.

External Pressure Coefficients

Combined gust effect factor and external pressure coefficients for components and cladding, (GC_p), are given in the figures associated with this chapter. The pressure coefficient values and gust effect factor shall not be separated.

3. Velocity Pressure

Velocity Pressure Exposure Coefficient
Based on the exposure category determined in Section IV, a velocity pressure exposure coefficient K_z of K_h as applicable, shall be determined from Table 30.3-1. For a site located in a transition zone between exposure categories, that is, near to a change in ground surface roughness, intermediate values of K_z or K_h, between those shown in Table 30.3-1, are permitted, provided that they are determined by a rational analysis method defined in the recognized literature.

Velocity Pressure
Velocity pressure q_z, evaluated at height *z* shall be calculated by the following equation:

$$q_z = 0.00256 \ K_z K_{zt} K_d V^2 \ (\text{lb/ft}^2) \quad (30.3\text{-}1)$$

Where
K_d = wind directionality factor defined in Section 26.6
K_z = Velocity pressure exposure coefficient delineated in Table 30.3-1
K_{zt} = topographic factor
V = basic wind speed
q_h = velocity pressure calculated using Eq. 30.3-1 at height *h*

The numerical coefficient 0.00256 shall be used except where sufficient climatic data are available to justify the selection of a different value of this factor for a design application.

Design Wind Pressures
The procedures for the determination of design wind pressures for components and cladding for all types and heights of buildings and structures are described in Chapter 30 of ASCE Standard 7-10. Part 2 of Chapter 30 is a simplified method to determine wind pressures on C&C of enclosed low-rise buildings (*h* = 60 ft or less) having flat, gable or hip roof shapes. The provisions of Part 2 are based on the envelope procedure with wind pressures determined from a table and adjusted as appropriate. The building type applicable to Part 2 are representatives of many buildings constructed in Florida and the design procedures are describes hereafter. For the design procedures for other building types, see ASCE Standard 7-10, Parts 1 and 3 though 6.

4. Low-Rise Buildings (Simplified)

a. Building Types
The provisions of Section VII.E are applicable to an enclosed:
 h. Low-Rise building with $h \leq 60$ ft
The building has a flat roof, gable roof, or hip roof. The steps required for the determination of wind loads on components are cladding for these building types are shown in Table VII.E-1

Conditions
For the design of components and cladding the building shall comply with all the following conditions:

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1. The mean roof height *h* must be less than or equal to 60 ft.
2. The building in enclosed as defined in Section III and conforms to the wind-borne debris provisions of Section II
3. The building is a regular-shaped building or structure as defined in Section III
4. The building does not have response characteristics making it subject to across wind loading, vortex shedding, or instability due to galloping or flutter; and it does not have a site location for which channeling effects or buffeting in the wake of upwind obstructions warrant special consideration.
5. The building has either a flat roof , a gable roof with θ ≤ 45°, or a hip roof with θ ≤ 27°.

Design wind Pressures

Net design wind pressures, p_{net}, for component and cladding of buildings designed using the procedure specified herein represent the net pressures (sum of internal and external) that shall be applied normal to each building surface as shown in fig. 30.5-1. p_{net} shall be determined by the following equation:

$$p_{net} = \lambda K_{zt} p_{net30} \quad (30.5\text{-}1)$$

where
λ = adjustment factor for building height and exposure from Fig. 30.5-1
K_{zt} = topographic factor evaluated at 0.33 mean roof height, 0.33*h*
P_{net30} = net design wind pressure for Exposure B, at *h* = 30 ft, from Fig. 30.5-1

Table VII.E-1 Steps to Determine C&C Wind Loads Enclosed Low-Rise Buildings (Simplified Method)

Step 1: Determine risk category, see Table 1604.5

Step 2: Determine the basic wind speed, *v*, for applicable risk category, see Figure 1609-1A, C or C

Step 3: Determine wind load parameters:
Exposure category B, C or D, see Section IV.C.
Topographic factor K_{zt}, see Section IV.D

Step 4: Enter figure to determine wind pressures at *h* = 30 ft., p_{net30}, see Fig. 30.5-1

Step 5: enter figure to determine adjustment for building height and exposure, λ, see Fig. 30.5-1

Step 6: Determine adjusted wind pressures, p_{net}, see Eq. 30.5-1

E. Wind Tunnel Procedure
The wind tunnel procedure may always be used for determining wind pressure for the MWFRS and/or for C&C for any building or structure. This method is considered to produce the most accurate wind pressures for any method described in ASCE Standard 7-10. The wind tunnel procedure is discussed in Chapter 31 of ASCE 7-10.

F. Florida Building Code- Alternate all-heights Method
The alternate wind design provisions in Section 1609.6 of the FBC are simplifications of Chapter 27, Part 1 Directional Procedure of ASCE 7-10.

1. Scope.
As an alternative to ASCE 7 Chapter 27, Part 1 and Chapter 30, Part 3, the following provisions are permitted to be used to determine the wind effects on regularly shaped buildings, or other structures that are regularly shaped, which meet all the following conditions:
a. The building or other structure is less than or equal to 75 feet in height with a height-to-least-width ratio of 4 or less, or the building or other structure has a fundamental frequency greater than or equal to 1 hertz.
b. The building or other structure is not sensitive to dynamic effects.
c. The building or other structure is not located on a site for which channeling effects of buffeting in the wake of upwind obstructions warrant special consideration.
d. The building shall meet the requirements of a simple diaphragm building as defined in ASCE 7 Section 26.2, where wind loads are only transmitted to the main wind-force-resisting system (MWFRS) at the diaphragms.
e. For open buildings, multispan gable roofs, stepped roofs, sawtooth roofs, domed roofs, roofs with sloped greater than 45 degrees, solid free-standing walls and solid signs, and rooftop equipment, apply ASCE 7 provisions.

2. Symbols and notations.
Coefficients and variables used in the alternative all-heights method equations are as follows:

C_{net} = net-pressure coefficient based on $K_d [(G) (C_p) – (GC_{pi})]$, in accordance with Table 1609.6.2(2).
G = Gust effect factor for rigid structures in accordance with ASCE 7 Section 26.9.
K_d = Wind directionality factor in accordance with ASCE 7 Table 26.6-1.
P_{net} = Design wind pressure to be used in determination of wind loads on building or other structures or their components and cladding, in psf.
q_s = Wind stagnation pressure in psf in accordance with Table 1609.6.2(1).

3. Design equations
When using the alternative all-heights method, the MWFRS, and components and cladding of every structure shall be designed to resist the effects of wind pressures on the building envelope in accordance with Equation 16-34.

$$P_{net} = q_s K_z C_{net} [K_{zt}] \quad \text{(Equation 16-34)}$$

Design wind forces for the MWFRS shall not be less than 16 psf multiplied by the wall are of the building and 8 psf multiplied by the roof area of the building

projected on a plane normal to the assumed wind direction (see ASCE 7 Section 27.4.7 for criteria). Design net wind pressure for components and cladding shall not be less than 16 psf acting in either direction normal to the surface.

4. **Design procedure**
   The MWFRS and the components and cladding of every building or other structure shall be designed for the pressures calculated using Equation 16-34

5. **Main wind-force-resisting systems.**
   The MWFRS shall be investigated for the torsional effects indentified in ASCE 7 Figure 27.4-8.

6. **Determination of K_z and K_{zt}**
   Velocity pressure exposure coefficient, K_{zt} shall be determined in accordance with ASCE 7 Sections 27.3 and 30.3 and the topographic factor, K_{zt}, shall be determined in accordance with ASCE 7 Section 26.8.

       (1)   For the windward side of a structure, K_{zt} and K_z shall be based on height *z*

       (2)   For leeward and sidewalls, and for windward and leeward roofs, K_{zt} and K_z shall be based on mean roof height *h*.

7. **Determination of net pressure coefficients, and C_{net}**
   For the design of the MWFRS and for components and cladding, the sum of the internal and external net pressure shall be based on the net pressure coefficient, C_{net}. The pressure coefficient, C_{net}, for walls and roofs shall be determined from Table 1609.6.2(2). Where C_{net} has more than one value, the more severe wind load condition shall be used for design.

8. **Application of wind pressures**
   When using the alternative all-heights method, wind pressures shall be applied simultaneously on, and in a direction normal to, all building envelope wall and roof surfaces.

9. **Components and cladding**
   Wind pressure for each component or cladding element is applied as follows using C_{net} values based on the effective wind area, *A*, contained within the zones in areas of discontinuity of width and/or length "a," "2a" or "4a" at: corners of roofs and walls; edge strips for ridges, rakes and eaves; or field areas on walls or roofs as indicated in figures in tables in ASCE 7 as reference in Table 1609.6.2(2) in accordance with the following
   a. Calculated pressures at local discontinuities acting over specific edge strips or corner boundary areas.
   b. Include "field" (Zone 1, 2 or 4, as applicable) pressures applied to areas beyond the boundaries of the areas of discontinuity.
   c. Where applicable, the calculated pressures at discontinuities (Zones 2 or 3) shall be combined with design pressures that apply specifically on rakes or eave overhangs.

10. **Garage doors and rolling doors**

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Pressures from Table 1604.7(1) for wind loading actions on grage doors and rolling doors for building designed as enclosed shall be permitted

11. Rooftop structures and equipment

The lateral force on rooftop structures and equipment with A_f, less than $(0.1Bh)$ located on buildings of all heights shall be determined from Equation 29.5-1 of ASCE 7 in which the value of GC_f shall be taken as 3.1. GC_f shall be permitted to be reduced linearly from 3.1 to 1.1 as the value of A_f is increased from $(0.1Bh)$ to (Bh). The value of G from Section 26.9 of ASCE 7 shall not be used. Additionally, a simultaneous uplift force shall be applied, given by Equation 29.5-1 of ASCE 7 in which $GC_f = 1.5$ and A_f is replaced by the horizontal projected area, A_r, of the rooftop structure or equipment. For the uplift force GC_f shall be permitted to be reduced linearly from 1.5 to 1.0 as the value of A_f is increased from $(0.1BL)$ to (BL).

12. Minimum Design Wind Loads

The load effects of the design wind pressures from Section 28.6.3 shall not be less than a minimum load defined by assuming the pressures, p_s, for zones Z and C equal to +16 psf, Zones B and D equal to +8 psf, while assuming ps for Zones E, F, G, and H are equal to 0 psf

VIII Representative Examples

A. Preface

Two examples will be illustrated to show how that various tables and equations discussed in previous chapters are used to determine wind forces on building. Both examples will use similar criteria as follows:

- a. Building locations: Ft. Myers, Florida (Wind Borne Debris Region)
- b. Building outline: 40 feet by 100 feet x 40 feet high with a flat roof
- c. Enclosed building
- d. Exposure C
- e. Topographic Factor K_{zt} = 1.0
- f. Building Use: Commercial Office (Rick Category II)
- g. Wind load resisting system: Floor/roof support is provided by major beams spanning north-south and bar joists spanning east-west with metal decking and concrete floor/roof deck. The sketch below illustrates the conditions.
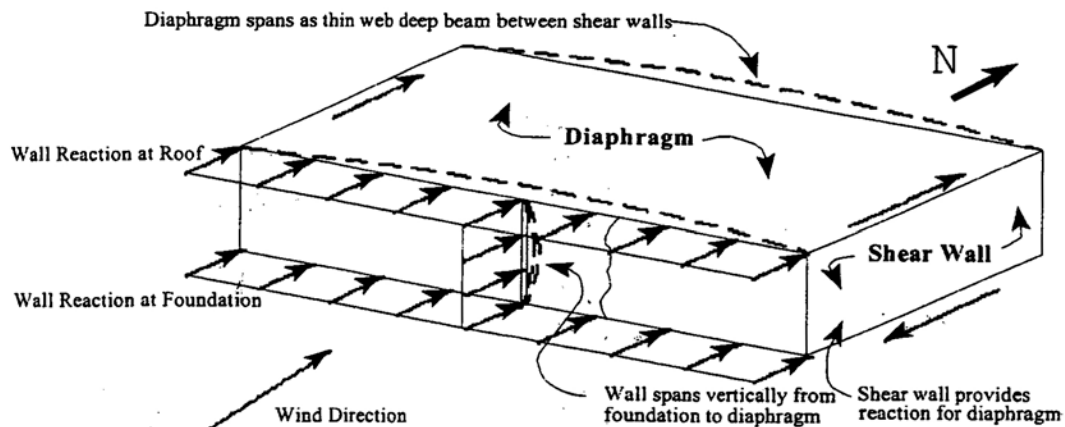
B. ASCE 7-10

Based on the example presented in paragraph A, the following procedures for determining wind pressures are applicable:
MWFRS – Envelope Procedure, Part 2 Components and Cladding, Part 2, Low-Rise Buildings (Simplified)

Determine wind pressure p_{s30} for the MWFRS

From Figure 1609A, the basic wind speed is 160 mph.

From figure 28.6-1 selected the wind pressures of the MWFRS for the various zones.

Horizontal Pressures:
      a. End Zone of wall 40.6 psf
      b. End zone of roof 21.1 psf
      c. Interior zone of wall 26.9 psf
      d. Interior zone of rood 12.5 psf

Vertical Pressures:
      a. End zone of windward roof 48.8 psf
      b. End zone of leeward roof 27.7 psf
      c. Interior zone of windward roof 34.0 psf
      d. Interior zone of leeward roof 21.5 psf

Overhangs:
      a. End zone 68.3 psf
      b. Interior zone 53.5 psf

The above values are for a building height of 30 feet. The example given was for a building height of 40 feet and Exposure C. Find the adjustment factor for the example conditions in the table at the end of Figure 28.6-1. The adjustment factor is 1.49. the above values need to be multiplied by 1.49 to obtain the actual wind pressures on the MWFRS

1. Components and Cladding
For the components and cladding the net design wind pressures are determined using the method described in Part 2 of Chapter 30 of ASCE 7-10. This is a simplified method applicable to enclosed low-rise buildings having flat, gable or hip-roof shapes and is based on the Envelope Procedure with wind pressures determined from a table and adjusted as appropriate.

For the given example, the following values (in psf) are obtained from Figures 30.5-1 based on an effective wind area of 10 sq. ft.

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Roof:
   a. Interior zone 18.7 and 46.1
   b. End zone 18.7 and 77.3
   c. Corner zone 18.7 and 116.3

Wall
   a. Interior zone 46.1 and 50.0
   b. End zone 46.1 and 61.7

Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.

Similar to the procedure for the MWFRS, the above values have to be adjusted for building height and exposure using the table at the end of Figure 30.5-1.The adjustment factor is 1.49 and the above values have to be multiplied by it to obtain the actual wind pressures on the C&C of the given example.

C. Florida Building Code-Alternate all-heights method

The equation to be used in determining design wind pressures are found in Section 1609.3
$P_{net} = q_s K_z C_{net} [K_{zt}]$

The symbols and notations are described in Section 1609.6.2

For the given example:
q_s = 65.6 psf – see table 1609.6.2(1) for 16- mph wind speed
K_z = 1.04 – ASCE 7-10, Table 27.3-1 where h=40 ft, Exposure C
C_{net} = values taken from Table 1609.6.2(2)
K_{zt} = 1.0 – ASCE 7-10, Section 26.8.2, Topographic Factor

P_{net} = 65.5 (1.04) C_{net} [1.0] = 68.12 C_{net}

For example: The C_{net} for the positive internal pressure on the windward wall for the MWFRS is 0.43 P_{net} then becomes 68.12 (0.43) = 29.3 psf.
Compare this value to the previous examples (ASCE 7-10) Envelope procedure, Part 2 where the pressures were 40.6 psf for the end zone and 26.9 psf for the interior zone.

For the C&C wall elements see Part 4 of Table 1609.6.2(2), h=60 ft.
The positive C_{net} factor = 1.0 and the negative C_{net} factor = -1.09 for 10 ft^2 sections.
P_{net} = 68.12 (1.0) = 68. 1 psf
P_{net} = 68.12 (-1.09) = -74.25 psf

These values are considerably greater than the 46.1 psf and -61.7 psf using the ASCE 7-10.

Thus, it would appear that the FBC all-heights method is a more conservative approach to determining wind pressure.

Similar to the ASCE method, the values obtained have to be adjusted in accordance with Table 1609.7(2). The adjustment factor for h = 40 ft and Exposure C is 1.49

Chapter IX

Figures and Tables

A.   Florida Building Code

Table 1604.5 Risk Category of Buildings and Other Structures (Page F&T 1)

Figures 1609 A, B and C Ultimate Design Wind Speeds (Pages F&T 2, 3 & 4)

Table 1609.6.2(2) Net Pressure Coefficients (F&T Page 5-8a & 8b)

Table 1609.6.2(1) Wind Stagnation Pressure (F&T Page 9)

Table 1609.3.1 Wind Speed Conversion (F&T Page 9)

B.   ASCE 7-10

Table 26.6-1 Wind Directionality Factor K_d (F&T Page 10)

Table 26.11-1 Internal Pressure Coefficient (GC_{pi}) (Page 11)

Table 27.3-1 MWFRS Part 1 Velocity Pressure Exposure Coefficient K_h and K_z (Page F&T 12)

Figure 27.4-1 MWFRS Part 1 External Pressure Coefficient C_p Walls and   Roofs (Page F&T 13 & 14)

Figure 27.4-2 MWFRS Part 1 C_p Domed Roofs (F&T Page 15)

Figure 27.4-3 MWFRS Part 1 Arched Roofs (F&T Page 16)

Figure 27 4-8 MWFRS Part 1 Design Wind Load Cases (F&T 17)

Figure 27.5-1 MWFRS Part 2 Building Class (F&T 18)

Figure 27.6-1 MWFRS Part 2 Application of Wind Pressures (Page F&T 19)

Figure 27.6-2 MWFRS Part 2 Application of Parapet Wind Loads (Page F&T 20)

Figure 27.6-3 MWFRS Part 2 Application of Roof Overhang Wind Loads (F&T Page 21)

Table 27.6-1 MWFRS Part 2 Wind Pressures, Walls (F&T Pages 22-25)

Table 27.6-2 MWFRS Part 2 Wind Pressures, Roof (F&T Pages 26-39)

Envelope Procedure

Table 28.3-1 Velocity Pressure Exposure Coefficient, K_h and K_z (F&T Page 40)

Figure 28.-1 External Pressure Coefficient, GC_{pf}, Walls and Roofs
(F&T Pages 41&42)

Figure 28.6-1 MWFRS, Method 2, Design Wind Pressures, Walls and Roofs
(F&T Pages 43-45)

Table 29.3-1 Velocity Pressure Exposure Coefficients, K_h and K_z, Other
structures and Building Appurtenances (F&T Page 46)

Table 30.3-1 Velocity Pressure Exposure Coefficient K_h and K_z Components and
Cladding (F&T Page 47)

Table 30.5-1 Design Wind Pressures Components and Cladding (F&T Pages 48-
50)

TABLE 1604.5
RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities. • Screen enclosures.
II	Buildings and other structures except those listed in Risk Categories I, III and IV
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing elementary school, secondary school or day care facilities with an occupant load greater than 250. • Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500. • Group I-2 occupancies with an occupant load of 50 or more resident patients but not having surgery or emergency treatment facilities. • Group I-3 occupancies. • Any other occupancy with an occupant load greater than 5,000[a]. • Power-generating stations, water treatment facilities for potable water, waste water treatment facilities and other public utility facilities not included in Risk Category IV. • Buildings and other structures not included in Risk Category IV containing sufficient quantities of toxic or explosive substances to be dangerous to the public if released.
IV	Buildings and other structures designated as essential facilities, including but not limited to: • Group I-2 occupancies having surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures. • Structures containing highly toxic materials as defined by Section 307 where the quantity of the material exceeds the maximum allowable quantities of Table 307.1(2). • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.1 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.
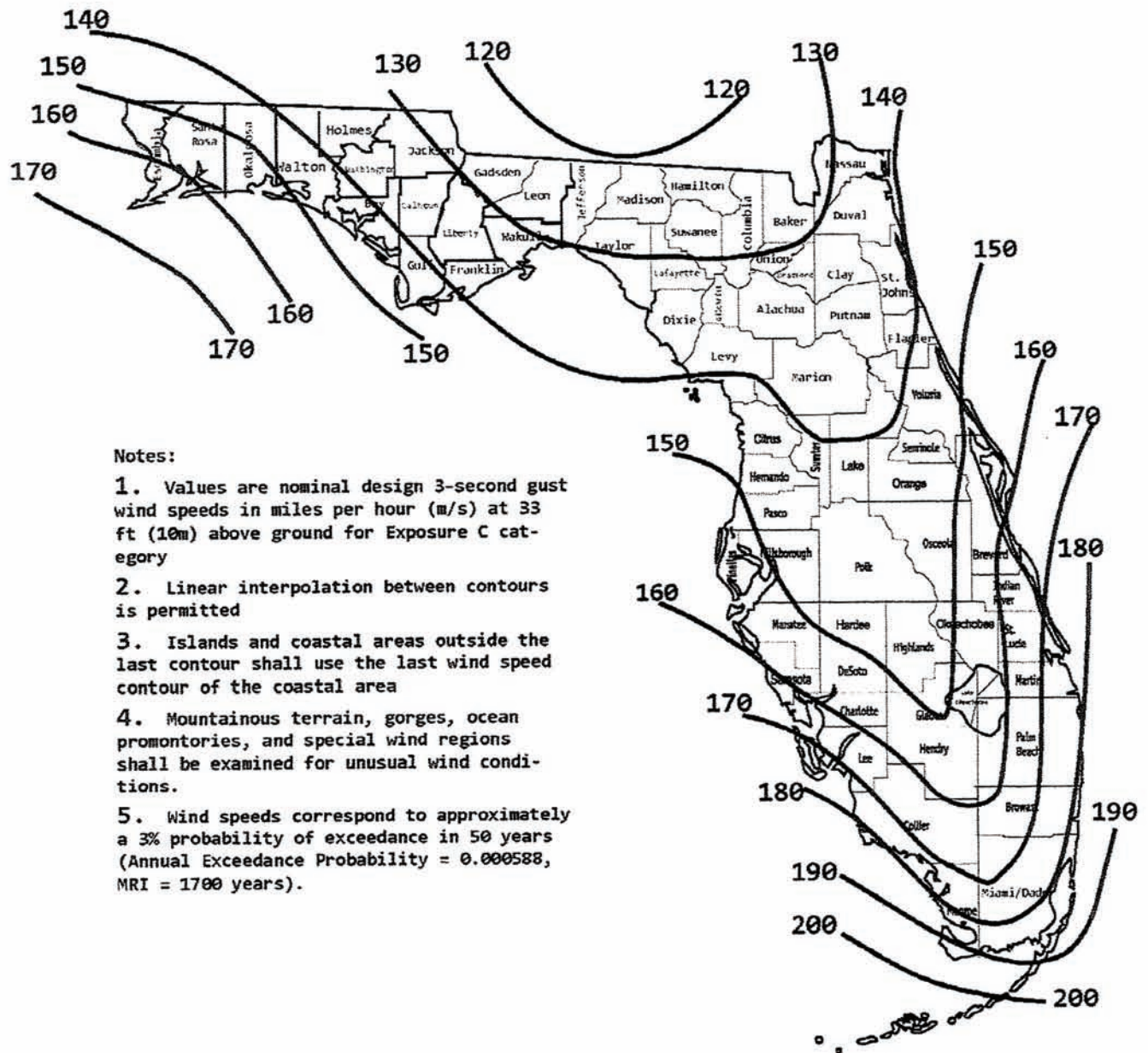
F&T page 1

Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.

2. Linear interpolation between contours is permitted.

3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.

4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 years).

FIGURE 1609A
ULTIMATE DESIGN WIND SPEEDS, V_{alt} FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES

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Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category

2. Linear interpolation between contours is permitted

3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area

4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

5. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (Annual Exceedance Probability = 0.000588, MRI = 1700 years).

FIGURE 1609B
ULTIMATE DESIGN WIND SPEEDS, V_{alt} FOR RISK CATEGORY III AND IV BUILDINGS AND OTHER STRUCTURES
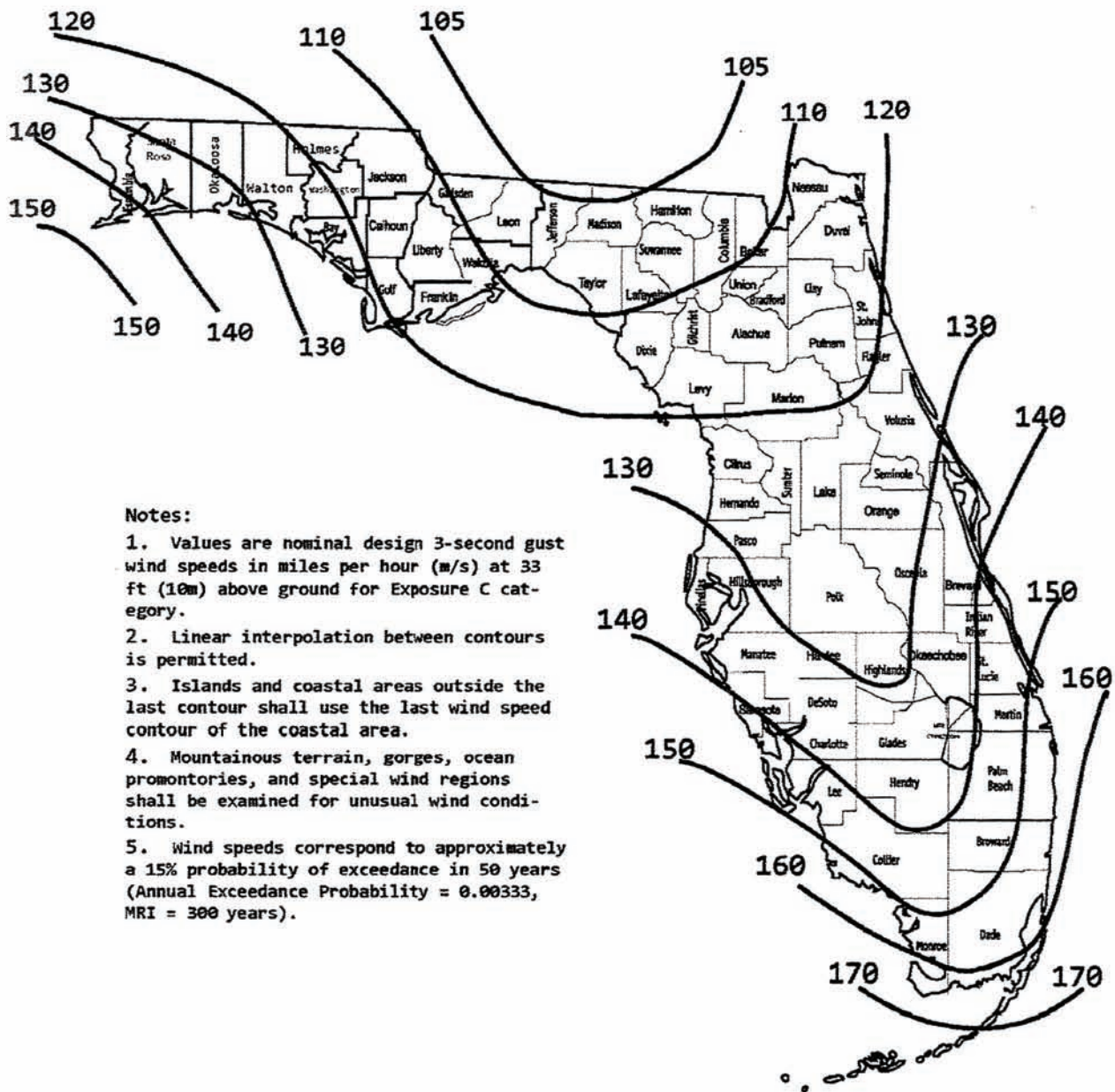
Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.

2. Linear interpolation between contours is permitted.

3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.

4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

5. Wind speeds correspond to approximately a 15% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00333, MRI = 300 years).

FIGURE 1609C
ULTIMATE DESIGN WIND SPEEDS, V$_{alt}$ FOR RISK CATEGORY I BUILDINGS AND OTHER STRUCTURES

TABLE 1609.6.2(2)
NET PRESSURE COEFFICIENTS, C_{net}[a, b]

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR			
	Walls:		Enclosed		Partially enclosed	
			+ Internal pressure	- Internal pressure	+ Internal pressure	- Internal pressure
	Windward wall		0.43	0.73	0.11	1.05
	Leeward wall		-0.51	-0.21	-0.83	0.11
	Sidewall		-0.66	-0.35	-0.97	-0.04
	Parapet wall	Windward	1.28		1.28	
		Leeward	-0.85		-0.85	
	Roofs:		Enclosed		Partially enclosed	
	Wind perpendicular to ridge		+ Internal pressure	- Internal pressure	+ Internal pressure	- Internal pressure
	Leeward roof or flat roof		-0.66	-0.35	-0.97	-0.04
	Windward roof slopes					
	Slope = 2:12 (10°)	Condition 1	-1.09	-0.79	-1.41	-0.47
		Condition 2	-0.28	0.02	-0.60	0.34
	Slope = 4:12 (18°)	Condition 1	-0.73	-0.42	-1.04	-0.11
		Condition 2	-0.05	0.25	-0.37	0.57
	Slope = 5:12 (23°)	Condition 1	-0.58	-0.28	-0.90	0.04
		Condition 2	0.03	0.34	-0.29	0.65
1. Main wind-force-resisting frames and systems	Slope = 6:12 (27°)	Condition 1	-0.47	-0.16	-0.78	0.15
		Condition 2	0.06	0.37	-0.25	0.68
	Slope = 7:12 (30°)	Condition 1	-0.37	-0.06	-0.68	0.25
		Condition 2	0.07	0.37	-0.25	0.69
	Slope = 9:12 (37°)	Condition 1	-0.27	0.04	-0.58	0.35
		Condition 2	0.14	0.44	-0.18	0.76
	Slope = 12:12 (45°)		0.14	0.44	-0.18	0.76
	Wind parallel to ridge and flat roofs		-1.09	-0.79	-1.41	-0.47
	Nonbuilding Structures: Chimneys, Tanks and Similar Structures:					
			h/D			
			1	7	25	
	Square (Wind normal to face)		0.99	1.07	1.53	
	Square (Wind on diagonal)		0.77	0.84	1.15	
	Hexagonal or Octagonal		0.81	0.97	1.13	
	Round		0.65	0.81	0.97	
	Open signs and lattice frameworks		Ratio of solid to gross area			
			< 0.1	0.1 to 0.29	0.3 to 0.7	
	Flat		1.45	1.30	1.16	
	Round		0.87	0.94	1.08	

(continued)

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TABLE 1609.6.2(2)—continued
NET PRESSURE COEFFICIENTS, C_{net}[a, b]

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
	Roof elements and slopes		Enclosed	Partially enclosed
2. Components and cladding not in areas of disconti-nuity—roofs and overhangs	Gable of hipped configurations (Zone 1)			
	Flat < Slope < 6:12 (27°) See ASCE 7 Figure 30.4-2B Zone 1			
	Positive	10 square feet or less	0.58	0.89
		100 square feet or more	0.41	0.72
	Negative	10 square feet or less	-1.00	-1.32
		100 square feet or more	-0.92	-1.23
	Overhang: Flat < Slope < 6:12 (27°) See ASCE 7 Figure 30.4-2A Zone 1			
	Negative	10 square feet or less	-1.45	
		100 square feet or more	-1.36	
		500 square feet or more	-0.94	
	6:12 (27°) < Slope < 12:12 (45°) See ASCE 7 Figure 30.4-2C Zone 1			
	Positive	10 square feet or less	0.92	1.23
		100 square feet or more	0.83	1.15
	Negative	10 square feet or less	-1.00	-1.32
		100 square feet or more	-0.83	-1.15
	Monosloped configurations (Zone 1)		Enclosed	Partially enclosed
	Flat < Slope < 7:12 (30°) See ASCE 7 Figure 30.4-5A Zone 1			
	Positive	10 square feet or less	0.49	0.81
		100 square feet or more	0.41	0.72
	Negative	10 square feet or less	-1.26	-1.57
		100 square feet or more	-1.09	-1.40
	Tall flat-topped roofs $h > 60'$		Enclosed	Partially enclosed
	Flat < Slope < 2:12 (10°) (Zone 1) See ASCE 7 Figure 30.6-1 Zone 1			
	Negative	10 square feet or less	-1.34	-1.66
		500 square feet or more	-0.92	-1.23

(continued)

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TABLE 1609.6.2(2)—continued
NET PRESSURE COEFFICIENTS, C_{net}[a, b]

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
	Roof elements and slopes		Enclosed	Partially enclosed
	Gable or hipped configurations at ridges, eaves and rakes (Zone 2)			
	Flat < Slope < 6:12 (27°) See ASCE 7 Figure 30.4-2B Zone 2			
	Positive	10 square feet or less	0.58	0.89
		100 square feet or more	0.41	10.72
	Negative	10 square feet or less	-1.68	-2.00
		100 square feet or more	-1.17	-1.49
	Overhang for Slope Flat < Slope < 6:12 (27°) See ASCE 7 Figure 30.4-2B Zone 2			
	Negative	10 square feet or less	-1.87	
		100 square feet or more	-1.87	
	6:12 (27°) < Slope < 12:12 (45°) Figure 30.4-2C		Enclosed	Partially enclosed
	Positive	10 square feet or less	0.92	1.23
		100 square feet or more	0.83	1.15
	Negative	10 square feet or less	-1.17	-1.49
		100 square feet or more	-1.00	-1.32
3. Components and cladding in areas of discontinuities—roofs and overhangs	Overhang for 6:12 (27°) < Slope < 12:12 (45°) See ASCE 7 Figure 30.4-2C Zone 2			
	Negative	10 square feet or less	-1.70	
		500 square feet or more	-1.53	
	Monosloped configurations at ridges, eaves and rakes (Zone 2)			
	Flat < Slope < 7:12 (30°) See ASCE 7 Figure 30.4-5A Zone 2			
	Positive	10 square feet or less	0.49	0.81
		100 square feet or more	0.41	0.72
	Negative	10 square feet or less	-1.51	-1.83
		100 square feet or more	-1.43	-1.74
	Tall flat topped roofs $h > 60'$		Enclosed	Partially enclosed
	Flat < Slope < 2:12 (10°) (Zone 2) See ASCE 7 Figure 30.6-1 Zone 2			
	Negative	10 square feet or less	-2.11	-2.42
		500 square feet or more	-1.51	-1.83
	Gable or hipped configurations at corners (Zone 3) See ASCE 7 Figure 30.4-2B Zone 3			
	Flat < Slope < 6:12 (27°)		Enclosed	Partially enclosed
	Positive	10 square feet or less	0.58	0.89
		100 square feet or more	0.41	0.72
	Negative	10 square feet or less	-2.53	-2.85
		100 square feet or more	-1.85	-2.17

(continued)

TABLE 1609.6.2(2)—continued
NET PRESSURE COEFFICIENTS, C_{net}[a, b]

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
3. Components and cladding in areas of discontinuity—roofs and overhangs (continued)	Overhang for Slope Flat < Slope < 6:12 (27°) See ASCE 7 Figure 30.4-2B Zone 3			
	Negative	10 square feet or less	-3.15	
		100 square feet or more	-2.13	
	6:12 (27°) < 12:12 (45°) See ASCE 7 Figure 30.4-2C Zone 3			
	Positive	10 square feet or less	0.92	1.23
		100 square feet or more	0.83	1.15
	Negative	10 square feet or less	-1.17	-1.49
		100 square feet or more	-1.00	-1.32
	Overhang for 6:12 (27°) < Slope < 12:12 (45°)		Enclosed	Partially enclosed
	Negative	10 square feet or less	-1.70	
		100 square feet or more	-1.53	
	Monosloped Configurations at corners (Zone 3) See ASCE 7 Figure 30.4-5A Zone 3			
	Flat < Slope < 7:12 (30°)			
	Positive	10 square feet or less	0.49	0.81
		100 square feet or more	0.41	0.72
	Negative	10 square feet or less	-2.62	-2.93
		100 square feet or more	-1.85	-2.17
	Tall flat topped roofs $h > 60'$		Enclosed	Partially enclosed
	Flat < Slope < 2:12 (10°) (Zone 3) See ASCE 7 Figure 30.6-1 Zone 3			
	Negative	10 square feet or less	-2.87	-3.19
		500 square feet or more	-2.11	-2.42
4. Components and cladding not in areas of discontinuity—walls and parapets	Wall Elements: $h = 60'$ (Zone 4) Figure 6-11A		Enclosed	Partially enclosed
	Positive	10 square feet or less	1.00	1.32
		500 square feet or more	0.75	1.06
	Negative	10 square feet or less	-1.09	-1.40
		500 square feet or more	-0.83	-1.15
	Wall Elements: $h > 60'$ (Zone 4) See ASCE 7 Figure 30.6-1 Zone 4			
	Positive	20 square feet or less	0.92	1.23
		500 square feet or more	0.66	0.98
	Negative	20 square feet or less	-0.92	-1.23
		500 square feet or more	-0.75	-1.06
	Parapet Walls			
	Positive		2.87	3.19
	Negative		-1.68	-2.00

(continued)

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TABLE 1609.6.2(2)—continued
NET PRESSURE COEFFICIENTS, C_{net}[a, b]

STRUCTURE OR PART THEREOF	DESCRIPTION		C_{net} FACTOR	
	Wall elements: $h \leq 60'$ (Zone 5) Figure 30.4-1		Enclosed	Partially enclosed
	Positive	10 square feet or less	1.00	1.32
		500 square feet or more	0.75	1.06
	Negative	10 square feet or less	-1.34	-1.66
		500 square feet or more	-0.83	-1.15
5. Components and cladding in areas of discontinuity—walls and parapets	Wall elements: $h > 60'$ (Zone 5) See ASCE 7 Figure 30.6-1 Zone 4			
	Positive	20 square feet or less	0.92	1.23
		500 square feet or more	0.66	0.98
	Negative	20 square feet or less	-1.68	-2.00
		500 square feet or more	-1.00	-1.32
	Parapet walls			
	Positive		3.64	3.95
	Negative		-2.45	-2.76

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 degree = 0.0175 rad.

a. Linear interpolation between values in the table is permitted.

b. Some C_{net} values have been grouped together. Less conservative results may be obtained by applying ASCE 7 provisions.

TABLE 1609.7(1)
GARAGE DOOR AND ROLLING DOOR WIND LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (psf)

EFFECTIVE WIND AREA		V_{asd} determined in accordance with Section 1609.3.1															
Width (ft)	Height (ft)	85		90		100		110		120		130		140		150	
Roof Angle 0 - 10 degrees																	
8	8	10.5	-11.9	11.7	-13.3	14.5	-16.4	17.5	-19.9	20.9	-23.6	24.5	-27.7	28.4	-32.2	32.6	-36.9
10	10	10.1	-11.4	11.4	-12.7	14.0	-15.7	17.0	-19.0	20.2	-22.7	23.7	-26.6	27.5	-30.8	31.6	-35.4
14	14	10.0	-10.7	10.8	-12.0	13.3	-14.8	16.1	-17.9	19.2	-21.4	22.5	-25.1	26.1	-29.1	30.0	-33.4
Roof Angle > 10																	
9	7	11.4	-12.9	12.8	-14.5	15.8	-17.9	19.1	-21.6	22.8	-25.8	26.7	-30.2	31.0	-35.1	35.6	-40.2
16	7	10.9	-12.2	12.3	-13.7	15.2	-16.9	18.3	-20.4	21.8	-24.3	25.6	-28.5	29.7	-33.1	34.1	-38.0

For SI: 1 Square foot = 0.929 m², 1 mph = 0.447 m/s, 1 psf = 47.88 N/m²

1. For effective areas or wind speeds between those given above the load may be interpolated, otherwise use the load associated with the lower effective area.

2. Table values shall be adjusted for height and exposure by multiplying by adjustment coefficients in Table 1609.7(2).

3. Plus and minus signs signify pressures acting toward and away from the building surfaces.

4. Negative pressures assume door has 2 feet of width in building's end zone.

TABLE 1609.7(2)
ADJUSTMENT FACTOR FOR BUILDING HEIGHT AND EXPOSURE, (λ)

MEAN ROOF HEIGHT (feet)	EXPOSURE		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61
30	1.00	1.40	1.66
35	1.05	1.45	1.70
40	1.09	1.49	1.74
45	1.12	1.53	1.78
50	1.16	1.56	1.81
55	1.19	1.59	1.84
60	1.22	1.62	1.87

For SI: 1 foot = 304.8 mm.

a. All table values shall be adjusted for other exposures and heights by multiplying by the above coefficients.

TABLE 1609.3.1
WIND SPEED CONVERSIONS[a, b, c]

V_{ult}	100	110	120	130	140	150	160	170	180	190	200
V_{asd}	78	85	93	101	108	116	124	132	139	147	155

For SI: 1 mile per hour = 0.447 m/s.

a. Linear interpolation is permitted.

b. V_{asd} = nominal design wind speed.

c. V_{ult} = ultimate design wind speed determined from Figures 1609A, 1609B, or 1609C.

16.18

TABLE 1609.6.2(1)
WIND STAGNATION PRESSURE (q_s) AT STANDARD HEIGHT OF 33 FEET[a]

BASIC WIND SPEED (mph)	105	110	120	125	130	140	150	160	170	180	190	200
PRESSURE, q_s (psf)	28.2	31.0	36.9	40.0	43.3	50.2	57.6	65.5	74.0	83.0	92.4	102.4

For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 47.88 Pa.

a. For basic wind speeds not shown, use $q_s = 0.00256 \, V^2$.

Structure Type	Directionality Factor K_d*

Buildings
    Main Wind Force Resisting System
    Components and Cladding
	0.85
	0.85

Arched Roofs	0.85

Chimneys, Tanks, and Similar Structures
    Square
    Hexagonal
    Round
	0.90
	0.95
	0.95

Solid Freestanding Walls and Solid **Freestanding and Attached Signs**	0.85
Open Signs and Lattice Framework	0.85

Trussed Towers
    Triangular, square, rectangular
    All other cross sections
	0.85
	0.95

*Directionality Factor K_d has been calibrated with combinations of loads specified in Chapter 2. This factor shall only be applied when used in conjunction with load combinations specified in Sections 2.3 and 2.4.

Main Wind Force Resisting System and Components and Cladding	All Heights
Table 26.11-1 Internal Pressure Coefficient, (GC_{pi}) Enclosed, Partially Enclosed, and Open Buildings	**Walls & Roofs**

Enclosure Classification	(GC_{pi})
Open Buildings	0.00
Partially Enclosed Buildings	+0.55 -0.55
Enclosed Buildings	+0.18 -0.18

Notes:

1. Plus and minus signs signify pressures acting toward and away from the internal surfaces, respectively.

2. Values of (GC_{pi}) shall be used with q_z or q_h as specified.

3. Two cases shall be considered to determine the critical load requirements for the appropriate condition:

   (i) a positive value of (GC_{pi}) applied to all internal surfaces
   (ii) a negative value of (GC_{pi}) applied to all internal surfaces

| Velocity Pressure Exposure Coefficients, K_h and K_z |
| Table 27.3-1 |

Height above ground level, z		Exposure		
ft	(m)	B	C	D
0-15	(0-4.6)	0.57	0.85	1.03
20	(6.1)	0.62	0.90	1.08
25	(7.6)	0.66	0.94	1.12
30	(9.1)	0.70	0.98	1.16
40	(12.2)	0.76	1.04	1.22
50	(15.2)	0.81	1.09	1.27
60	(18)	0.85	1.13	1.31
70	(21.3)	0.89	1.17	1.34
80	(24.4)	0.93	1.21	1.38
90	(27.4)	0.96	1.24	1.40
100	(30.5)	0.99	1.26	1.43
120	(36.6)	1.04	1.31	1.48
140	(42.7)	1.09	1.36	1.52
160	(48.8)	1.13	1.39	1.55
180	(54.9)	1.17	1.43	1.58
200	(61.0)	1.20	1.46	1.61
250	(76.2)	1.28	1.53	1.68
300	(91.4)	1.35	1.59	1.73
350	(106.7)	1.41	1.64	1.78
400	(121.9)	1.47	1.69	1.82
450	(137.2)	1.52	1.73	1.86
500	(152.4)	1.56	1.77	1.89

Notes:

1. The velocity pressure exposure coefficient K_z may be determined from the following formula:

   For 15 ft. $\leq z \leq z_g$ For $z < 15$ ft.

   $K_z = 2.01 \ (z/z_g)^{2/\alpha}$ $K_z = 2.01 \ (15/z_g)^{2/\alpha}$

2. α and z_g are tabulated in Table 26.9.1.

3. Linear interpolation for intermediate values of height z is acceptable.

4. Exposure categories are defined in Section 26.7.

GABLE, HIP ROOF

MONOSLOPE ROOF (NOTE 4)
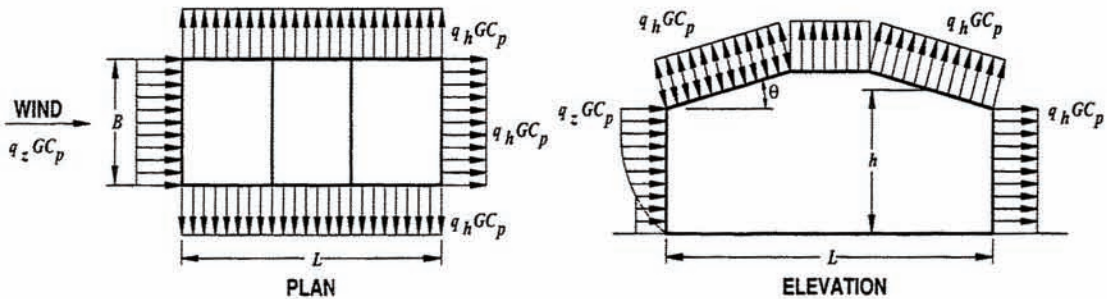
MANSARD ROOF (NOTE 8)

Main Wind Force Resisting System – Part 1		All Heights
Figure 27.4-1 (cont.) External Pressure Coefficients, C_p		**Walls & Roofs**
Enclosed, Partially Enclosed Buildings		

Wall Pressure Coefficients, C_p

Surface	L/B	C_p	Use With
Windward Wall	All values	0.8	q_z
Leeward Wall	0-1	-0.5	
	2	-0.3	q_h
	≥4	-0.2	
Side Wall	All values	-0.7	q_h

Roof Pressure Coefficients, C_p, for use with q_h

Wind Direction		Windward								Leeward		
		Angle, θ (degrees)								Angle, θ (degrees)		
	h/L	10	15	20	25	30	35	45	≥60#	10	15	≥20
Normal to ridge for θ ≥ 10°	≤0.25	-0.7 / -0.18	-0.5 / 0.0*	-0.3 / 0.2	-0.2 / 0.3	-0.2 / 0.3	0.0* / 0.4	0.4	0.01 θ	-0.3	-0.5	-0.6
	0.5	-0.9 / -0.18	-0.7 / -0.18	-0.4 / 0.0*	-0.3 / 0.2	-0.2 / 0.2	-0.2 / 0.3	0.0* / 0.4	0.01 θ	-0.5	-0.5	-0.6
	≥1.0	-1.3** / -0.18	-1.0 / -0.18	-0.7 / -0.18	-0.5 / 0.0*	-0.3 / 0.2	-0.2 / 0.2	0.0* / 0.3	0.01 θ	-0.7	-0.6	-0.6

Normal to ridge for θ < 10 and Parallel to ridge for all θ		Horiz distance from windward edge	C_p	*Value is provided for interpolation purposes.
	≤ 0.5	0 to h/2	-0.9, -0.18	
		h/2 to h	-0.9, -0.18	**Value can be reduced linearly with area over which it is applicable as follows
		h to 2 h	-0.5, -0.18	
		> 2h	-0.3, -0.18	

				Area (sq ft)	Reduction Factor
	≥ 1.0	0 to h/2	-1.3**, -0.18	≤ 100 (9.3 sq m)	1.0
		> h/2	-0.7, -0.18	250 (23.2 sq m)	0.9
				≥ 1000 (92.9 sq m)	0.8

Notes:
1. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
2. Linear interpolation is permitted for values of *L/B*, *h/L* and θ other than shown. Interpolation shall only be carried out between values of the same sign. Where no value of the same sign is given, assume 0.0 for interpolation purposes.
3. Where two values of C_p are listed, this indicates that the windward roof slope is subjected to either positive or negative pressures and the roof structure shall be designed for both conditions. Interpolation for intermediate ratios of h/L in this case shall only be carried out between C_p values of like sign.
4. For monoslope roofs, entire roof surface is either a windward or leeward surface.
5. For flexible buildings use appropriate G_f as determined by Section 26.9.4.
6. Refer to Figure 27.4-2 for domes and Figure 27.4-3 for arched roofs.
7. Notation:
   B: Horizontal dimension of building, in feet (meter), measured normal to wind direction.
   L: Horizontal dimension of building, in feet (meter), measured parallel to wind direction.
   h: Mean roof height in feet (meters), except that eave height shall be used for θ ≤ 10 degrees.
   z: Height above ground, in feet (meters).
   G: Gust effect factor.
   q_z, q_h: Velocity pressure, in pounds per square foot (N/m²), evaluated at respective height.
   θ: Angle of plane of roof from horizontal, in degrees.
8. For mansard roofs, the top horizontal surface and leeward inclined surface shall be treated as leeward surfaces from the table.
9. Except for MWFRS's at the roof consisting of moment resisting frames, the total horizontal shear shall not be less than that determined by neglecting wind forces on roof surfaces.
#For roof slopes greater than 80°, use C_p = 0.8
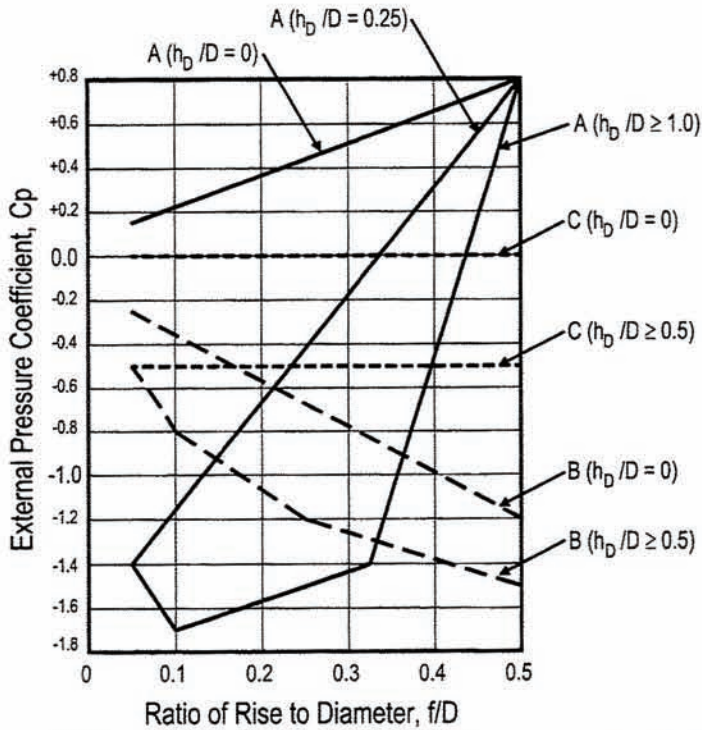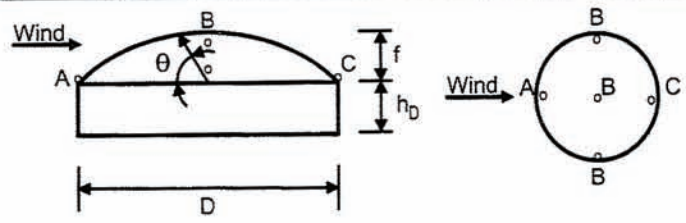
External Pressure Coefficients for Domes with a Circular Base.

(Adapted from Eurocode, 1995)

Notes:

1. Two load cases shall be considered:

   Case A. C_p values between A and B and between B and C shall be determined by linear interpolation along arcs on the dome parallel to the wind direction;

   Case B. C_p shall be the constant value of A for $\theta \leq 25$ degrees, and shall be determined by linear interpolation from 25 degrees to B and from B to C.

2. Values denote C_p to be used with $q_{(h_D+f)}$ where $h_D + f$ is the height at the top of the dome.

3. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.

4. C_p is constant on the dome surface for arcs of circles perpendicular to the wind direction; for example, the arc passing through B-B-B and all arcs parallel to B-B-B.

5. For values of h_D/D between those listed on the graph curves, linear interpolation shall be permitted.

6. $\theta = 0$ degrees on dome springline, $\theta = 90$ degrees at dome center top point. f is measured from springline to top.

7. The total horizontal shear shall not be less than that determined by neglecting wind forces on roof surfaces.

8. For f/D values less than 0.05, use Figure 27.4-1.

Conditions	Rise-to-span ratio, r	C_p		
		Windward quarter	Center half	Leeward quarter
Roof on elevated structure	$0 < r < 0.2$	-0.9	$-0.7 - r$	-0.5
	$0.2 \leq r < 0.3*$	$1.5r - 0.3$	$-0.7 - r$	-0.5
	$0.3 \leq r \leq 0.6$	$2.75r - 0.7$	$-0.7 - r$	-0.5
Roof springing from ground level	$0 < r \leq 0.6$	$1.4r$	$-0.7 - r$	-0.5

*When the rise-to-span ratio is $0.2 \leq r \leq 0.3$, alternate coefficients given by $6r - 2.1$ shall also be used for the windward quarter.

Notes:

1. Values listed are for the determination of average loads on main wind force resisting systems.

2. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.

3. For wind directed parallel to the axis of the arch, use pressure coefficients from Fig. 27.4-1 with wind directed parallel to ridge.

4. For components and cladding: (1) At roof perimeter, use the external pressure coefficients in Fig. 30.4-2A, B and C with θ based on spring-line slope and (2) for remaining roof areas, use external pressure coefficients of this table multiplied by 0.87.

CASE 1

CASE 3

CASE 2

CASE 4

$$M_T = 0.75 \, (P_{WX}+P_{LX})B_X e_X$$
$$e_X = \pm 0.15 \, B_X$$

$$M_T = 0.75 \, (P_{WY}+P_{LY})B_Y e_Y$$
$$e_Y = \pm 0.15 \, B_Y$$

$$M_T = 0.563 \, (P_{WX}+P_{LX})B_X e_X + 0.563 \, (P_{WY}+P_{LY})B_Y e_Y$$
$$e_X = \pm 0.15 \, B_X \qquad e_Y = \pm 0.15 \, B_Y$$
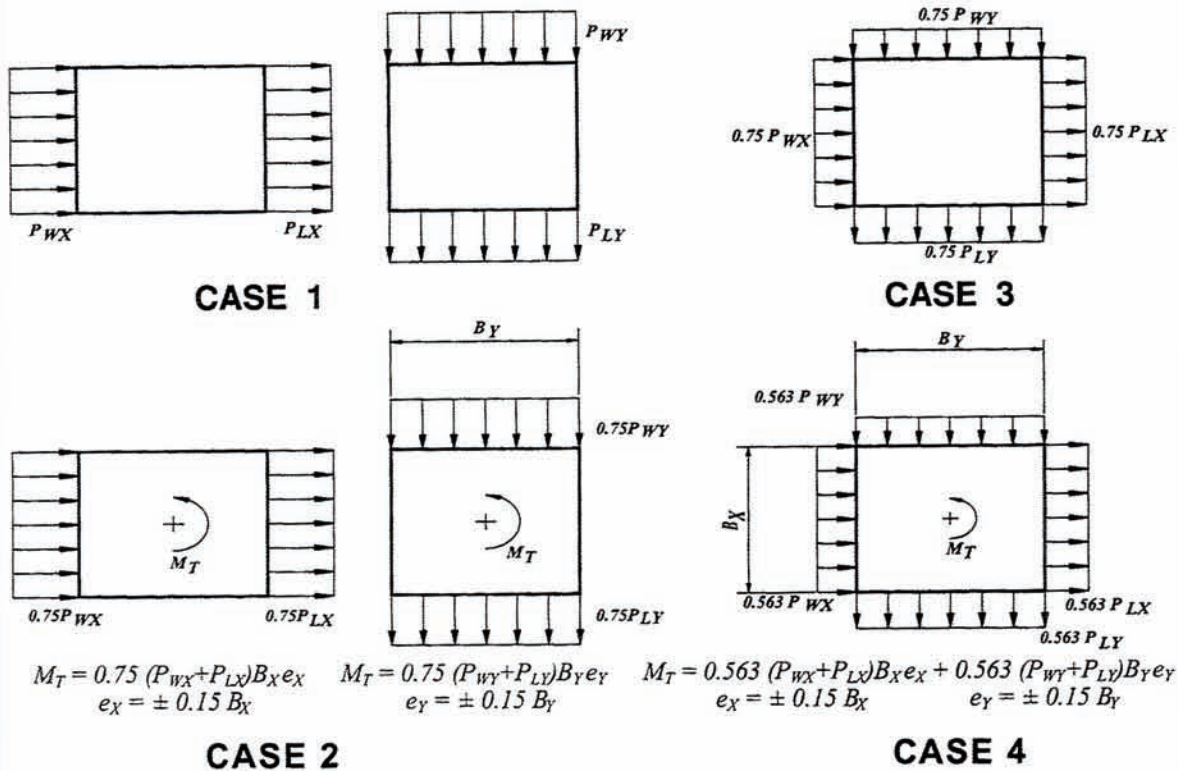
Case 1. Full design wind pressure acting on the projected area perpendicular to each principal axis of the structure, considered separately along each principal axis.

Case 2. Three quarters of the design wind pressure acting on the projected area perpendicular to each principal axis of the structure in conjunction with a torsional moment as shown, considered separately for each principal axis.

Case 3. Wind loading as defined in Case 1, but considered to act simultaneously at 75% of the specified value.

Case 4. Wind loading as defined in Case 2, but considered to act simultaneously at 75% of the specified value.

Notes:

1. Design wind pressures for windward and leeward faces shall be determined in accordance with the provisions of 27.4.1 and 27.4.2 as applicable for building of all heights.
2. Diagrams show plan views of building.
3. Notation:
   P_{WX}, P_{WY}: Windward face design pressure acting in the x, y principal axis, respectively.
   P_{LX}, P_{LY}: Leeward face design pressure acting in the x, y principal axis, respectively.
   e (e_X, e_Y) : Eccentricity for the x, y principal axis of the structure, respectively.
   M_T: Torsional moment per unit height acting about a vertical axis of the building.

Main Wind Force Resisting System – Part 2		h ≤ 160 ft.
Figure 27.5-1	**Building Class**	**Building Geometry Requirements**
Enclosed Simple Diaphragm Buildings		

$0.2L \leq B \leq 5L$

L

Plan

Class 1 Building

Mean roof ht.

$h \leq 60$ ft

Elevation

$0.5L \leq B \leq 2L$

L

Plan

Mean roof ht.

Class 2 Building

$h = 60 - 160$ ft
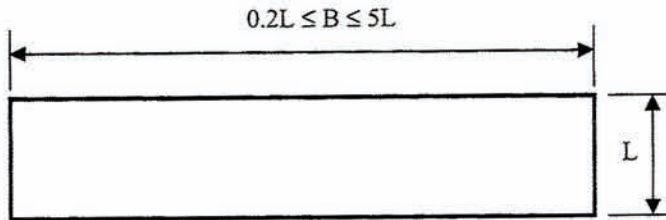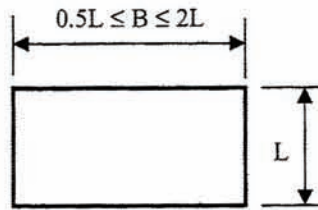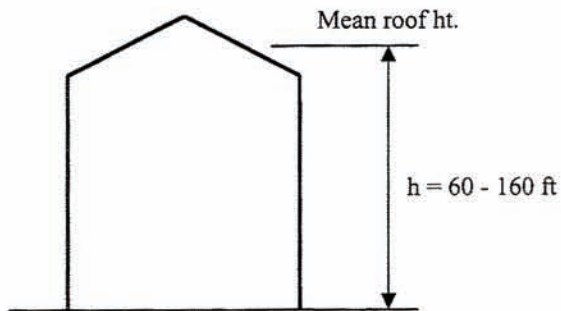
Elevation

Note: Roof form may be flat, gable, mansard or hip

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Main Wind Force Resisting System – Part 2		h ≤ 160 ft.
Figure 27.6-1	Wind Pressures – Walls and Roof	**Application of Wind Pressures**
Enclosed Simple Diaphragm Buildings		**See Tables 27.6-1 and 27.6-2**

See Fig 27.6-2 for parapet wind pressures

Roof Pressures
See Table 27.6-2

Mean roof ht.

θ

p_h

Wall Pressures
See Table 27.6-1

h

p_o

Elevation

L

Wind

B

Plan
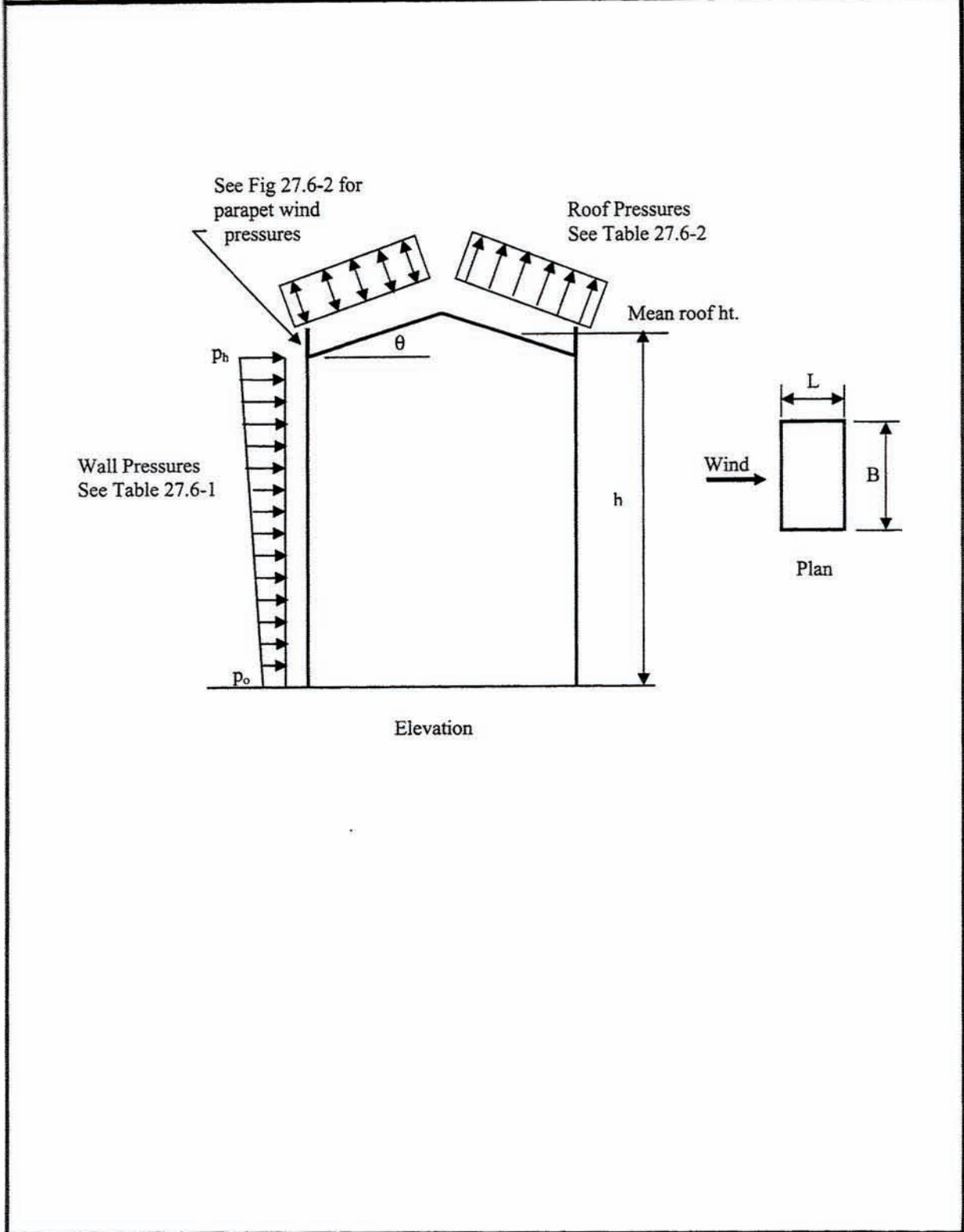
Main Wind Force Resisting System.– Part 2		h ≤ 160 ft.
Figure 27.6-2	**Parapet Wind Loads**	Application of Parapet Wind Loads - See Table 27.6-1
Enclosed Simple Diaphragm Buildings		

p_p

Additional load on MWFRS from all parapets and parapet surfaces

mean roof ht.

h_p

p_h wall pressure from Table 27.6-1 at height h

h

p_p = 2.25 times the pressure determined from Table 27.6-1 for a height measured to the top of the parapet (h_p)

Roof edge pressure from table
Zones 1 or 3 as applicable
p_1 or p_3

Wind Direction

p_{ovh}

$p_{ovh} = 0.75 \times p_1$ or p_3 as applicable,
applied as an additional upward loading
(positive pressure) to roof negative edge
pressures shown

Main Force Resisting System – Part 2		$h \leq 160$ ft.
Table 27.6-1	**Wind Pressures - Walls**	**Application of Wall Pressures**
Enclosed Simple Diaphragm Buildings		

Plan   Wind Pressure   Elevation
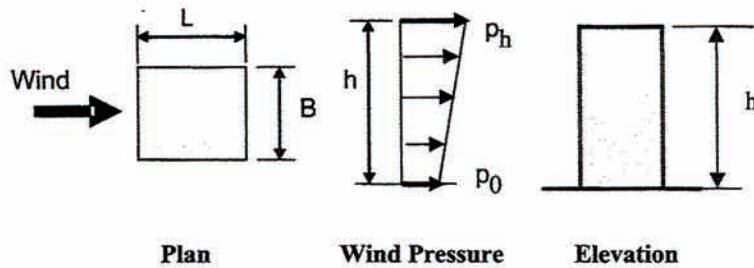
Notes to Wall Pressure Table 27.6-1:

1. From table for each Exposure (B, C or D), V, L/B and h, determine p_h (top number) and p_0 (bottom number) horizontal along-wind net wall pressures.

2. Side wall external pressures shall be uniform over the wall surface acting outward and shall be taken as 54% of the tabulated p_h pressure for $0.2 \leq L/B \leq 1.0$ and 64% of the tabulated p_h pressure for $2.0 \leq L/B \leq 5.0$. Linear interpolation shall apply for $1.0 < L/B < 2.0$. Side wall external pressures do not include effect of internal pressure.

3. Apply along-wind net wall pressures as shown above to the projected area of the building walls in the direction of the wind and apply external side wall pressures to the projected area of the building walls normal to the direction wind, simultaneously with the roof pressures from Table 27.6-2.

4. Distribution of tabulated net wall pressures between windward and leeward wall faces shall be based on the linear distribution of total net pressure with building height as shown above and the leeward external wall pressures assumed uniformly distributed over the leeward wall surface acting outward at 38% of p_h for $0.2 \leq L/B \leq 1.0$ and 27% of p_h for $2.0 \leq L/B \leq 5.0$. Linear interpolation shall be used for $1.0 < L/B < 2.0$. The remaining net pressure shall be applied to the windward walls as an external wall pressure acting towards the wall surface. Windward and leeward wall pressures so determined do not include effect of internal pressure.

5. Interpolation between values of V, h and L/B is permitted.

Notation:
L = building plan dimension parallel to wind direction (ft.)
B = building plan dimension perpendicular to wind direction (ft)
h = mean roof height (ft.)
p_h, p_0 = along-wind net wall pressure at top and base of building respectively (psf)

Table 27.6-1
MWFRS – Part 2: Wind Loads – Walls
Exposure B

V(mph)	110			115			120			130			140			160			180			200		
h(ft.), L/B	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2
160	38.1	37.7	34.1	42.1	41.7	37.8	46.4	45.9	41.7	55.8	55.1	50.2	66.3	65.4	59.7	91.0	89.4	81.8	120.8	118.3	108.5	156.2	152.4	140.0
	25.6	25.4	21.0	28.3	28.1	23.3	31.2	30.9	25.7	37.5	37.1	30.9	44.6	44.0	36.8	61.2	60.1	50.4	81.3	79.6	66.9	105.2	102.6	86.2
150	36.9	36.6	33.0	40.7	40.4	36.5	44.9	44.4	40.3	53.9	53.3	48.5	63.9	63.1	57.6	87.5	86.1	78.9	116.1	113.8	104.5	149.9	146.5	134.7
	25.1	24.9	20.6	27.7	27.5	22.8	30.5	30.2	25.2	36.7	36.2	30.3	43.5	43.0	36.0	59.6	58.6	49.3	79.0	77.4	65.3	102.0	99.7	84.2
140	35.6	35.4	31.9	39.3	39.1	35.3	43.3	42.9	38.9	51.9	51.4	46.7	61.5	60.8	55.5	84.0	82.8	75.9	111.2	109.2	100.4	143.5	140.5	129.3
	24.5	24.4	20.2	27.1	26.9	22.4	29.8	29.6	24.6	35.7	35.4	29.6	42.4	41.9	35.2	57.9	57.0	48.1	76.6	75.2	63.7	98.8	96.7	82.0
130	34.4	34.2	30.8	37.9	37.7	34.0	41.7	41.4	37.4	49.9	49.5	44.9	59.1	58.5	53.3	80.5	79.5	72.8	106.3	104.6	96.2	136.9	134.3	123.8
	24.0	23.9	19.8	26.5	26.3	21.9	29.1	28.9	24.1	34.8	34.5	28.9	41.2	40.8	34.3	56.2	55.4	46.9	74.2	73.0	62.0	95.6	93.7	79.8
120	33.1	33.0	29.6	36.5	36.3	32.7	40.1	39.9	35.9	47.9	47.6	43.1	56.6	56.2	51.0	76.9	76.1	69.6	101.3	99.9	91.8	130.2	128.0	118.0
	23.4	23.3	19.4	25.8	25.7	21.4	28.4	28.2	23.6	33.9	33.7	28.3	40.1	39.7	33.5	54.4	53.8	45.6	71.7	70.7	60.2	92.2	90.6	77.4
110	31.8	31.7	28.4	35.1	34.9	31.3	38.5	38.3	34.4	45.9	45.6	41.2	54.1	53.8	48.8	73.3	72.6	66.3	96.3	95.1	87.4	123.8	121.6	112.1
	22.9	22.8	19.0	25.2	25.1	20.9	27.7	27.5	23.0	33.0	32.8	27.6	38.9	38.7	32.6	52.7	52.2	44.4	69.2	68.4	58.4	88.8	87.4	75.0
100	30.5	30.4	27.1	33.6	33.5	29.9	36.8	36.7	32.9	43.8	43.6	39.3	51.6	51.3	46.4	69.6	69.1	62.9	91.2	90.3	82.8	116.6	115.1	106.0
	22.3	22.3	18.5	24.6	24.5	20.4	26.9	26.8	22.5	32.1	31.9	26.8	37.8	37.6	31.7	50.9	50.5	43.0	66.7	66.0	56.6	85.3	84.2	72.5
90	29.2	29.1	25.9	32.1	32.0	28.5	35.1	35.0	31.2	41.7	41.6	37.3	49.1	48.8	44.0	65.9	65.5	59.5	86.0	85.3	78.0	109.6	108.5	99.8
	21.8	21.7	18.1	23.9	23.9	19.9	26.2	26.1	21.9	31.1	31.0	26.1	36.6	36.4	30.8	49.2	48.9	41.7	64.2	63.6	54.6	81.8	80.9	69.9
80	27.8	27.7	24.5	30.5	30.5	27.0	33.4	33.3	29.6	39.6	39.5	35.2	46.4	46.3	41.5	62.2	61.9	55.9	80.8	80.3	73.1	102.6	101.7	93.3
	21.2	21.2	17.7	23.3	23.2	19.4	25.5	25.4	21.3	30.2	30.1	25.4	35.4	35.3	29.9	47.4	47.2	40.3	61.6	61.2	52.6	78.3	77.6	67.2
70	26.3	26.3	23.1	28.9	28.8	25.4	31.6	31.5	27.9	37.4	37.3	33.1	43.7	43.6	38.9	58.3	58.1	52.2	75.5	75.1	68.1	95.5	94.9	86.6
	20.6	20.6	17.2	22.6	22.6	18.9	24.7	24.7	20.7	29.3	29.2	24.6	34.2	34.2	28.9	45.6	45.5	38.8	59.1	58.8	50.6	74.7	74.3	64.3
60	24.8	24.8	21.7	27.2	27.1	23.8	29.7	29.6	26.1	35.1	35.0	30.9	41.0	40.9	36.2	54.4	54.2	48.4	70.1	69.8	62.8	88.2	87.9	79.6
	20.0	20.0	16.7	21.9	21.9	18.4	23.9	23.9	20.1	28.3	28.2	23.6	33.0	33.0	27.9	43.9	43.8	37.3	56.5	56.3	48.5	71.2	70.9	61.4
50	23.1	23.1	20.2	25.3	25.3	22.1	27.6	27.6	24.2	32.6	32.6	28.6	38.0	38.0	33.4	50.3	50.2	44.5	64.5	64.4	57.4	80.9	80.7	72.5
	19.3	19.3	16.3	21.2	21.2	17.8	23.1	23.1	19.5	27.3	27.3	23.0	31.8	31.8	26.9	42.0	42.0	35.8	54.0	53.8	46.3	67.6	67.5	58.4
40	21.5	21.5	18.6	23.5	23.5	20.4	25.6	25.6	22.3	30.2	30.2	26.3	35.1	35.1	30.7	46.3	46.2	40.7	59.2	59.1	52.3	73.9	73.8	65.7
	18.8	18.7	15.8	20.5	20.5	17.4	22.4	22.4	18.9	26.4	26.4	22.4	30.7	30.7	26.1	40.5	40.4	34.6	51.7	51.7	44.5	64.6	64.5	55.8
30	19.6	19.6	16.9	21.4	21.4	18.5	23.3	23.3	20.2	27.5	27.4	23.8	31.9	31.9	27.7	41.9	41.9	36.6	53.4	53.4	46.8	66.5	66.4	58.5
	18.1	18.1	15.4	19.8	19.8	16.8	21.5	21.5	18.4	25.3	25.3	21.6	29.5	29.5	25.2	38.7	38.7	33.2	49.3	49.3	42.5	61.4	61.3	53.1
20	17.5	17.5	15.1	19.2	19.2	16.6	20.9	20.9	18.1	24.5	24.5	21.2	28.5	28.5	24.7	37.3	37.3	32.4	47.4	47.4	41.3	58.8	58.8	51.4
	17.2	17.2	14.8	18.8	18.8	16.2	20.5	20.5	17.7	24.1	24.1	20.8	28.0	28.0	24.2	36.7	36.7	31.7	46.6	46.6	40.4	57.8	57.7	50.3
15	16.7	16.7	14.5	18.2	18.2	15.8	19.9	19.9	17.3	23.3	23.3	20.3	27.1	27.1	23.6	35.4	35.4	30.9	44.9	44.9	39.3	55.6	55.6	48.7
	16.7	16.7	14.5	18.2	18.2	15.8	19.9	19.9	17.3	23.3	23.3	20.3	27.1	27.1	23.6	35.4	35.4	30.9	44.9	44.9	39.3	55.6	55.6	48.7

Table 27.6-1
MWFRS – Part 2: Wind Loads – Walls
Exposure C

V(mph)	110			115			120			130			140			160			180			200		
h(ft), L/B	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2
160	49.2	48.7	43.7	54.5	53.8	48.3	60.0	59.3	53.3	72.2	71.1	64.1	85.8	84.3	76.1	117.4	115.0	103.9	155.4	151.8	137.2	200.2	195.0	176.2
	36.1	35.7	30.0	40.0	39.5	33.2	44.1	43.5	36.6	53.0	52.2	44.0	62.9	61.9	52.3	86.2	84.4	71.5	114.1	111.4	94.3	146.9	143.1	121.1
150	48.0	47.5	42.6	53.0	52.4	47.1	58.4	57.7	51.9	70.1	69.2	62.3	83.3	82.0	74.0	113.8	111.7	101.0	150.6	147.3	133.3	193.8	189.0	171.0
	35.5	35.2	29.6	39.3	38.8	32.7	43.3	42.8	36.1	52.0	51.3	43.3	61.7	60.7	51.4	84.3	82.8	70.2	111.5	109.1	92.7	143.5	140.0	118.9
140	46.6	46.2	41.4	51.5	51.0	45.8	56.7	56.1	50.4	68.1	67.2	60.6	80.7	79.6	71.8	110.2	108.3	98.0	145.6	142.6	129.2	187.2	182.9	165.7
	34.9	34.6	29.1	38.6	38.2	32.2	42.4	42.0	35.5	50.9	50.3	42.6	60.4	59.5	50.6	82.4	81.0	68.9	108.9	106.7	90.9	140.0	136.8	116.6
130	45.3	45.0	40.2	50.0	49.6	44.5	55.0	54.5	48.9	65.9	65.2	58.7	78.1	77.1	69.6	106.4	104.7	94.8	140.4	137.7	124.9	180.4	176.5	160.1
	34.3	34.0	28.7	37.8	37.5	31.7	41.6	41.2	34.9	49.9	49.3	41.9	59.1	58.3	49.6	80.5	79.2	67.6	106.2	104.1	89.1	136.4	133.4	114.2
120	43.9	43.6	39.0	48.5	48.1	43.1	53.3	52.8	47.4	63.8	63.1	56.8	75.4	74.6	67.3	102.6	101.1	91.5	135.1	132.7	120.5	173.3	169.8	154.3
	33.6	33.4	28.2	37.1	36.8	31.1	40.7	40.4	34.3	48.8	48.3	41.1	57.7	57.1	48.7	78.5	77.3	66.2	103.3	101.5	87.1	132.6	129.9	111.6
110	42.5	42.3	37.7	46.9	46.6	41.6	51.5	51.1	45.8	61.5	61.0	54.8	72.7	72.0	64.8	98.6	97.3	88.1	129.6	127.6	115.8	166.0	163.0	148.2
	32.9	32.8	27.7	36.3	36.1	30.6	39.9	39.6	33.6	47.7	47.3	40.3	56.3	55.8	47.6	76.4	75.4	64.7	100.4	98.8	85.1	128.6	126.3	108.9
100	41.1	40.9	36.4	45.2	45.0	40.1	49.6	49.3	44.1	59.2	58.8	52.7	69.8	69.3	62.3	94.5	93.5	84.5	123.9	122.2	111.0	158.5	155.9	141.9
	32.3	32.1	27.2	35.5	35.4	30.0	39.0	38.8	33.0	46.5	46.2	39.4	54.9	54.4	46.6	74.2	73.4	63.2	97.4	96.0	82.9	124.5	122.5	106.1
90	39.6	39.4	35.0	43.5	43.3	38.5	47.7	47.5	42.3	56.8	56.5	50.6	66.9	66.5	59.7	90.3	89.4	80.8	118.1	116.7	105.9	150.6	148.5	135.2
	31.6	31.5	26.6	34.7	34.6	29.4	38.1	37.9	32.3	45.4	45.1	38.5	53.4	53.1	45.5	72.1	71.4	61.6	94.2	93.2	80.7	120.3	118.6	103.0
80	38.0	37.9	33.5	41.8	41.6	36.9	45.8	45.6	40.5	54.4	54.2	48.3	63.9	63.6	56.9	85.9	85.3	76.8	112.0	111.0	100.5	142.6	140.9	128.1
	30.9	30.8	26.1	33.9	33.8	28.7	37.2	37.1	31.5	44.2	44.0	37.6	52.0	51.7	44.3	69.8	69.3	59.8	91.0	90.2	78.3	115.8	114.5	99.8
70	36.4	36.3	32.0	39.9	39.9	35.2	43.7	43.6	38.6	51.9	51.7	45.9	60.8	60.6	54.0	81.4	81.0	72.7	105.8	105.0	94.9	134.2	133.0	120.7
	30.2	30.1	25.5	33.1	33.1	28.1	36.3	36.2	30.8	43.0	42.9	36.6	50.5	50.3	43.1	67.5	67.2	58.0	87.8	87.1	75.7	111.3	110.3	96.3
60	34.6	34.6	30.3	38.0	38.0	33.3	41.6	41.5	36.5	49.2	49.1	43.4	57.6	57.4	50.9	76.8	76.5	68.8	99.4	98.8	88.9	125.6	124.7	112.8
	29.4	29.4	24.9	32.3	32.2	27.4	35.3	35.2	30.0	41.8	41.7	35.6	48.9	48.8	41.9	65.2	65.0	56.1	84.4	83.9	73.0	106.7	105.9	92.7
50	32.8	32.8	28.6	36.0	36.0	31.4	39.3	39.2	34.3	46.4	46.3	40.7	54.2	54.1	47.7	72.0	71.8	63.7	92.7	92.4	82.5	116.7	116.1	104.4
	28.7	28.6	24.3	31.4	31.4	26.7	34.3	34.3	29.2	40.5	40.5	34.6	47.4	47.3	40.5	62.9	62.7	54.2	81.0	80.7	70.2	101.9	101.4	88.8
40	30.8	30.8	26.7	33.7	33.7	29.3	36.8	36.8	32.0	43.4	43.4	37.8	50.6	50.5	44.2	66.9	66.8	58.8	85.8	85.6	75.8	107.4	107.1	95.5
	27.8	27.8	23.6	30.5	30.5	25.9	33.3	33.2	28.3	39.2	39.2	33.5	45.7	45.7	39.2	60.4	60.3	52.1	77.5	77.3	67.2	97.1	96.8	84.6
30	28.5	28.5	24.6	31.2	31.2	27.0	34.1	34.1	29.5	40.1	40.1	34.8	46.7	46.6	40.5	61.4	61.4	53.6	78.4	78.3	68.8	97.8	97.6	86.1
	26.9	26.9	22.9	29.4	29.4	25.1	32.1	32.1	27.4	37.8	37.8	32.4	44.0	43.9	37.7	57.9	57.8	49.9	73.9	73.8	64.0	92.1	91.9	80.2
20	26.2	26.2	22.6	28.6	28.6	24.7	31.2	31.2	26.9	36.7	36.7	31.7	42.6	42.6	36.9	55.9	55.9	48.5	71.1	71.1	61.9	88.2	88.0	77.0
	25.8	25.8	22.2	28.3	28.3	24.3	30.8	30.8	26.5	36.2	36.2	31.2	42.1	42.1	36.3	55.2	55.1	47.7	70.1	70.1	60.9	87.1	87.0	75.8
15	25.2	25.2	21.8	27.6	27.6	23.8	30.0	30.0	26.0	35.3	35.3	30.6	41.0	41.0	35.5	53.7	53.7	46.6	68.1	68.1	59.3	84.4	84.4	73.6
	25.2	25.2	21.8	27.6	27.6	23.8	30.0	30.0	26.0	35.3	35.3	30.6	41.0	41.0	35.5	53.7	53.7	46.6	68.1	68.1	59.3	84.4	84.4	73.6

Table 27.6-1
MWFRS – Part 2: Wind Loads – Walls
Exposure D

V(mph) h(ft), L/B	110			115			120			130			140			160			180			200		
	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2
160	55.7	55.1	49.1	61.6	60.8	54.3	67.9	67.0	59.7	81.5	80.3	71.7	96.7	95.0	85.0	131.9	129.2	115.6	173.9	169.9	152.0	223.0	217.5	194.4
	42.9	42.4	35.7	47.4	46.8	39.5	52.2	51.5	43.5	62.7	61.7	52.2	74.4	73.1	61.9	101.4	99.4	84.2	133.7	130.7	110.7	171.5	167.2	141.6
150	54.5	53.9	48.0	60.2	59.5	53.0	66.3	65.4	58.4	79.5	78.4	70.0	94.3	92.8	83.0	128.5	126.0	112.8	169.3	165.6	148.3	217.0	211.8	189.6
	42.2	41.8	35.3	46.7	46.1	39.0	51.4	50.7	43.0	61.6	60.8	51.5	73.1	71.9	61.0	99.6	97.7	83.0	131.2	128.3	109.1	168.2	164.2	139.4
140	53.2	52.7	46.9	58.7	58.1	51.8	64.6	63.9	57.0	77.5	76.5	68.3	91.8	90.4	80.9	124.9	122.7	109.9	164.5	161.1	144.4	210.7	205.9	184.5
	41.6	41.2	34.8	45.9	45.4	38.5	50.5	49.9	42.4	60.6	59.8	50.8	71.7	70.7	60.1	97.7	95.9	81.7	128.6	125.9	107.3	164.7	160.9	137.2
130	51.8	51.4	45.7	57.2	56.7	50.5	62.9	62.3	55.5	75.4	74.5	66.5	89.2	88.0	78.7	121.2	119.2	106.9	159.5	156.4	140.3	204.2	199.7	179.2
	40.9	40.5	34.4	45.1	44.7	38.0	49.7	49.1	41.8	59.5	58.8	50.0	70.4	69.4	59.2	95.7	94.1	80.4	125.8	123.4	105.5	161.1	157.6	134.7
120	50.4	50.1	44.5	55.7	55.2	49.1	61.2	60.6	54.0	73.2	72.4	64.7	86.5	85.5	76.5	117.4	115.6	103.7	154.2	151.5	136.1	197.3	193.3	173.7
	40.2	39.9	33.9	44.4	44.0	37.4	48.8	48.3	41.1	58.3	57.7	49.2	69.0	68.1	58.2	93.6	92.2	78.9	122.9	120.7	103.5	157.3	154.0	132.2
110	49.0	48.7	43.2	54.0	53.6	47.7	59.4	58.9	52.4	70.9	70.2	62.7	83.8	82.8	74.1	113.4	111.9	100.4	148.8	146.3	131.6	190.2	186.5	167.9
	39.5	39.2	33.3	43.5	43.2	36.8	47.8	47.5	40.4	57.2	56.6	48.4	67.5	66.8	57.2	91.4	90.2	77.4	119.9	117.9	101.5	153.2	150.3	129.5
100	47.5	47.3	41.9	52.4	52.0	46.2	57.5	57.1	50.8	68.6	68.0	60.7	80.9	80.1	71.6	109.3	108.0	96.9	143.1	141.0	126.8	182.7	179.5	161.7
	38.8	38.6	32.8	42.7	42.5	36.2	46.9	46.6	39.7	55.9	55.5	47.5	66.0	65.4	56.1	89.2	88.1	75.9	116.8	115.0	99.3	149.0	146.4	126.6
90	46.0	45.8	40.5	50.6	50.4	44.6	55.5	55.2	49.0	66.2	65.7	58.5	77.9	77.3	69.0	105.0	103.9	93.2	137.2	135.4	121.8	174.8	172.1	155.2
	38.0	37.9	32.2	41.9	41.7	35.5	45.9	45.7	39.0	54.7	54.3	46.6	64.4	63.9	54.9	86.8	85.9	74.2	113.5	112.0	97.0	144.6	142.3	123.5
80	44.4	44.2	39.0	48.8	48.6	43.0	53.5	53.3	47.2	63.6	63.3	56.2	74.8	74.3	66.2	100.6	99.7	89.3	131.0	129.6	116.5	166.6	164.4	148.2
	37.3	37.1	31.6	41.0	40.8	34.8	44.9	44.7	38.2	53.4	53.1	45.6	62.8	62.4	53.7	84.4	83.7	72.4	110.0	108.8	94.5	139.9	138.0	120.2
70	42.7	42.6	37.4	46.9	46.8	41.2	51.4	51.2	45.2	61.0	60.7	53.8	71.6	71.2	63.3	95.9	95.2	85.1	124.6	123.5	110.9	158.0	156.3	140.8
	36.5	36.4	31.0	40.1	40.0	34.1	43.9	43.8	37.4	52.1	51.9	44.5	61.2	60.9	52.4	81.9	81.4	70.5	106.5	105.5	91.8	135.0	133.5	116.6
60	40.9	40.9	35.8	44.9	44.8	39.3	49.2	49.0	43.1	58.2	58.1	51.2	68.2	68.0	60.1	91.0	90.6	80.6	117.9	117.1	104.8	149.0	147.7	132.8
	35.7	35.6	30.3	39.2	39.1	33.4	42.9	42.8	36.6	50.8	50.6	43.4	59.5	59.3	51.0	79.4	79.0	68.4	102.8	102.1	88.9	128.9	128.8	112.7
50	39.0	39.0	34.0	42.8	42.7	37.3	46.8	46.7	40.8	55.3	55.2	48.4	64.7	64.5	56.8	85.9	85.6	75.9	110.8	110.3	98.3	139.5	138.7	124.2
	34.9	34.8	29.7	38.2	38.2	32.6	41.8	41.7	35.7	49.4	49.3	42.3	57.7	57.6	49.6	76.7	76.5	66.2	99.0	98.5	85.8	124.6	123.8	108.5
40	37.0	36.9	32.0	40.5	40.5	35.1	44.2	44.2	38.4	52.2	52.1	45.4	60.9	60.8	53.1	80.5	80.4	70.7	103.4	103.1	91.2	129.6	129.1	114.9
	34.0	33.9	28.9	37.2	37.2	31.7	40.6	40.6	34.7	47.9	47.9	41.1	55.9	55.8	48.0	74.0	73.8	63.9	95.0	94.7	82.5	119.1	118.7	103.9
30	34.7	34.6	29.9	37.9	37.7	32.7	41.4	41.4	35.7	48.7	48.7	42.2	56.7	56.7	49.2	74.8	74.7	65.2	95.5	95.4	83.7	119.2	119.0	103.9
	33.0	33.0	28.2	36.1	36.1	30.9	39.4	39.4	33.7	46.4	46.3	39.8	54.0	54.0	46.4	71.1	71.1	61.4	90.9	90.8	78.9	113.5	113.2	98.9
20	32.2	32.1	27.6	35.2	35.2	30.3	38.3	38.3	33.0	45.1	45.1	38.8	52.4	52.4	45.2	68.7	68.7	59.5	87.5	87.4	76.0	108.6	108.5	94.7
	31.8	31.8	27.3	34.8	34.8	29.9	37.9	37.9	32.6	44.6	44.6	38.3	51.8	51.8	44.6	68.0	68.0	58.8	86.5	86.5	75.0	107.5	107.4	93.5
15	31.1	31.1	26.8	34.0	34.0	29.3	37.0	37.0	31.9	43.5	43.5	37.5	50.5	50.5	43.6	66.2	66.1	57.3	84.0	84.0	73.0	104.1	104.1	90.7
	31.1	31.1	26.8	34.0	34.0	29.3	37.0	37.0	31.9	43.5	43.5	37.5	50.5	50.5	43.6	66.1	66.1	57.3	84.0	84.0	73.0	104.1	104.1	90.7

Notes to Roof Pressure Table 27.6-2:

1. From table for Exposure C, V, h and roof slope, determine roof pressure p_h for each roof zone shown in the figures for the applicable roof form. For other exposures B or D, multiply pressures from table by appropriate exposure adjustment factor as determined from figure below.
2. Where two load cases are shown, both load cases shall be investigated. Load case 2 is required to investigate maximum overturning on the building from roof pressures shown.
3. Apply along-wind net wall pressures to the projected area of the building walls in the direction of the wind and apply exterior side wall pressures to the projected area of the building walls normal to the direction of the wind acting outward, simultaneously with the roof pressures from Table 27.6-2.
4. Where a value of zero is shown in the tables for the flat roof case, it is provided for the purpose of interpolation.
5. Interpolation between V, h and roof slope is permitted.

Roof Pressures - MWFRS
Exposure Adjustment Factor

Exposure Adjustment Factor		
h (ft.)	Exp B	Exp D
160	0.809	1.113
150	0.805	1.116
140	0.801	1.118
130	0.796	1.121
120	0.792	1.125
110	0.786	1.128
100	0.781	1.132
90	0.775	1.137
80	0.768	1.141
70	0.760	1.147
60	0.751	1.154
50	0.741	1.161
40	0.729	1.171
30	0.713	1.183
20	0.692	1.201
15	0.677	1.214
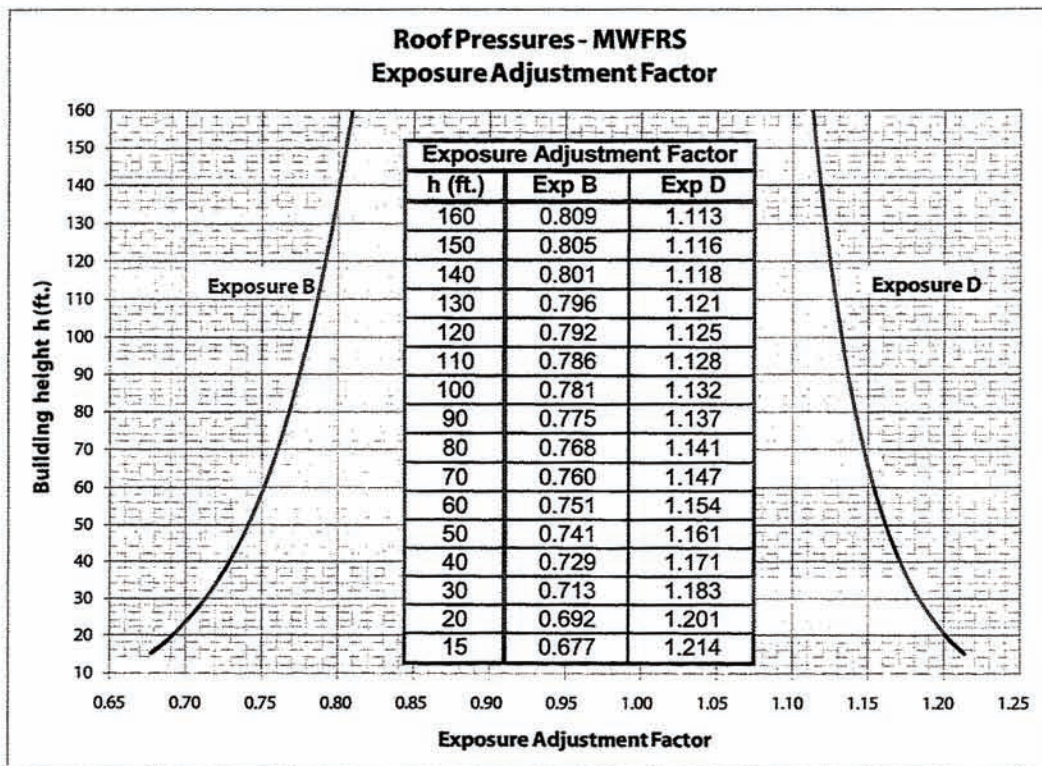
Main Wind Force Resisting System – Part 2		$h \leq 160$ ft.
Table 27.6-2	**Wind Pressures – Roof**	**Application of Roof Pressures**
Enclosed Simple Diaphragm Buildings		

Flat Roof ($\theta < 10$ deg)

Gable Roof

Hip Roof

Monoslope Roof

Mansard Roof

Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

h (ft)	Roof Slope	Load Case	110 Zone 1	2	3	4	5	115 Zone 1	2	3	4	5	120 Zone 1	2	3	4	5
40	Flat < 2:12 (9.46 deg)	1	NA	NA	-29.1	-26.0	-21.3	NA	NA	-31.8	-28.4	-23.3	NA	NA	-34.7	-30.9	-25.3
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-28.6	-19.4	-29.1	-26.0	-21.3	-31.2	-22.5	-31.8	-28.4	-23.3	-34.0	-23.1	-34.7	-30.9	-25.3
		2	4.1	-5.8	0.0	0.0	0.0	4.5	-6.3	0.0	0.0	0.0	4.9	-6.9	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-23.5	-19.0	-29.1	-26.0	-21.3	-25.7	-20.7	-31.8	-28.4	-23.3	-28.0	-22.6	-34.7	-30.9	-25.3
		2	8.1	-8.3	0.0	0.0	0.0	8.9	-9.1	0.0	0.0	0.0	9.7	-9.9	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-18.8	-19.0	-29.1	-26.0	-21.3	-20.6	-20.7	-31.8	-28.4	-23.3	-22.4	-22.6	-34.7	-30.9	-25.3
		2	10.8	-9.1	0.0	0.0	0.0	11.8	-9.9	0.0	0.0	0.0	12.9	-10.8	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-15.1	-19.0	-29.1	-26.0	-21.3	-16.5	-20.7	-31.8	-28.4	-23.3	-18.0	-22.6	-34.7	-30.9	-25.3
		2	12.0	-9.1	0.0	0.0	0.0	13.1	-9.9	0.0	0.0	0.0	14.2	-10.8	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-8.8	-19.0	-29.1	-26.0	-21.3	-9.6	-20.7	-31.8	-28.4	-23.3	-10.4	-22.6	-34.7	-30.9	-25.3
		2	14.3	-9.1	0.0	0.0	0.0	15.6	-9.9	0.0	0.0	0.0	17.0	-10.8	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-4.9	-19.0	-29.1	-26.0	-21.3	-5.4	-20.7	-31.8	-28.4	-23.3	-5.9	-22.6	-34.7	-30.9	-25.3
		2	14.3	-9.1	0.0	0.0	0.0	15.6	-9.9	0.0	0.0	0.0	17.0	-10.8	0.0	0.0	0.0
30	Flat < 2:12 (9.46 deg)	1	NA	NA	-27.4	-24.4	-20.0	NA	NA	-30.0	-26.7	-21.9	NA	NA	-32.6	-29.1	-23.9
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-26.9	-18.3	-27.4	-24.4	-20.0	-29.4	-21.2	-30.0	-26.7	-21.9	-32.0	-21.8	-32.6	-29.1	-23.9
		2	3.9	-5.5	0.0	0.0	0.0	4.2	-6.0	0.0	0.0	0.0	4.6	-6.5	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-22.1	-17.8	-27.4	-24.4	-20.0	-24.2	-19.5	-30.0	-26.7	-21.9	-26.3	-21.2	-32.6	-29.1	-23.9
		2	7.7	-7.8	0.0	0.0	0.0	8.4	-8.6	0.0	0.0	0.0	9.1	-9.3	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-17.7	-17.8	-27.4	-24.4	-20.0	-19.4	-19.5	-30.0	-26.7	-21.9	-21.1	-21.2	-32.6	-29.1	-23.9
		2	10.2	-8.5	0.0	0.0	0.0	11.1	-9.3	0.0	0.0	0.0	12.1	-10.2	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-14.3	-17.8	-27.4	-24.4	-20.0	-15.6	-19.5	-30.0	-26.7	-21.9	-17.0	-21.2	-32.6	-29.1	-23.9
		2	11.3	-8.5	0.0	0.0	0.0	12.3	-9.3	0.0	0.0	0.0	13.4	-10.2	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-8.3	-17.8	-27.4	-24.4	-20.0	-9.0	-19.5	-30.0	-26.7	-21.9	-9.8	-21.2	-32.6	-29.1	-23.9
		2	13.4	-8.5	0.0	0.0	0.0	14.7	-9.3	0.0	0.0	0.0	16.0	-10.2	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-4.7	-17.8	-27.4	-24.4	-20.0	-5.1	-19.5	-30.0	-26.7	-21.9	-5.5	-21.2	-32.6	-29.1	-23.9
		2	13.4	-8.5	0.0	0.0	0.0	14.7	-9.3	0.0	0.0	0.0	16.0	-10.2	0.0	0.0	0.0
20	Flat < 2:12 (9.46 deg)	1	NA	NA	-25.2	-22.4	-18.4	NA	NA	-27.5	-24.5	-20.1	NA	NA	-30.0	-26.7	-21.9
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-24.7	-16.8	-25.2	-22.4	-18.4	-27.0	-19.4	-27.5	-24.5	-20.1	-29.4	-20.0	-30.0	-26.7	-21.9
		2	3.6	-5.0	0.0	0.0	0.0	3.9	-5.5	0.0	0.0	0.0	4.2	-6.0	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-20.3	-16.4	-25.2	-22.4	-18.4	-22.2	-17.9	-27.5	-24.5	-20.1	-24.2	-19.5	-30.0	-26.7	-21.9
		2	7.0	-7.2	0.0	0.0	0.0	7.7	-7.9	0.0	0.0	0.0	8.4	-8.6	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-16.3	-16.4	-25.2	-22.4	-18.4	-17.8	-17.9	-27.5	-24.5	-20.1	-19.4	-19.5	-30.0	-26.7	-21.9
		2	9.4	-7.8	0.0	0.0	0.0	10.2	-8.6	0.0	0.0	0.0	11.1	-9.3	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-13.1	-16.4	-25.2	-22.4	-18.4	-14.3	-17.9	-27.5	-24.5	-20.1	-15.6	-19.5	-30.0	-26.7	-21.9
		2	10.3	-7.8	0.0	0.0	0.0	11.3	-8.6	0.0	0.0	0.0	12.3	-9.3	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-7.6	-16.4	-25.2	-22.4	-18.4	-8.3	-17.9	-27.5	-24.5	-20.1	-9.0	-19.5	-30.0	-26.7	-21.9
		2	12.3	-7.8	0.0	0.0	0.0	13.5	-8.6	0.0	0.0	0.0	14.7	-9.3	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-4.3	-16.4	-25.2	-22.4	-18.4	-4.7	-17.9	-27.5	-24.5	-20.1	-5.1	-19.5	-30.0	-26.7	-21.9
		2	12.3	-7.8	0.0	0.0	0.0	13.5	-8.6	0.0	0.0	0.0	14.7	-9.3	0.0	0.0	0.0
15	Flat < 2:12 (9.46 deg)	1	NA	NA	-23.7	-21.1	-17.3	NA	NA	-25.9	-23.1	-18.9	NA	NA	-28.2	-25.1	-20.6
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-23.2	-15.8	-23.7	-21.1	-17.3	-25.4	-18.3	-25.9	-23.1	-18.9	-27.7	-18.8	-28.2	-25.1	-20.6
		2	3.4	-4.7	0.0	0.0	0.0	3.7	-5.2	0.0	0.0	0.0	4.0	-5.6	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-19.1	-15.4	-23.7	-21.1	-17.3	-20.9	-16.9	-25.9	-23.1	-18.9	-22.7	-18.4	-28.2	-25.1	-20.6
		2	6.6	-6.8	0.0	0.0	0.0	7.2	-7.4	0.0	0.0	0.0	7.9	-8.1	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-15.3	-15.4	-23.7	-21.1	-17.3	-16.8	-16.9	-25.9	-23.1	-18.9	-18.2	-18.4	-28.2	-25.1	-20.6
		2	8.8	-7.4	0.0	0.0	0.0	9.6	-8.1	0.0	0.0	0.0	10.5	-8.8	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-12.3	-15.4	-23.7	-21.1	-17.3	-13.5	-16.9	-25.9	-23.1	-18.9	-14.7	-18.4	-28.2	-25.1	-20.6
		2	9.7	-7.4	0.0	0.0	0.0	10.6	-8.1	0.0	0.0	0.0	11.6	-8.8	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-7.1	-15.4	-23.7	-21.1	-17.3	-7.8	-16.9	-25.9	-23.1	-18.9	-8.5	-18.4	-28.2	-25.1	-20.6
		2	11.6	-7.4	0.0	0.0	0.0	12.7	-8.1	0.0	0.0	0.0	13.8	-8.8	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-4.0	-15.4	-23.7	-21.1	-17.3	-4.4	-16.9	-25.9	-23.1	-18.9	-4.8	-18.4	-28.2	-25.1	-20.6
		2	11.6	-7.4	0.0	0.0	0.0	12.7	-8.1	0.0	0.0	0.0	13.8	-8.8	0.0	0.0	0.0

Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

MWFRS – Roof
V = 130–150 mph
h = 15–40 ft.

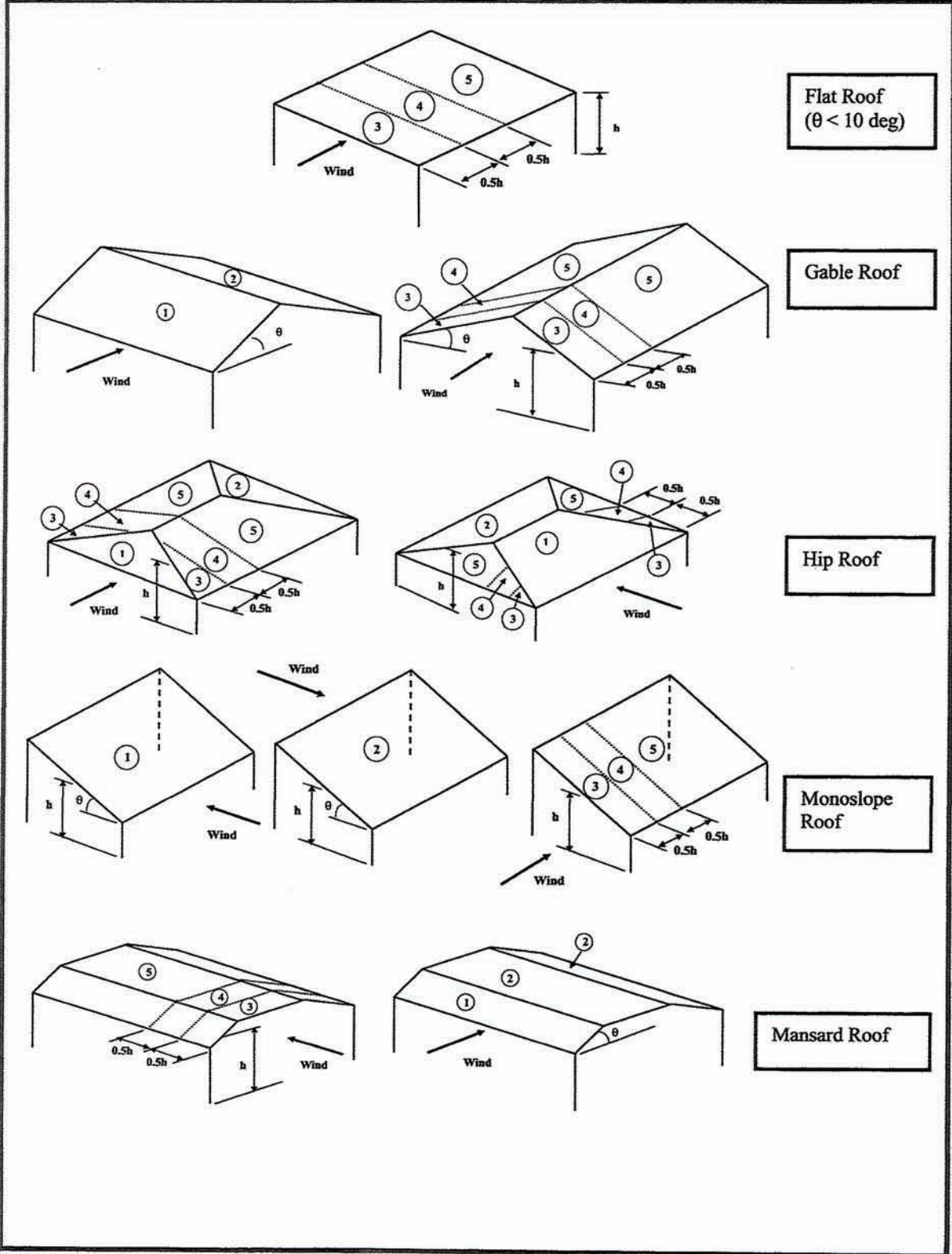| h (ft)	Roof Slope	Load Case	130		Zone			140		Zone			150		Zone		
	V (MPH)		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
40	Flat < 2:12 (9.46 deg)	1	NA	NA	-40.7	-36.3	-29.7	NA	NA	-47.2	-42.1	-34.5	NA	NA	-54.2	-48.3	-39.6
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-39.9	-27.1	-40.7	-36.3	-29.7	-46.3	-31.5	-47.2	-42.1	-34.5	-53.1	-36.1	-54.2	-48.3	-39.6
		2	5.8	-8.1	0.0	0.0	0.0	6.7	-9.4	0.0	0.0	0.0	7.7	-10.8	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-32.8	-26.5	-40.7	-36.3	-29.7	-38.1	-30.7	-47.2	-42.1	-34.5	-43.7	-35.3	-54.2	-48.3	-39.6
		2	11.4	-11.6	0.0	0.0	0.0	13.2	-13.5	0.0	0.0	0.0	15.1	-15.5	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-26.3	-26.5	-40.7	-36.3	-29.7	-30.5	-30.7	-47.2	-42.1	-34.5	-35.1	-35.3	-54.2	-48.3	-39.6
		2	15.1	-12.7	0.0	0.0	0.0	17.5	-14.7	0.0	0.0	0.0	20.1	-16.9	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-21.1	-26.5	-40.7	-36.3	-29.7	-24.5	-30.7	-47.2	-42.1	-34.5	-28.2	-35.3	-54.2	-48.3	-39.6
		2	16.7	-12.7	0.0	0.0	0.0	19.4	-14.7	0.0	0.0	0.0	22.2	-16.9	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-12.2	-26.5	-40.7	-36.3	-29.7	-14.2	-30.7	-47.2	-42.1	-34.5	-16.3	-35.3	-54.2	-48.3	-39.6
		2	20.0	-12.7	0.0	0.0	0.0	23.1	-14.7	0.0	0.0	0.0	8.5	-16.9	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-6.9	-26.5	-40.7	-36.3	-29.7	-8.0	-30.7	-47.2	-42.1	-34.5	-9.2	-35.3	-54.2	-48.3	-39.6
		2	20.0	-12.7	0.0	0.0	0.0	23.1	-14.7	0.0	0.0	0.0	26.6	-16.9	0.0	0.0	0.0
30	Flat < 2:12 (9.46 deg)	1	NA	NA	-38.3	-34.1	-28.0	NA	NA	-44.4	-39.6	-32.5	NA	NA	-51.0	-45.4	-37.3
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-37.6	-25.5	-38.3	-34.1	-28.0	-43.6	-29.6	-44.4	-39.6	-32.5	-50.0	-34.0	-51.0	-45.4	-37.3
		2	5.4	-7.6	0.0	0.0	0.0	6.3	-8.8	0.0	0.0	0.0	7.2	-10.1	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-30.9	-24.9	-38.3	-34.1	-28.0	-35.8	-28.9	-44.4	-39.6	-32.5	-41.1	-33.2	-51.0	-45.4	-37.3
		2	10.7	-10.9	0.0	0.0	0.0	12.4	-12.7	0.0	0.0	0.0	14.2	-14.6	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-24.8	-24.9	-38.3	-34.1	-28.0	-28.7	-28.9	-44.4	-39.6	-32.5	-33.0	-33.2	-51.0	-45.4	-37.3
		2	14.2	-11.9	0.0	0.0	0.0	16.5	-13.8	0.0	0.0	0.0	18.9	-15.9	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-19.9	-24.9	-38.3	-34.1	-28.0	-23.1	-28.9	-44.4	-39.6	-32.5	-26.5	-33.2	-51.0	-45.4	-37.3
		2	15.7	-11.9	0.0	0.0	0.0	18.2	-13.8	0.0	0.0	0.0	20.9	-15.9	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-11.5	-24.9	-38.3	-34.1	-28.0	-13.4	-28.9	-44.4	-39.6	-32.5	-15.3	-33.2	-51.0	-45.4	-37.3
		2	18.8	-11.9	0.0	0.0	0.0	21.8	-13.8	0.0	0.0	0.0	8.0	-15.9	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-6.5	-24.9	-38.3	-34.1	-28.0	-7.5	-28.9	-44.4	-39.6	-32.5	-8.7	-33.2	-51.0	-45.4	-37.3
		2	18.8	-11.9	0.0	0.0	0.0	21.8	-13.8	0.0	0.0	0.0	25.0	-15.9	0.0	0.0	0.0
20	Flat < 2:12 (9.46 deg)	1	NA	NA	-35.2	-31.3	-25.7	NA	NA	-40.8	-36.3	-29.8	NA	NA	-46.8	-41.7	-34.2
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-34.5	-23.4	-35.2	-31.3	-25.7	-40.0	-27.2	-40.8	-36.3	-29.8	-45.9	-31.2	-46.8	-41.7	-34.2
		2	5.0	-7.0	0.0	0.0	0.0	5.8	-8.1	0.0	0.0	0.0	6.6	-9.3	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-28.4	-22.9	-35.2	-31.3	-25.7	-32.9	-26.5	-40.8	-36.3	-29.8	-37.8	-30.5	-46.8	-41.7	-34.2
		2	9.8	-10.0	0.0	0.0	0.0	11.4	-11.7	0.0	0.0	0.0	13.1	-13.4	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-22.8	-22.9	-35.2	-31.3	-25.7	-26.4	-26.5	-40.8	-36.3	-29.8	-30.3	-30.5	-46.8	-41.7	-34.2
		2	13.1	-10.9	0.0	0.0	0.0	15.2	-12.7	0.0	0.0	0.0	17.4	-14.6	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-18.3	-22.9	-35.2	-31.3	-25.7	-21.2	-26.5	-40.8	-36.3	-29.8	-24.3	-30.5	-46.8	-41.7	-34.2
		2	14.4	-10.9	0.0	0.0	0.0	16.7	-12.7	0.0	0.0	0.0	19.2	-14.6	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-10.6	-22.9	-35.2	-31.3	-25.7	-12.3	-26.5	-40.8	-36.3	-29.8	-14.1	-30.5	-46.8	-41.7	-34.2
		2	17.2	-10.9	0.0	0.0	0.0	20.0	-12.7	0.0	0.0	0.0	7.4	-14.6	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-6.0	-22.9	-35.2	-31.3	-25.7	-6.9	-26.5	-40.8	-36.3	-29.8	-7.9	-30.5	-46.8	-41.7	-34.2
		2	17.2	-10.9	0.0	0.0	0.0	20.0	-12.7	0.0	0.0	0.0	23.0	-14.6	0.0	0.0	0.0
15	Flat < 2:12 (9.46 deg)	1	NA	NA	-33.1	-29.5	-24.2	NA	NA	-38.4	-34.2	-28.1	NA	NA	-44.1	-39.3	-32.2
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-32.5	-22.1	-33.1	-29.5	-24.2	-37.7	-25.6	-38.4	-34.2	-28.1	-43.2	-29.4	-44.1	-39.3	-32.2
		2	4.7	-6.6	0.0	0.0	0.0	5.4	-7.6	0.0	0.0	0.0	6.2	-8.8	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-26.7	-21.5	-33.1	-29.5	-24.2	-31.0	-25.0	-38.4	-34.2	-28.1	-35.5	-28.7	-44.1	-39.3	-32.2
		2	9.2	-9.5	0.0	0.0	0.0	10.7	-11.0	0.0	0.0	0.0	12.3	-12.6	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-21.4	-21.5	-33.1	-29.5	-24.2	-24.8	-25.0	-38.4	-34.2	-28.1	-28.5	-28.7	-44.1	-39.3	-32.2
		2	12.3	-10.3	0.0	0.0	0.0	14.3	-11.9	0.0	0.0	0.0	16.4	-13.7	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-17.2	-21.5	-33.1	-29.5	-24.2	-19.9	-25.0	-38.4	-34.2	-28.1	-22.9	-28.7	-44.1	-39.3	-32.2
		2	13.6	-10.3	0.0	0.0	0.0	15.7	-11.9	0.0	0.0	0.0	18.1	-13.7	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-10.0	-21.5	-33.1	-29.5	-24.2	-11.5	-25.0	-38.4	-34.2	-28.1	-13.3	-28.7	-44.1	-39.3	-32.2
		2	16.2	-10.3	0.0	0.0	0.0	18.8	-11.9	0.0	0.0	0.0	6.9	-13.7	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-5.6	-21.5	-33.1	-29.5	-24.2	-6.5	-25.0	-38.4	-34.2	-28.1	-7.5	-28.7	-44.1	-39.3	-32.2
		2	16.2	-10.3	0.0	0.0	0.0	18.8	-11.9	0.0	0.0	0.0	21.6	-13.7	0.0	0.0	0.0

Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

MWFRS – Roof
V = 160–200 mph
h = 15–40 ft.

h (ft)	Roof Slope	Load Case	160 Zone 1	2	3	4	5	180 Zone 1	2	3	4	5	200 Zone 1	2	3	4	5
40	Flat < 2:12 (9.46 deg)	1	NA	NA	-61.6	-54.9	-45.1	NA	NA	-78.0	-69.5	-57.0	NA	NA	-96.3	-85.8	-70.4
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-60.5	-43.5	-61.6	-54.9	-45.1	-76.5	-52.0	-78.0	-69.5	-57.0	-94.5	-64.2	-96.3	-85.8	-70.4
		2	8.7	-12.3	0.0	0.0	0.0	11.0	-15.5	0.0	0.0	0.0	13.6	-19.2	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-49.7	-40.1	-61.6	-54.9	-45.1	-62.9	-50.8	-78.0	-69.5	-57.0	-77.7	-62.7	-96.3	-85.8	-70.4
		2	17.2	-17.6	0.0	0.0	0.0	21.8	-22.3	0.0	0.0	0.0	26.9	-27.5	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-39.9	-40.1	-61.6	-54.9	-45.1	-50.5	-50.8	-78.0	-69.5	-57.0	-62.3	-62.7	-96.3	-85.8	-70.4
		2	22.9	-19.2	0.0	0.0	0.0	29.0	-24.3	0.0	0.0	0.0	35.8	-30.0	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-32.0	-40.1	-61.6	-54.9	-45.1	-40.5	-50.8	-78.0	-69.5	-57.0	-50.0	-62.7	-96.3	-85.8	-70.4
		2	25.3	-19.2	0.0	0.0	0.0	32.0	-24.3	0.0	0.0	0.0	39.5	-30.0	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-18.5	-40.1	-61.6	-54.9	-45.1	-23.5	-50.8	-78.0	-69.5	-57.0	-29.0	-62.7	-96.3	-85.8	-70.4
		2	30.2	-19.2	0.0	0.0	0.0	38.3	-24.3	0.0	0.0	0.0	47.2	-30.0	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-10.5	-40.1	-61.6	-54.9	-45.1	-13.2	-50.8	-78.0	-69.5	-57.0	-16.3	-62.7	-96.3	-85.8	-70.4
		2	30.2	-19.2	0.0	0.0	0.0	38.3	-24.3	0.0	0.0	0.0	47.2	-30.0	0.0	0.0	0.0
30	Flat < 2:12 (9.46 deg)	1	NA	NA	-58.0	-51.7	-42.4	NA	NA	-73.4	-65.4	-53.7	NA	NA	-90.6	-80.8	-66.3
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-56.9	-41.0	-58.0	-51.7	-42.4	-72.0	-49.0	-73.4	-65.4	-53.7	-88.9	-60.4	-90.6	-80.8	-66.3
		2	8.2	-11.5	0.0	0.0	0.0	10.4	-14.6	0.0	0.0	0.0	12.8	-18.0	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-46.8	-37.8	-58.0	-51.7	-42.4	-59.2	-47.8	-73.4	-65.4	-53.7	-73.1	-59.0	-90.6	-80.8	-66.3
		2	16.2	-16.6	0.0	0.0	0.0	20.5	-21.0	0.0	0.0	0.0	25.3	-25.9	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-37.5	-37.8	-58.0	-51.7	-42.4	-47.5	-47.8	-73.4	-65.4	-53.7	-58.6	-59.0	-90.6	-80.8	-66.3
		2	21.6	-18.1	0.0	0.0	0.0	27.3	-22.9	0.0	0.0	0.0	33.7	-28.2	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-30.1	-37.8	-58.0	-51.7	-42.4	-38.2	-47.8	-73.4	-65.4	-53.7	-47.1	-59.0	-90.6	-80.8	-66.3
		2	23.8	-18.1	0.0	0.0	0.0	30.1	-22.9	0.0	0.0	0.0	37.2	-28.2	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-17.5	-37.8	-58.0	-51.7	-42.4	-22.1	-47.8	-73.4	-65.4	-53.7	-27.3	-59.0	-90.6	-80.8	-66.3
		2	28.5	-18.1	0.0	0.0	0.0	36.0	-22.9	0.0	0.0	0.0	44.5	-28.2	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-9.8	-37.8	-58.0	-51.7	-42.4	-12.5	-47.8	-73.4	-65.4	-53.7	-15.4	-59.0	-90.6	-80.8	-66.3
		2	28.5	-18.1	0.0	0.0	0.0	36.0	-22.9	0.0	0.0	0.0	44.5	-28.2	0.0	0.0	0.0
20	Flat < 2:12 (9.46 deg)	1	NA	NA	-53.3	-47.5	-38.9	NA	NA	-67.4	-60.1	-49.3	NA	NA	-83.2	-74.2	-60.8
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-52.2	-37.6	-53.3	-47.5	-38.9	-66.1	-45.0	-67.4	-60.1	-49.3	-81.6	-55.5	-83.2	-74.2	-60.8
		2	7.5	-10.6	0.0	0.0	0.0	9.5	-13.4	0.0	0.0	0.0	11.8	-16.6	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-43.0	-34.7	-53.3	-47.5	-38.9	-54.4	-43.9	-67.4	-60.1	-49.3	-67.1	-54.2	-83.2	-74.2	-60.8
		2	14.9	-15.2	0.0	0.0	0.0	18.8	-19.3	0.0	0.0	0.0	23.2	-23.8	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-34.5	-34.7	-53.3	-47.5	-38.9	-43.6	-43.9	-67.4	-60.1	-49.3	-53.9	-54.2	-83.2	-74.2	-60.8
		2	19.8	-16.6	0.0	0.0	0.0	25.1	-21.0	0.0	0.0	0.0	30.9	-25.9	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-27.7	-34.7	-53.3	-47.5	-38.9	-35.0	-43.9	-67.4	-60.1	-49.3	-43.3	-54.2	-83.2	-74.2	-60.8
		2	21.9	-16.6	0.0	0.0	0.0	27.7	-21.0	0.0	0.0	0.0	34.1	-25.9	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-16.0	-34.7	-53.3	-47.5	-38.9	-20.3	-43.9	-67.4	-60.1	-49.3	-25.0	-54.2	-83.2	-74.2	-60.8
		2	26.1	-16.6	0.0	0.0	0.0	33.1	-21.0	0.0	0.0	0.0	40.8	-25.9	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-9.0	-34.7	-53.3	-47.5	-38.9	-11.4	-43.9	-67.4	-60.1	-49.3	-14.1	-54.2	-83.2	-74.2	-60.8
		2	26.1	-16.6	0.0	0.0	0.0	33.1	-21.0	0.0	0.0	0.0	40.8	-25.9	0.0	0.0	0.0
15	Flat < 2:12 (9.46 deg)	1	NA	NA	-50.1	-44.7	-36.6	NA	NA	-63.4	-56.6	-46.4	NA	NA	-78.3	-69.8	-57.3
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-49.2	-35.4	-50.1	-44.7	-36.6	-62.2	-42.3	-63.4	-56.6	-46.4	-76.8	-52.2	-78.3	-69.8	-57.3
		2	7.1	-10.0	0.0	0.0	0.0	9.0	-12.6	0.0	0.0	0.0	11.1	-15.6	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-40.4	-32.6	-50.1	-44.7	-36.6	-51.2	-41.3	-63.4	-56.6	-46.4	-63.2	-51.0	-78.3	-69.8	-57.3
		2	14.0	-14.3	0.0	0.0	0.0	17.7	-18.1	0.0	0.0	0.0	21.9	-22.4	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-32.4	-32.6	-50.1	-44.7	-36.6	-41.1	-41.3	-63.4	-56.6	-46.4	-50.7	-51.0	-78.3	-69.8	-57.3
		2	18.6	-15.6	0.0	0.0	0.0	23.6	-19.7	0.0	0.0	0.0	29.1	-24.4	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-26.1	-32.6	-50.1	-44.7	-36.6	-33.0	-41.3	-63.4	-56.6	-46.4	-40.7	-51.0	-78.3	-69.8	-57.3
		2	20.6	-15.6	0.0	0.0	0.0	26.0	-19.7	0.0	0.0	0.0	32.1	-24.4	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-15.1	-32.6	-50.1	-44.7	-36.6	-19.1	-41.3	-63.4	-56.6	-46.4	-23.6	-51.0	-78.3	-69.8	-57.3
		2	24.6	-15.6	0.0	0.0	0.0	31.1	-19.7	0.0	0.0	0.0	38.4	-24.4	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-8.5	-32.6	-50.1	-44.7	-36.6	-10.8	-41.3	-63.4	-56.6	-46.4	-13.3	-51.0	-78.3	-69.8	-57.3
		2	24.6	-15.6	0.0	0.0	0.0	31.1	-19.7	0.0	0.0	0.0	38.4	-24.4	0.0	0.0	0.0

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Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

</div>

MWFRS – Roof
V = 110–120 mph
h = 50–80 ft.

h (ft)	Roof Slope	Load Case	110 Zone 1	2	3	4	5	115 Zone 1	2	3	4	5	120 Zone 1	2	3	4	5
80	Flat < 2:12 (9.46 deg)	1	NA	NA	-33.7	-30.0	-24.6	NA	NA	-36.8	-32.8	-26.9	NA	NA	-40.1	-35.8	-29.3
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-33.1	-22.5	-33.7	-30.0	-24.6	-36.1	-26.0	-36.8	-32.8	-26.9	-39.4	-26.8	-40.1	-35.8	-29.3
		2	4.8	-6.7	0.0	0.0	0.0	5.2	-7.3	0.0	0.0	0.0	5.7	-8.0	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-27.2	-21.9	-33.7	-30.0	-24.6	-29.7	-24.0	-36.8	-32.8	-26.9	-32.4	-26.1	-40.1	-35.8	-29.3
		2	9.4	-9.6	0.0	0.0	0.0	10.3	-10.5	0.0	0.0	0.0	11.2	-11.5	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-21.8	-21.9	-33.7	-30.0	-24.6	-23.8	-24.0	-36.8	-32.8	-26.9	-26.0	-26.1	-40.1	-35.8	-29.3
		2	12.5	-10.5	0.0	0.0	0.0	13.7	-11.5	0.0	0.0	0.0	14.9	-12.5	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-17.5	-21.9	-33.7	-30.0	-24.6	-19.1	-24.0	-36.8	-32.8	-26.9	-20.8	-26.1	-40.1	-35.8	-29.3
		2	13.8	-10.5	0.0	0.0	0.0	15.1	-11.5	0.0	0.0	0.0	16.5	-12.5	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-10.1	-21.9	-33.7	-30.0	-24.6	-11.1	-24.0	-36.8	-32.8	-26.9	-12.1	-26.1	-40.1	-35.8	-29.3
		2	16.5	-10.5	0.0	0.0	0.0	18.1	-11.5	0.0	0.0	0.0	19.7	-12.5	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-5.7	-21.9	-33.7	-30.0	-24.6	-6.3	-24.0	-36.8	-32.8	-26.9	-6.8	-26.1	-40.1	-35.8	-29.3
		2	16.5	-10.5	0.0	0.0	0.0	18.1	-11.5	0.0	0.0	0.0	19.7	-12.5	0.0	0.0	0.0
70	Flat < 2:12 (9.46 deg)	1	NA	NA	-32.8	-29.2	-24.0	NA	NA	-35.8	-31.9	-26.2	NA	NA	-39.0	-34.8	-28.5
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-32.1	-21.9	-32.8	-29.2	-24.0	-35.1	-25.3	-35.8	-31.9	-26.2	-38.3	-26.0	-39.0	-34.8	-28.5
		2	4.6	-6.5	0.0	0.0	0.0	5.1	-7.1	0.0	0.0	0.0	5.5	-7.8	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-26.4	-21.3	-32.8	-29.2	-24.0	-28.9	-23.3	-35.8	-31.9	-26.2	-31.5	-25.4	-39.0	-34.8	-28.5
		2	9.2	-9.4	0.0	0.0	0.0	10.0	-10.2	0.0	0.0	0.0	10.9	-11.1	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-21.2	-21.3	-32.8	-29.2	-24.0	-23.2	-23.3	-35.8	-31.9	-26.2	-25.2	-25.4	-39.0	-34.8	-28.5
		2	12.2	-10.2	0.0	0.0	0.0	13.3	-11.1	0.0	0.0	0.0	14.5	-12.1	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-17.0	-21.3	-32.8	-29.2	-24.0	-18.6	-23.3	-35.8	-31.9	-26.2	-20.3	-25.4	-39.0	-34.8	-28.5
		2	13.4	-10.2	0.0	0.0	0.0	14.7	-11.1	0.0	0.0	0.0	16.0	-12.1	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-9.9	-21.3	-32.8	-29.2	-24.0	-10.8	-23.3	-35.8	-31.9	-26.2	-11.7	-25.4	-39.0	-34.8	-28.5
		2	16.1	-10.2	0.0	0.0	0.0	17.6	-11.1	0.0	0.0	0.0	19.1	-12.1	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-5.6	-21.3	-32.8	-29.2	-24.0	-6.1	-23.3	-35.8	-31.9	-26.2	-6.6	-25.4	-39.0	-34.8	-28.5
		2	16.1	-10.2	0.0	0.0	0.0	17.6	-11.1	0.0	0.0	0.0	19.1	-12.1	0.0	0.0	0.0
60	Flat < 2:12 (9.46 deg)	1	NA	NA	-31.7	-28.3	-23.2	NA	NA	-34.7	-30.9	-25.3	NA	NA	-37.8	-33.7	-27.6
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-31.1	-21.2	-31.7	-28.3	-23.2	-34.0	-24.5	-34.7	-30.9	-25.3	-37.0	-25.2	-37.8	-33.7	-27.6
		2	4.5	-6.3	0.0	0.0	0.0	4.9	-6.9	0.0	0.0	0.0	5.3	-7.5	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-25.6	-20.6	-31.7	-28.3	-23.2	-28.0	-22.6	-34.7	-30.9	-25.3	-30.4	-24.6	-37.8	-33.7	-27.6
		2	8.9	-9.1	0.0	0.0	0.0	9.7	-9.9	0.0	0.0	0.0	10.5	-10.8	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-20.5	-20.6	-31.7	-28.3	-23.2	-22.4	-22.6	-34.7	-30.9	-25.3	-24.4	-24.6	-37.8	-33.7	-27.6
		2	11.8	-9.9	0.0	0.0	0.0	12.9	-10.8	0.0	0.0	0.0	14.0	-11.8	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-16.5	-20.6	-31.7	-28.3	-23.2	-18.0	-22.6	-34.7	-30.9	-25.3	-19.6	-24.6	-37.8	-33.7	-27.6
		2	13.0	-9.9	0.0	0.0	0.0	14.2	-10.8	0.0	0.0	0.0	15.5	-11.8	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-9.5	-20.6	-31.7	-28.3	-23.2	-10.4	-22.6	-34.7	-30.9	-25.3	-11.4	-24.6	-37.8	-33.7	-27.6
		2	15.6	-9.9	0.0	0.0	0.0	17.0	-10.8	0.0	0.0	0.0	18.5	-11.8	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-5.4	-20.6	-31.7	-28.3	-23.2	-5.9	-22.6	-34.7	-30.9	-25.3	-6.4	-24.6	-37.8	-33.7	-27.6
		2	15.6	-9.9	0.0	0.0	0.0	17.0	-10.8	0.0	0.0	0.0	18.5	-11.8	0.0	0.0	0.0
50	Flat < 2:12 (9.46 deg)	1	NA	NA	-30.5	-27.2	-22.3	NA	NA	-33.4	-29.7	-24.4	NA	NA	-36.3	-32.4	-26.6
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-30.0	-20.4	-30.5	-27.2	-22.3	-32.7	-23.6	-33.4	-29.7	-24.4	-35.6	-24.2	-36.3	-32.4	-26.6
		2	4.3	-6.1	0.0	0.0	0.0	4.7	-6.6	0.0	0.0	0.0	5.1	-7.2	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-24.6	-19.9	-30.5	-27.2	-22.3	-26.9	-21.7	-33.4	-29.7	-24.4	-29.3	-23.6	-36.3	-32.4	-26.6
		2	8.5	-8.7	0.0	0.0	0.0	9.3	-9.5	0.0	0.0	0.0	10.1	-10.4	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-19.8	-19.9	-30.5	-27.2	-22.3	-21.6	-21.7	-33.4	-29.7	-24.4	-23.5	-23.6	-36.3	-32.4	-26.6
		2	11.3	-9.5	0.0	0.0	0.0	12.4	-10.4	0.0	0.0	0.0	13.5	-11.3	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-15.9	-19.9	-30.5	-27.2	-22.3	-17.3	-21.7	-33.4	-29.7	-24.4	-18.9	-23.6	-36.3	-32.4	-26.6
		2	12.5	-9.5	0.0	0.0	0.0	13.7	-10.4	0.0	0.0	0.0	14.9	-11.3	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-9.2	-19.9	-30.5	-27.2	-22.3	-10.0	-21.7	-33.4	-29.7	-24.4	-10.9	-23.6	-36.3	-32.4	-26.6
		2	15.0	-9.5	0.0	0.0	0.0	16.4	-10.4	0.0	0.0	0.0	17.8	-11.3	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-5.2	-19.9	-30.5	-27.2	-22.3	-5.7	-21.7	-33.4	-29.7	-24.4	-6.2	-23.6	-36.3	-32.4	-26.6
		2	15.0	-9.5	0.0	0.0	0.0	16.4	-10.4	0.0	0.0	0.0	17.8	-11.3	0.0	0.0	0.0

Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

MWFRS – Roof
V = 130–150 mph
h = 50–80 ft.

h (ft)	Roof Slope	Load Case	130 Zone 1	2	3	4	5	140 Zone 1	2	3	4	5	150 Zone 1	2	3	4	5
80	Flat < 2:12 (9.46 deg)	1	NA	NA	-47.1	-42.0	-34.4	NA	NA	-54.6	-48.7	-39.9	NA	NA	-62.7	-55.9	-45.8
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-46.2	-31.4	-47.1	-42.0	-34.4	-53.6	-36.4	-54.6	-48.7	-39.9	-61.5	-41.8	-62.7	-55.9	-45.8
		2	6.7	-9.4	0.0	0.0	0.0	7.7	-10.9	0.0	0.0	0.0	8.9	-12.5	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-38.0	-30.6	-47.1	-42.0	-34.4	-44.0	-35.5	-54.6	-48.7	-39.9	-50.5	-40.8	-62.7	-55.9	-45.8
		2	13.1	-13.5	0.0	0.0	0.0	15.2	-15.6	0.0	0.0	0.0	17.5	-17.9	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-30.5	-30.6	-47.1	-42.0	-34.4	-35.3	-35.5	-54.6	-48.7	-39.9	-40.6	-40.8	-62.7	-55.9	-45.8
		2	17.5	-14.7	0.0	0.0	0.0	20.3	-17.0	0.0	0.0	0.0	23.3	-19.5	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-24.5	-30.6	-47.1	-42.0	-34.4	-28.4	-35.5	-54.6	-48.7	-39.9	-32.6	-40.8	-62.7	-55.9	-45.8
		2	19.3	-14.7	0.0	0.0	0.0	22.4	-17.0	0.0	0.0	0.0	25.7	-19.5	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-14.2	-30.6	-47.1	-42.0	-34.4	-16.4	-35.5	-54.6	-48.7	-39.9	-18.9	-40.8	-62.7	-55.9	-45.8
		2	23.1	-14.7	0.0	0.0	0.0	26.8	-17.0	0.0	0.0	0.0	9.9	-19.5	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-8.0	-30.6	-47.1	-42.0	-34.4	-9.3	-35.5	-54.6	-48.7	-39.9	-10.6	-40.8	-62.7	-55.9	-45.8
		2	23.1	-14.7	0.0	0.0	0.0	26.8	-17.0	0.0	0.0	0.0	30.7	-19.5	0.0	0.0	0.0
70	Flat < 2:12 (9.46 deg)	1	NA	NA	-45.8	-40.8	-33.5	NA	NA	-53.1	-47.3	-38.8	NA	NA	-60.9	-54.3	-44.5
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-44.9	-30.5	-45.8	-40.8	-33.5	-52.1	-35.4	-53.1	-47.3	-38.8	-59.8	-40.6	-60.9	-54.3	-44.5
		2	6.5	-9.1	0.0	0.0	0.0	7.5	-10.6	0.0	0.0	0.0	8.6	-12.1	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-36.9	-29.8	-45.8	-40.8	-33.5	-42.8	-34.6	-53.1	-47.3	-38.8	-49.1	-39.7	-60.9	-54.3	-44.5
		2	12.8	-13.1	0.0	0.0	0.0	14.8	-15.2	0.0	0.0	0.0	17.0	-17.4	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-29.6	-29.8	-45.8	-40.8	-33.5	-34.4	-34.6	-53.1	-47.3	-38.8	-39.4	-39.7	-60.9	-54.3	-44.5
		2	17.0	-14.2	0.0	0.0	0.0	19.7	-16.5	0.0	0.0	0.0	22.6	-19.0	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-23.8	-29.8	-45.8	-40.8	-33.5	-27.6	-34.6	-53.1	-47.3	-38.8	-31.7	-39.7	-60.9	-54.3	-44.5
		2	18.8	-14.2	0.0	0.0	0.0	21.8	-16.5	0.0	0.0	0.0	25.0	-19.0	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-13.8	-29.8	-45.8	-40.8	-33.5	-16.0	-34.6	-53.1	-47.3	-38.8	-18.3	-39.7	-60.9	-54.3	-44.5
		2	22.5	-14.2	0.0	0.0	0.0	26.0	-16.5	0.0	0.0	0.0	9.6	-19.0	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-7.8	-29.8	-45.8	-40.8	-33.5	-9.0	-34.6	-53.1	-47.3	-38.8	-10.3	-39.7	-60.9	-54.3	-44.5
		2	22.5	-14.2	0.0	0.0	0.0	26.0	-16.5	0.0	0.0	0.0	29.9	-19.0	0.0	0.0	0.0
60	Flat < 2:12 (9.46 deg)	1	NA	NA	-44.3	-39.5	-32.4	NA	NA	-51.4	-45.8	-37.6	NA	NA	-59.0	-52.6	-43.1
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-43.5	-29.6	-44.3	-39.5	-32.4	-50.4	-34.3	-51.4	-45.8	-37.6	-57.9	-39.3	-59.0	-52.6	-43.1
		2	6.3	-8.8	0.0	0.0	0.0	7.3	-10.2	0.0	0.0	0.0	8.3	-11.7	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-35.7	-28.8	-44.3	-39.5	-32.4	-41.4	-33.4	-51.4	-45.8	-37.6	-47.6	-38.4	-59.0	-52.6	-43.1
		2	12.4	-12.7	0.0	0.0	0.0	14.3	-14.7	0.0	0.0	0.0	16.5	-16.9	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-28.7	-28.8	-44.3	-39.5	-32.4	-33.3	-33.4	-51.4	-45.8	-37.6	-38.2	-38.4	-59.0	-52.6	-43.1
		2	16.5	-13.8	0.0	0.0	0.0	19.1	-16.0	0.0	0.0	0.0	21.9	-18.4	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-23.0	-28.8	-44.3	-39.5	-32.4	-26.7	-33.4	-51.4	-45.8	-37.6	-30.7	-38.4	-59.0	-52.6	-43.1
		2	18.2	-13.8	0.0	0.0	0.0	21.1	-16.0	0.0	0.0	0.0	24.2	-18.4	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-13.3	-28.8	-44.3	-39.5	-32.4	-15.5	-33.4	-51.4	-45.8	-37.6	-17.8	-38.4	-59.0	-52.6	-43.1
		2	21.7	-13.8	0.0	0.0	0.0	25.2	-16.0	0.0	0.0	0.0	9.3	-18.4	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-7.5	-28.8	-44.3	-39.5	-32.4	-8.7	-33.4	-51.4	-45.8	-37.6	-10.0	-38.4	-59.0	-52.6	-43.1
		2	21.7	-13.8	0.0	0.0	0.0	25.2	-16.0	0.0	0.0	0.0	28.9	-18.4	0.0	0.0	0.0
50	Flat < 2:12 (9.46 deg)	1	NA	NA	-42.6	-38.0	-31.2	NA	NA	-49.4	-44.1	-36.2	NA	NA	-56.8	-50.6	-41.5
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-41.8	-28.4	-42.6	-38.0	-31.2	-48.5	-33.0	-49.4	-44.1	-36.2	-55.7	-37.9	-56.8	-50.6	-41.5
		2	6.0	-8.5	0.0	0.0	0.0	7.0	-9.8	0.0	0.0	0.0	8.0	-11.3	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-34.4	-27.8	-42.6	-38.0	-31.2	-39.9	-32.2	-49.4	-44.1	-36.2	-45.8	-37.0	-56.8	-50.6	-41.5
		2	11.9	-12.2	0.0	0.0	0.0	13.8	-14.1	0.0	0.0	0.0	15.9	-16.2	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-27.6	-27.8	-42.6	-38.0	-31.2	-32.0	-32.2	-49.4	-44.1	-36.2	-36.7	-37.0	-56.8	-50.6	-41.5
		2	15.8	-13.3	0.0	0.0	0.0	18.4	-15.4	0.0	0.0	0.0	21.1	-17.7	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-22.2	-27.8	-42.6	-38.0	-31.2	-25.7	-32.2	-49.4	-44.1	-36.2	-29.5	-37.0	-56.8	-50.6	-41.5
		2	17.5	-13.3	0.0	0.0	0.0	20.3	-15.4	0.0	0.0	0.0	23.3	-17.7	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-12.8	-27.8	-42.6	-38.0	-31.2	-14.9	-32.2	-49.4	-44.1	-36.2	-17.1	-37.0	-56.8	-50.6	-41.5
		2	20.9	-13.3	0.0	0.0	0.0	24.3	-15.4	0.0	0.0	0.0	8.9	-17.7	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-7.2	-27.8	-42.6	-38.0	-31.2	-8.4	-32.2	-49.4	-44.1	-36.2	-9.6	-37.0	-56.8	-50.6	-41.5
		2	20.9	-13.3	0.0	0.0	0.0	24.3	-15.4	0.0	0.0	0.0	27.8	-17.7	0.0	0.0	0.0

Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

MWFRS – Roof
V = 160–200 mph
h = 50–80 ft.

h (ft)	Roof Slope	Load Case	160 Zone 1	2	3	4	5	180 Zone 1	2	3	4	5	200 Zone 1	2	3	4	5
80	Flat < 2:12 (9.46 deg)	1	NA	NA	-71.3	-63.6	-52.1	NA	NA	-90.2	-80.5	-66.0	NA	NA	-111.4	-99.3	-81.5
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-70.0	-50.4	-71.3	-63.6	-52.1	-88.5	-60.2	-90.2	-80.5	-66.0	-109.3	-74.3	-111.4	-99.3	-81.5
		2	10.1	-14.2	0.0	0.0	0.0	12.8	-18.0	0.0	0.0	0.0	15.8	-22.2	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-57.5	-46.4	-71.3	-63.6	-52.1	-72.8	-58.7	-90.2	-80.5	-66.0	-89.9	-72.5	-111.4	-99.3	-81.5
		2	19.9	-20.4	0.0	0.0	0.0	25.2	-25.8	0.0	0.0	0.0	31.1	-31.8	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-46.1	-46.4	-71.3	-63.6	-52.1	-58.4	-58.7	-90.2	-80.5	-66.0	-72.1	-72.5	-111.4	-99.3	-81.5
		2	26.5	-22.2	0.0	0.0	0.0	33.5	-28.1	0.0	0.0	0.0	41.4	-34.7	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-37.1	-46.4	-71.3	-63.6	-52.1	-46.9	-58.7	-90.2	-80.5	-66.0	-57.9	-72.5	-111.4	-99.3	-81.5
		2	29.3	-22.2	0.0	0.0	0.0	37.0	-28.1	0.0	0.0	0.0	45.7	-34.7	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-21.5	-46.4	-71.3	-63.6	-52.1	-27.2	-58.7	-90.2	-80.5	-66.0	-33.5	-72.5	-111.4	-99.3	-81.5
		2	35.0	-22.2	0.0	0.0	0.0	44.3	-28.1	0.0	0.0	0.0	54.7	-34.7	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-12.1	-46.4	-71.3	-63.6	-52.1	-15.3	-58.7	-90.2	-80.5	-66.0	-18.9	-72.5	-111.4	-99.3	-81.5
		2	35.0	-22.2	0.0	0.0	0.0	44.3	-28.1	0.0	0.0	0.0	54.7	-34.7	0.0	0.0	0.0
70	Flat < 2:12 (9.46 deg)	1	NA	NA	-69.3	-61.8	-50.7	NA	NA	-87.7	-78.2	-64.2	NA	NA	-108.3	-96.6	-79.2
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-68.0	-49.0	-69.3	-61.8	-50.7	-86.1	-58.5	-87.7	-78.2	-64.2	-106.3	-72.2	-108.3	-96.6	-79.2
		2	9.8	-13.8	0.0	0.0	0.0	12.4	-17.5	0.0	0.0	0.0	15.3	-21.6	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-55.9	-45.1	-69.3	-61.8	-50.7	-70.8	-57.1	-87.7	-78.2	-64.2	-87.4	-70.5	-108.3	-96.6	-79.2
		2	19.4	-19.8	0.0	0.0	0.0	24.5	-25.1	0.0	0.0	0.0	30.2	-31.0	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-44.9	-45.1	-69.3	-61.8	-50.7	-56.8	-57.1	-87.7	-78.2	-64.2	-70.1	-70.5	-108.3	-96.6	-79.2
		2	25.8	-21.6	0.0	0.0	0.0	32.6	-27.3	0.0	0.0	0.0	40.3	-33.7	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-36.0	-45.1	-69.3	-61.8	-50.7	-45.6	-57.1	-87.7	-78.2	-64.2	-56.3	-70.5	-108.3	-96.6	-79.2
		2	28.4	-21.6	0.0	0.0	0.0	36.0	-27.3	0.0	0.0	0.0	44.5	-33.7	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-20.9	-45.1	-69.3	-61.8	-50.7	-26.4	-57.1	-87.7	-78.2	-64.2	-32.6	-70.5	-108.3	-96.6	-79.2
		2	34.0	-21.6	0.0	0.0	0.0	43.0	-27.3	0.0	0.0	0.0	53.1	-33.7	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-11.8	-45.1	-69.3	-61.8	-50.7	-14.9	-57.1	-87.7	-78.2	-64.2	-18.4	-70.5	-108.3	-96.6	-79.2
		2	34.0	-21.6	0.0	0.0	0.0	43.0	-27.3	0.0	0.0	0.0	53.1	-33.7	0.0	0.0	0.0
60	Flat < 2:12 (9.46 deg)	1	NA	NA	-67.1	-59.8	-49.1	NA	NA	-84.9	-75.7	-62.1	NA	NA	-104.9	-93.5	-76.7
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-65.8	-47.4	-67.1	-59.8	-49.1	-83.3	-56.7	-84.9	-75.7	-62.1	-102.9	-69.9	-104.9	-93.5	-76.7
		2	9.5	-13.4	0.0	0.0	0.0	12.0	-16.9	0.0	0.0	0.0	14.8	-20.9	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-54.1	-43.7	-67.1	-59.8	-49.1	-68.5	-55.3	-84.9	-75.7	-62.1	-84.6	-68.3	-104.9	-93.5	-76.7
		2	18.7	-19.2	0.0	0.0	0.0	23.7	-24.3	0.0	0.0	0.0	29.3	-30.0	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-43.4	-43.7	-67.1	-59.8	-49.1	-55.0	-55.3	-84.9	-75.7	-62.1	-67.9	-68.3	-104.9	-93.5	-76.7
		2	24.9	-20.9	0.0	0.0	0.0	31.6	-26.4	0.0	0.0	0.0	39.0	-32.6	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-34.9	-43.7	-67.1	-59.8	-49.1	-44.2	-55.3	-84.9	-75.7	-62.1	-54.5	-68.3	-104.9	-93.5	-76.7
		2	27.5	-20.9	0.0	0.0	0.0	34.9	-26.4	0.0	0.0	0.0	43.0	-32.6	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-20.2	-43.7	-67.1	-59.8	-49.1	-25.6	-55.3	-84.9	-75.7	-62.1	-31.6	-68.3	-104.9	-93.5	-76.7
		2	32.9	-20.9	0.0	0.0	0.0	41.7	-26.4	0.0	0.0	0.0	51.4	-32.6	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-11.4	-43.7	-67.1	-59.8	-49.1	-14.4	-55.3	-84.9	-75.7	-62.1	-17.8	-68.3	-104.9	-93.5	-76.7
		2	32.9	-20.9	0.0	0.0	0.0	41.7	-26.4	0.0	0.0	0.0	51.4	-32.6	0.0	0.0	0.0
50	Flat < 2:12 (9.46 deg)	1	NA	NA	-64.6	-57.6	-47.2	NA	NA	-81.7	-72.9	-59.8	NA	NA	-100.9	-90.0	-73.8
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-63.4	-45.6	-64.6	-57.6	-47.2	-80.2	-54.5	-81.7	-72.9	-59.8	-99.0	-67.3	-100.9	-90.0	-73.8
		2	9.1	-12.9	0.0	0.0	0.0	11.6	-16.3	0.0	0.0	0.0	14.3	-20.1	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-52.1	-42.0	-64.6	-57.6	-47.2	-65.9	-53.2	-81.7	-72.9	-59.8	-81.4	-65.7	-100.9	-90.0	-73.8
		2	18.0	-18.5	0.0	0.0	0.0	22.8	-23.4	0.0	0.0	0.0	28.2	-28.8	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-41.8	-42.0	-64.6	-57.6	-47.2	-52.9	-53.2	-81.7	-72.9	-59.8	-65.3	-65.7	-100.9	-90.0	-73.8
		2	24.0	-20.1	0.0	0.0	0.0	30.4	-25.4	0.0	0.0	0.0	37.5	-31.4	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-33.6	-42.0	-64.6	-57.6	-47.2	-42.5	-53.2	-81.7	-72.9	-59.8	-52.5	-65.7	-100.9	-90.0	-73.8
		2	26.5	-20.1	0.0	0.0	0.0	33.5	-25.4	0.0	0.0	0.0	41.4	-31.4	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-19.4	-42.0	-64.6	-57.6	-47.2	-24.6	-53.2	-81.7	-72.9	-59.8	-30.4	-65.7	-100.9	-90.0	-73.8
		2	31.7	-20.1	0.0	0.0	0.0	40.1	-25.4	0.0	0.0	0.0	49.5	-31.4	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-11.0	-42.0	-64.6	-57.6	-47.2	-13.9	-53.2	-81.7	-72.9	-59.8	-17.1	-65.7	-100.9	-90.0	-73.8
		2	31.7	-20.1	0.0	0.0	0.0	40.1	-25.4	0.0	0.0	0.0	49.5	-31.4	0.0	0.0	0.0

Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

MWFRS – Roof
V = 110–120 mph
h = 90–120 ft.

h (ft)	Roof Slope	Load Case	110 Zone 1	110 Zone 2	110 Zone 3	110 Zone 4	110 Zone 5	115 Zone 1	115 Zone 2	115 Zone 3	115 Zone 4	115 Zone 5	120 Zone 1	120 Zone 2	120 Zone 3	120 Zone 4	120 Zone 5
120	Flat < 2:12 (9.46 deg)	1	NA	NA	-36.7	-32.7	-26.8	NA	NA	-40.1	-35.8	-29.3	NA	NA	-43.7	-38.9	-31.9
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-36.0	-24.5	-36.7	-32.7	-26.8	-39.4	-28.3	-40.1	-35.8	-29.3	-42.9	-29.1	-43.7	-38.9	-31.9
		2	5.2	-7.3	0.0	0.0	0.0	5.7	-8.0	0.0	0.0	0.0	6.2	-8.7	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-29.6	-23.9	-36.7	-32.7	-26.8	-32.4	-26.1	-40.1	-35.8	-29.3	-35.2	-28.4	-43.7	-38.9	-31.9
		2	10.2	-10.5	0.0	0.0	0.0	11.2	-11.5	0.0	0.0	0.0	12.2	-12.5	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-23.8	-23.9	-36.7	-32.7	-26.8	-26.0	-26.1	-40.1	-35.8	-29.3	-28.3	-28.4	-43.7	-38.9	-31.9
		2	13.6	-11.4	0.0	0.0	0.0	14.9	-12.5	0.0	0.0	0.0	16.2	-13.6	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-19.1	-23.9	-36.7	-32.7	-26.8	-20.9	-26.1	-40.1	-35.8	-29.3	-22.7	-28.4	-43.7	-38.9	-31.9
		2	15.1	-11.4	0.0	0.0	0.0	16.5	-12.5	0.0	0.0	0.0	17.9	-13.6	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-11.0	-23.9	-36.7	-32.7	-26.8	-12.1	-26.1	-40.1	-35.8	-29.3	-13.1	-28.4	-43.7	-38.9	-31.9
		2	18.0	-11.4	0.0	0.0	0.0	19.7	-12.5	0.0	0.0	0.0	21.4	-13.6	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-6.2	-23.9	-36.7	-32.7	-26.8	-6.8	-26.1	-40.1	-35.8	-29.3	-7.4	-28.4	-43.7	-38.9	-31.9
		2	18.0	-11.4	0.0	0.0	0.0	19.7	-12.5	0.0	0.0	0.0	21.4	-13.6	0.0	0.0	0.0
110	Flat < 2:12 (9.46 deg)	1	NA	NA	-36.0	-32.1	-26.3	NA	NA	-39.4	-35.1	-28.8	NA	NA	-42.9	-38.2	-31.4
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-35.4	-24.0	-36.0	-32.1	-26.3	-38.6	-27.8	-39.4	-35.1	-28.8	-42.1	-28.6	-42.9	-38.2	-31.4
		2	5.1	-7.2	0.0	0.0	0.0	5.6	-7.8	0.0	0.0	0.0	6.1	-8.5	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-29.1	-23.5	-36.0	-32.1	-26.3	-31.8	-25.6	-39.4	-35.1	-28.8	-34.6	-27.9	-42.9	-38.2	-31.4
		2	10.1	-10.3	0.0	0.0	0.0	11.0	-11.3	0.0	0.0	0.0	12.0	-12.3	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-23.3	-23.5	-36.0	-32.1	-26.3	-25.5	-25.6	-39.4	-35.1	-28.8	-27.8	-27.9	-42.9	-38.2	-31.4
		2	13.4	-11.2	0.0	0.0	0.0	14.6	-12.3	0.0	0.0	0.0	15.9	-13.4	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-18.7	-23.5	-36.0	-32.1	-26.3	-20.5	-25.6	-39.4	-35.1	-28.8	-22.3	-27.9	-42.9	-38.2	-31.4
		2	14.8	-11.2	0.0	0.0	0.0	16.2	-12.3	0.0	0.0	0.0	17.6	-13.4	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-10.8	-23.5	-36.0	-32.1	-26.3	-11.9	-25.6	-39.4	-35.1	-28.8	-12.9	-27.9	-42.9	-38.2	-31.4
		2	17.7	-11.2	0.0	0.0	0.0	19.3	-12.3	0.0	0.0	0.0	21.0	-13.4	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-6.1	-23.5	-36.0	-32.1	-26.3	-6.7	-25.6	-39.4	-35.1	-28.8	-7.3	-27.9	-42.9	-38.2	-31.4
		2	17.7	-11.2	0.0	0.0	0.0	19.3	-12.3	0.0	0.0	0.0	21.0	-13.4	0.0	0.0	0.0
100	Flat < 2:12 (9.46 deg)	1	NA	NA	-35.3	-31.5	-25.8	NA	NA	-38.6	-34.4	-28.2	NA	NA	-42.0	-37.5	-30.7
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-34.7	-23.6	-35.3	-31.5	-25.8	-37.9	-27.3	-38.6	-34.4	-28.2	-41.2	-28.0	-42.0	-37.5	-30.7
		2	5.0	-7.0	0.0	0.0	0.0	5.5	-7.7	0.0	0.0	0.0	5.9	-8.4	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-28.5	-23.0	-35.3	-31.5	-25.8	-31.1	-25.1	-38.6	-34.4	-28.2	-33.9	-27.4	-42.0	-37.5	-30.7
		2	9.9	-10.1	0.0	0.0	0.0	10.8	-11.0	0.0	0.0	0.0	11.7	-12.0	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-22.9	-23.0	-35.3	-31.5	-25.8	-25.0	-25.1	-38.6	-34.4	-28.2	-27.2	-27.4	-42.0	-37.5	-30.7
		2	13.1	-11.0	0.0	0.0	0.0	14.4	-12.0	0.0	0.0	0.0	15.6	-13.1	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-18.4	-23.0	-35.3	-31.5	-25.8	-20.1	-25.1	-38.6	-34.4	-28.2	-21.9	-27.4	-42.0	-37.5	-30.7
		2	14.5	-11.0	0.0	0.0	0.0	15.8	-12.0	0.0	0.0	0.0	17.3	-13.1	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-10.6	-23.0	-35.3	-31.5	-25.8	-11.6	-25.1	-38.6	-34.4	-28.2	-12.7	-27.4	-42.0	-37.5	-30.7
		2	17.3	-11.0	0.0	0.0	0.0	18.9	-12.0	0.0	0.0	0.0	20.6	-13.1	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-6.0	-23.0	-35.3	-31.5	-25.8	-6.6	-25.1	-38.6	-34.4	-28.2	-7.1	-27.4	-42.0	-37.5	-30.7
		2	17.3	-11.0	0.0	0.0	0.0	18.9	-12.0	0.0	0.0	0.0	20.6	-13.1	0.0	0.0	0.0
90	Flat < 2:12 (9.46 deg)	1	NA	NA	-34.5	-30.8	-25.3	NA	NA	-37.8	-33.7	-27.6	NA	NA	-41.1	-36.7	-30.1
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-33.9	-23.0	-34.5	-30.8	-25.3	-37.0	-26.7	-37.8	-33.7	-27.6	-40.3	-27.4	-41.1	-36.7	-30.1
		2	4.9	-6.9	0.0	0.0	0.0	5.3	-7.5	0.0	0.0	0.0	5.8	-8.2	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-27.9	-22.5	-34.5	-30.8	-25.3	-30.5	-24.6	-37.8	-33.7	-27.6	-33.2	-26.8	-41.1	-36.7	-30.1
		2	9.6	-9.9	0.0	0.0	0.0	10.5	-10.8	0.0	0.0	0.0	11.5	-11.8	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-22.4	-22.5	-34.5	-30.8	-25.3	-24.4	-24.6	-37.8	-33.7	-27.6	-26.6	-26.8	-41.1	-36.7	-30.1
		2	12.8	-10.8	0.0	0.0	0.0	14.0	-11.8	0.0	0.0	0.0	15.3	-12.8	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-18.0	-22.5	-34.5	-30.8	-25.3	-19.6	-24.6	-37.8	-33.7	-27.6	-21.4	-26.8	-41.1	-36.7	-30.1
		2	14.2	-10.8	0.0	0.0	0.0	15.5	-11.8	0.0	0.0	0.0	16.9	-12.8	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-10.4	-22.5	-34.5	-30.8	-25.3	-11.4	-24.6	-37.8	-33.7	-27.6	-12.4	-26.8	-41.1	-36.7	-30.1
		2	16.9	-10.8	0.0	0.0	0.0	18.5	-11.8	0.0	0.0	0.0	20.2	-12.8	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-5.9	-22.5	-34.5	-30.8	-25.3	-6.4	-24.6	-37.8	-33.7	-27.6	-7.0	-26.8	-41.1	-36.7	-30.1
		2	16.9	-10.8	0.0	0.0	0.0	18.5	-11.8	0.0	0.0	0.0	20.2	-12.8	0.0	0.0	0.0

Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

MWFRS – Roof
V = 130–150 mph
h = 90–120 ft.

h (ft)	Roof Slope	Load Case	130 Zone 1	2	3	4	5	140 Zone 1	2	3	4	5	150 Zone 1	2	3	4	5
120	Flat < 2:12 (9.46 deg)	1	NA	NA	-51.3	-45.7	-37.5	NA	NA	-59.5	-53.0	-43.5	NA	NA	-36.7	-32.7	-26.8
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-50.3	-34.2	-51.3	-45.7	-37.5	-58.3	-39.7	-59.5	-53.0	-43.5	-36.0	-24.5	-36.7	-32.7	-26.8
		2	7.3	-10.2	0.0	0.0	0.0	8.4	-11.8	0.0	0.0	0.0	5.2	-7.3	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-41.4	-33.4	-51.3	-45.7	-37.5	-48.0	-38.7	-59.5	-53.0	-43.5	-29.6	-23.9	-36.7	-32.7	-26.8
		2	14.3	-14.7	0.0	0.0	0.0	16.6	-17.0	0.0	0.0	0.0	10.2	-10.5	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-33.2	-33.4	-51.3	-45.7	-37.5	-38.5	-38.7	-59.5	-53.0	-43.5	-23.8	-23.9	-36.7	-32.7	-26.8
		2	19.1	-16.0	0.0	0.0	0.0	22.1	-18.5	0.0	0.0	0.0	13.6	-11.4	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-26.6	-33.4	-51.3	-45.7	-37.5	-30.9	-38.7	-59.5	-53.0	-43.5	-19.1	-23.9	-36.7	-32.7	-26.8
		2	21.0	-16.0	0.0	0.0	0.0	24.4	-18.5	0.0	0.0	0.0	15.1	-11.4	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-15.4	-33.4	-51.3	-45.7	-37.5	-17.9	-38.7	-59.5	-53.0	-43.5	-11.0	-23.9	-36.7	-32.7	-26.8
		2	25.1	-16.0	0.0	0.0	0.0	29.2	-18.5	0.0	0.0	0.0	18.0	-11.4	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-8.7	-33.4	-51.3	-45.7	-37.5	-10.1	-38.7	-59.5	-53.0	-43.5	-6.2	-23.9	-36.7	-32.7	-26.8
		2	25.1	-16.0	0.0	0.0	0.0	29.2	-18.5	0.0	0.0	0.0	18.0	-11.4	0.0	0.0	0.0
110	Flat < 2:12 (9.46 deg)	1	NA	NA	-50.3	-44.9	-36.8	NA	NA	-58.4	-52.0	-42.7	NA	NA	-36.0	-32.1	-26.3
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-49.4	-33.6	-50.3	-44.9	-36.8	-57.3	-38.9	-58.4	-52.0	-42.7	-35.4	-24.0	-36.0	-32.1	-26.3
		2	7.1	-10.0	0.0	0.0	0.0	8.3	-11.6	0.0	0.0	0.0	5.1	-7.2	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-40.6	-32.8	-50.3	-44.9	-36.8	-47.1	-38.0	-58.4	-52.0	-42.7	-29.1	-23.5	-36.0	-32.1	-26.3
		2	14.1	-14.4	0.0	0.0	0.0	16.3	-16.7	0.0	0.0	0.0	10.1	-10.3	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-32.6	-32.8	-50.3	-44.9	-36.8	-37.8	-38.0	-58.4	-52.0	-42.7	-23.3	-23.5	-36.0	-32.1	-26.3
		2	18.7	-15.7	0.0	0.0	0.0	21.7	-18.2	0.0	0.0	0.0	13.4	-11.2	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-26.2	-32.8	-50.3	-44.9	-36.8	-30.3	-38.0	-58.4	-52.0	-42.7	-18.7	-23.5	-36.0	-32.1	-26.3
		2	20.7	-15.7	0.0	0.0	0.0	24.0	-18.2	0.0	0.0	0.0	14.8	-11.2	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-15.1	-32.8	-50.3	-44.9	-36.8	-17.6	-38.0	-58.4	-52.0	-42.7	-10.8	-23.5	-36.0	-32.1	-26.3
		2	24.7	-15.7	0.0	0.0	0.0	28.6	-18.2	0.0	0.0	0.0	17.7	-11.2	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-8.5	-32.8	-50.3	-44.9	-36.8	-9.9	-38.0	-58.4	-52.0	-42.7	-6.1	-23.5	-36.0	-32.1	-26.3
		2	24.7	-15.7	0.0	0.0	0.0	28.6	-18.2	0.0	0.0	0.0	17.7	-11.2	0.0	0.0	0.0
100	Flat < 2:12 (9.46 deg)	1	NA	NA	-49.3	-44.0	-36.1	NA	NA	-57.2	-51.0	-41.8	NA	NA	-35.3	-31.5	-25.8
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-48.4	-32.9	-49.3	-44.0	-36.1	-56.1	-38.2	-57.2	-51.0	-41.8	-34.7	-23.6	-35.3	-31.5	-25.8
		2	7.0	-9.8	0.0	0.0	0.0	8.1	-11.4	0.0	0.0	0.0	5.0	-7.0	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-39.8	-32.1	-49.3	-44.0	-36.1	-46.2	-37.2	-57.2	-51.0	-41.8	-28.5	-23.0	-35.3	-31.5	-25.8
		2	13.8	-14.1	0.0	0.0	0.0	16.0	-16.4	0.0	0.0	0.0	9.9	-10.1	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-31.9	-32.1	-49.3	-44.0	-36.1	-37.0	-37.2	-57.2	-51.0	-41.8	-22.9	-23.0	-35.3	-31.5	-25.8
		2	18.3	-15.4	0.0	0.0	0.0	21.3	-17.8	0.0	0.0	0.0	13.1	-11.0	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-25.6	-32.1	-49.3	-44.0	-36.1	-29.7	-37.2	-57.2	-51.0	-41.8	-18.4	-23.0	-35.3	-31.5	-25.8
		2	20.2	-15.4	0.0	0.0	0.0	23.5	-17.8	0.0	0.0	0.0	14.5	-11.0	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-14.8	-32.1	-49.3	-44.0	-36.1	-17.2	-37.2	-57.2	-51.0	-41.8	-10.6	-23.0	-35.3	-31.5	-25.8
		2	24.2	-15.4	0.0	0.0	0.0	28.1	-17.8	0.0	0.0	0.0	17.3	-11.0	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-8.4	-32.1	-49.3	-44.0	-36.1	-9.7	-37.2	-57.2	-51.0	-41.8	-6.0	-23.0	-35.3	-31.5	-25.8
		2	24.2	-15.4	0.0	0.0	0.0	28.1	-17.8	0.0	0.0	0.0	17.3	-11.0	0.0	0.0	0.0
90	Flat < 2:12 (9.46 deg)	1	NA	NA	-48.3	-43.0	-35.3	NA	NA	-56.0	-49.9	-40.9	NA	NA	-34.5	-30.8	-25.3
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-47.3	-32.2	-48.3	-43.0	-35.3	-54.9	-37.3	-56.0	-49.9	-40.9	-33.9	-23.0	-34.5	-30.8	-25.3
		2	6.8	-9.6	0.0	0.0	0.0	7.9	-11.1	0.0	0.0	0.0	4.9	-6.9	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-38.9	-31.4	-48.3	-43.0	-35.3	-45.1	-36.4	-56.0	-49.9	-40.9	-27.9	-22.5	-34.5	-30.8	-25.3
		2	13.5	-13.8	0.0	0.0	0.0	15.6	-16.0	0.0	0.0	0.0	9.6	-9.9	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-31.2	-31.4	-48.3	-43.0	-35.3	-36.2	-36.4	-56.0	-49.9	-40.9	-22.4	-22.5	-34.5	-30.8	-25.3
		2	17.9	-15.0	0.0	0.0	0.0	20.8	-17.4	0.0	0.0	0.0	12.8	-10.8	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-25.1	-31.4	-48.3	-43.0	-35.3	-29.1	-36.4	-56.0	-49.9	-40.9	-18.0	-22.5	-34.5	-30.8	-25.3
		2	19.8	-15.0	0.0	0.0	0.0	23.0	-17.4	0.0	0.0	0.0	14.2	-10.8	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-14.5	-31.4	-48.3	-43.0	-35.3	-16.8	-36.4	-56.0	-49.9	-40.9	-10.4	-22.5	-34.5	-30.8	-25.3
		2	23.7	-15.0	0.0	0.0	0.0	27.5	-17.4	0.0	0.0	0.0	16.9	-10.8	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-8.2	-31.4	-48.3	-43.0	-35.3	-9.5	-36.4	-56.0	-49.9	-40.9	-5.9	-22.5	-34.5	-30.8	-25.3
		2	23.7	-15.0	0.0	0.0	0.0	27.5	-17.4	0.0	0.0	0.0	16.9	-10.8	0.0	0.0	0.0

Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

MWFRS – Roof
V = 160–200 mph
h = 90–120 ft.

h (ft)	Roof Slope	Load Case	160 Zone 1	160 Zone 2	160 Zone 3	160 Zone 4	160 Zone 5	180 Zone 1	180 Zone 2	180 Zone 3	180 Zone 4	180 Zone 5	200 Zone 1	200 Zone 2	200 Zone 3	200 Zone 4	200 Zone 5
120	Flat < 2:12 (9.46 deg)	1	NA	NA	-77.7	-69.2	-56.8	NA	NA	-98.3	-87.6	-71.9	NA	NA	-121.3	-108.2	-88.7
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-76.2	-54.8	-77.7	-69.2	-56.8	-96.4	-65.6	-98.3	-87.6	-71.9	-119.0	-80.9	-121.3	-108.2	-88.7
		2	11.0	-15.5	0.0	0.0	0.0	13.9	-19.6	0.0	0.0	0.0	17.2	-24.2	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-62.6	-50.5	-77.7	-69.2	-56.8	-79.3	-64.0	-98.3	-87.6	-71.9	-97.9	-79.0	-121.3	-108.2	-88.7
		2	21.7	-22.2	0.0	0.0	0.0	27.4	-28.1	0.0	0.0	0.0	33.9	-34.7	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-50.3	-50.5	-77.7	-69.2	-56.8	-63.6	-64.0	-98.3	-87.6	-71.9	-78.5	-79.0	-121.3	-108.2	-88.7
		2	28.9	-24.2	0.0	0.0	0.0	36.5	-30.6	0.0	0.0	0.0	45.1	-37.8	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-40.4	-50.5	-77.7	-69.2	-56.8	-51.1	-64.0	-98.3	-87.6	-71.9	-63.1	-79.0	-121.3	-108.2	-88.7
		2	31.9	-24.2	0.0	0.0	0.0	40.3	-30.6	0.0	0.0	0.0	49.8	-37.8	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-23.4	-50.5	-77.7	-69.2	-56.8	-29.6	-64.0	-98.3	-87.6	-71.9	-36.5	-79.0	-121.3	-108.2	-88.7
		2	38.1	-24.2	0.0	0.0	0.0	48.2	-30.6	0.0	0.0	0.0	59.5	-37.8	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-13.2	-50.5	-77.7	-69.2	-56.8	-16.7	-64.0	-98.3	-87.6	-71.9	-20.6	-79.0	-121.3	-108.2	-88.7
		2	38.1	-24.2	0.0	0.0	0.0	48.2	-30.6	0.0	0.0	0.0	59.5	-37.8	0.0	0.0	0.0
110	Flat < 2:12 (9.46 deg)	1	NA	NA	-76.2	-68.0	-55.7	NA	NA	-96.5	-86.0	-70.6	NA	NA	-119.1	-106.2	-87.1
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-74.8	-53.8	-76.2	-68.0	-55.7	-94.7	-64.4	-96.5	-86.0	-70.6	-116.9	-79.5	-119.1	-106.2	-87.1
		2	10.8	-15.2	0.0	0.0	0.0	13.7	-19.2	0.0	0.0	0.0	16.9	-23.7	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-61.5	-49.6	-76.2	-68.0	-55.7	-77.8	-62.8	-96.5	-86.0	-70.6	-96.1	-77.6	-119.1	-106.2	-87.1
		2	21.3	-21.8	0.0	0.0	0.0	26.9	-27.6	0.0	0.0	0.0	33.3	-34.1	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-49.3	-49.6	-76.2	-68.0	-55.7	-62.5	-62.8	-96.5	-86.0	-70.6	-77.1	-77.6	-119.1	-106.2	-87.1
		2	28.3	-23.7	0.0	0.0	0.0	35.9	-30.0	0.0	0.0	0.0	44.3	-37.1	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-39.6	-49.6	-76.2	-68.0	-55.7	-50.2	-62.8	-96.5	-86.0	-70.6	-61.9	-77.6	-119.1	-106.2	-87.1
		2	31.3	-23.7	0.0	0.0	0.0	39.6	-30.0	0.0	0.0	0.0	48.9	-37.1	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-22.9	-49.6	-76.2	-68.0	-55.7	-29.0	-62.8	-96.5	-86.0	-70.6	-35.9	-77.6	-119.1	-106.2	-87.1
		2	37.4	-23.7	0.0	0.0	0.0	47.3	-30.0	0.0	0.0	0.0	58.4	-37.1	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-12.9	-49.6	-76.2	-68.0	-55.7	-16.4	-62.8	-96.5	-86.0	-70.6	-20.2	-77.6	-119.1	-106.2	-87.1
		2	37.4	-23.7	0.0	0.0	0.0	47.3	-30.0	0.0	0.0	0.0	58.4	-37.1	0.0	0.0	0.0
100	Flat < 2:12 (9.46 deg)	1	NA	NA	-74.7	-66.6	-54.6	NA	NA	-94.6	-84.3	-69.2	NA	NA	-116.8	-104.1	-85.4
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-73.3	-52.8	-74.7	-66.6	-54.6	-92.8	-63.1	-94.6	-84.3	-69.2	-114.6	-77.9	-116.8	-104.1	-85.4
		2	10.6	-14.9	0.0	0.0	0.0	13.4	-18.8	0.0	0.0	0.0	16.5	-23.2	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-60.3	-48.6	-74.7	-66.6	-54.6	-76.3	-61.6	-94.6	-84.3	-69.2	-94.2	-76.0	-116.8	-104.1	-85.4
		2	20.9	-21.4	0.0	0.0	0.0	26.4	-27.0	0.0	0.0	0.0	32.6	-33.4	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-48.4	-48.6	-74.7	-66.6	-54.6	-61.2	-61.6	-94.6	-84.3	-69.2	-75.6	-76.0	-116.8	-104.1	-85.4
		2	27.8	-23.3	0.0	0.0	0.0	35.2	-29.4	0.0	0.0	0.0	43.4	-36.4	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-38.8	-48.6	-74.7	-66.6	-54.6	-49.2	-61.6	-94.6	-84.3	-69.2	-60.7	-76.0	-116.8	-104.1	-85.4
		2	30.7	-23.3	0.0	0.0	0.0	38.8	-29.4	0.0	0.0	0.0	47.9	-36.4	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-22.5	-48.6	-74.7	-66.6	-54.6	-28.5	-61.6	-94.6	-84.3	-69.2	-35.1	-76.0	-116.8	-104.1	-85.4
		2	36.7	-23.3	0.0	0.0	0.0	46.4	-29.4	0.0	0.0	0.0	57.3	-36.4	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-12.7	-48.6	-74.7	-66.6	-54.6	-16.1	-61.6	-94.6	-84.3	-69.2	-19.8	-76.0	-116.8	-104.1	-85.4
		2	36.7	-23.3	0.0	0.0	0.0	46.4	-29.4	0.0	0.0	0.0	57.3	-36.4	0.0	0.0	0.0
90	Flat < 2:12 (9.46 deg)	1	NA	NA	-73.1	-65.2	-53.4	NA	NA	-92.5	-82.5	-67.6	NA	NA	-114.2	-101.8	-83.5
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-71.7	-51.6	-73.1	-65.2	-53.4	-90.8	-61.7	-92.5	-82.5	-67.6	-112.1	-76.2	-114.2	-101.8	-83.5
		2	10.3	-14.5	0.0	0.0	0.0	13.1	-18.4	0.0	0.0	0.0	16.2	-22.7	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-59.0	-47.6	-73.1	-65.2	-53.4	-74.6	-60.2	-92.5	-82.5	-67.6	-92.1	-74.3	-114.2	-101.8	-83.5
		2	20.4	-20.9	0.0	0.0	0.0	25.8	-26.4	0.0	0.0	0.0	31.9	-32.6	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-47.3	-47.6	-73.1	-65.2	-53.4	-59.9	-60.2	-92.5	-82.5	-67.6	-73.9	-74.3	-114.2	-101.8	-83.5
		2	27.2	-22.8	0.0	0.0	0.0	34.4	-28.8	0.0	0.0	0.0	42.5	-35.6	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-38.0	-47.6	-73.1	-65.2	-53.4	-48.1	-60.2	-92.5	-82.5	-67.6	-59.4	-74.3	-114.2	-101.8	-83.5
		2	30.0	-22.8	0.0	0.0	0.0	38.0	-28.8	0.0	0.0	0.0	46.9	-35.6	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-22.0	-47.6	-73.1	-65.2	-53.4	-27.8	-60.2	-92.5	-82.5	-67.6	-34.4	-74.3	-114.2	-101.8	-83.5
		2	35.9	-22.8	0.0	0.0	0.0	45.4	-28.8	0.0	0.0	0.0	56.0	-35.6	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-12.4	-47.6	-73.1	-65.2	-53.4	-15.7	-60.2	-92.5	-82.5	-67.6	-19.4	-74.3	-114.2	-101.8	-83.5
		2	35.9	-22.8	0.0	0.0	0.0	45.4	-28.8	0.0	0.0	0.0	56.0	-35.6	0.0	0.0	0.0

Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

MWFRS – Roof
V = 110–120 mph
h = 130–160 ft.

h (ft)	Roof Slope	Load Case	110 Zone 1	2	3	4	5	115 Zone 1	2	3	4	5	120 Zone 1	2	3	4	5
160	Flat < 2:12 (9.46 deg)	1	NA	NA	-39.0	-34.8	-28.5	NA	NA	-42.6	-38.0	-31.2	NA	NA	-46.4	-41.4	-33.9
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-38.3	-26.0	-39.0	-34.8	-28.5	-41.8	-30.1	-42.6	-38.0	-31.2	-45.5	-31.0	-46.4	-41.4	-33.9
		2	5.5	-7.8	0.0	0.0	0.0	6.0	-8.5	0.0	0.0	0.0	6.6	-9.2	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-31.5	-25.4	-39.0	-34.8	-28.5	-34.4	-27.7	-42.6	-38.0	-31.2	-37.4	-30.2	-46.4	-41.4	-33.9
		2	10.9	-11.1	0.0	0.0	0.0	11.9	-12.2	0.0	0.0	0.0	13.0	-13.3	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-25.2	-25.4	-39.0	-34.8	-28.5	-27.6	-27.7	-42.6	-38.0	-31.2	-30.0	-30.2	-46.4	-41.4	-33.9
		2	14.5	-12.1	0.0	0.0	0.0	15.8	-13.3	0.0	0.0	0.0	17.3	-14.4	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-20.3	-25.4	-39.0	-34.8	-28.5	-22.2	-27.7	-42.6	-38.0	-31.2	-24.1	-30.2	-46.4	-41.4	-33.9
		2	16.0	-12.1	0.0	0.0	0.0	17.5	-13.3	0.0	0.0	0.0	19.0	-14.4	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-11.7	-25.4	-39.0	-34.8	-28.5	-12.8	-27.7	-42.6	-38.0	-31.2	-14.0	-30.2	-46.4	-41.4	-33.9
		2	19.1	-12.1	0.0	0.0	0.0	20.9	-13.3	0.0	0.0	0.0	22.8	-14.4	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-6.6	-25.4	-39.0	-34.8	-28.5	-7.2	-27.7	-42.6	-38.0	-31.2	-7.9	-30.2	-46.4	-41.4	-33.9
		2	19.1	-12.1	0.0	0.0	0.0	20.9	-13.3	0.0	0.0	0.0	22.8	-14.4	0.0	0.0	0.0
150	Flat < 2:12 (9.46 deg)	1	NA	NA	-38.5	-34.3	-28.1	NA	NA	-42.0	-37.5	-30.7	NA	NA	-45.8	-40.8	-33.5
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-37.7	-25.7	-38.5	-34.3	-28.1	-41.3	-29.7	-42.0	-37.5	-30.7	-44.9	-30.5	-45.8	-40.8	-33.5
		2	5.4	-7.7	0.0	0.0	0.0	6.0	-8.4	0.0	0.0	0.0	6.5	-9.1	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-31.0	-25.0	-38.5	-34.3	-28.1	-33.9	-27.4	-42.0	-37.5	-30.7	-36.9	-29.8	-45.8	-40.8	-33.5
		2	10.7	-11.0	0.0	0.0	0.0	11.7	-12.0	0.0	0.0	0.0	12.8	-13.1	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-24.9	-25.0	-38.5	-34.3	-28.1	-27.2	-27.4	-42.0	-37.5	-30.7	-29.6	-29.8	-45.8	-40.8	-33.5
		2	14.3	-12.0	0.0	0.0	0.0	15.6	-13.1	0.0	0.0	0.0	17.0	-14.3	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-20.0	-25.0	-38.5	-34.3	-28.1	-21.9	-27.4	-42.0	-37.5	-30.7	-23.8	-29.8	-45.8	-40.8	-33.5
		2	15.8	-12.0	0.0	0.0	0.0	17.3	-13.1	0.0	0.0	0.0	18.8	-14.3	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-11.6	-25.0	-38.5	-34.3	-28.1	-12.7	-27.4	-42.0	-37.5	-30.7	-13.8	-29.8	-45.8	-40.8	-33.5
		2	18.9	-12.0	0.0	0.0	0.0	20.6	-13.1	0.0	0.0	0.0	22.5	-14.3	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-6.5	-25.0	-38.5	-34.3	-28.1	-7.1	-27.4	-42.0	-37.5	-30.7	-7.8	-29.8	-45.8	-40.8	-33.5
		2	18.9	-12.0	0.0	0.0	0.0	20.6	-13.1	0.0	0.0	0.0	22.5	-14.3	0.0	0.0	0.0
140	Flat < 2:12 (9.46 deg)	1	NA	NA	-37.9	-33.8	-27.7	NA	NA	-41.4	-36.9	-30.3	NA	NA	-45.1	-40.2	-33.0
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-37.2	-25.3	-37.9	-33.8	-27.7	-40.7	-29.3	-41.4	-36.9	-30.3	-44.3	-30.1	-45.1	-40.2	-33.0
		2	5.4	-7.5	0.0	0.0	0.0	5.9	-8.2	0.0	0.0	0.0	6.4	-9.0	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-30.6	-24.7	-37.9	-33.8	-27.7	-33.4	-27.0	-41.4	-36.9	-30.3	-36.4	-29.4	-45.1	-40.2	-33.0
		2	10.6	-10.8	0.0	0.0	0.0	11.6	-11.8	0.0	0.0	0.0	12.6	-12.9	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-24.5	-24.7	-37.9	-33.8	-27.7	-26.8	-27.0	-41.4	-36.9	-30.3	-29.2	-29.4	-45.1	-40.2	-33.0
		2	14.1	-11.8	0.0	0.0	0.0	15.4	-12.9	0.0	0.0	0.0	16.8	-14.0	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-19.7	-24.7	-37.9	-33.8	-27.7	-21.5	-27.0	-41.4	-36.9	-30.3	-23.5	-29.4	-45.1	-40.2	-33.0
		2	15.6	-11.8	0.0	0.0	0.0	17.0	-12.9	0.0	0.0	0.0	18.5	-14.0	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-11.4	-24.7	-37.9	-33.8	-27.7	-12.5	-27.0	-41.4	-36.9	-30.3	-13.6	-29.4	-45.1	-40.2	-33.0
		2	18.6	-11.8	0.0	0.0	0.0	20.3	-12.9	0.0	0.0	0.0	22.1	-14.0	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-6.4	-24.7	-37.9	-33.8	-27.7	-7.0	-27.0	-41.4	-36.9	-30.3	-7.7	-29.4	-45.1	-40.2	-33.0
		2	18.6	-11.8	0.0	0.0	0.0	20.3	-12.9	0.0	0.0	0.0	22.1	-14.0	0.0	0.0	0.0
130	Flat < 2:12 (9.46 deg)	1	NA	NA	-37.3	-33.3	-27.3	NA	NA	-40.8	-36.4	-29.8	NA	NA	-44.4	-39.6	-32.5
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-36.6	-24.9	-37.3	-33.3	-27.3	-40.0	-28.8	-40.8	-36.4	-29.8	-43.6	-29.6	-44.4	-39.6	-32.5
		2	5.3	-7.4	0.0	0.0	0.0	5.8	-8.1	0.0	0.0	0.0	6.3	-8.8	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-30.1	-24.3	-37.3	-33.3	-27.3	-32.9	-26.6	-40.8	-36.4	-29.8	-35.8	-28.9	-44.4	-39.6	-32.5
		2	10.4	-10.7	0.0	0.0	0.0	11.4	-11.7	0.0	0.0	0.0	12.4	-12.7	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-24.2	-24.3	-37.3	-33.3	-27.3	-26.4	-26.6	-40.8	-36.4	-29.8	-28.7	-28.9	-44.4	-39.6	-32.5
		2	13.9	-11.6	0.0	0.0	0.0	15.2	-12.7	0.0	0.0	0.0	16.5	-13.8	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-19.4	-24.3	-37.3	-33.3	-27.3	-21.2	-26.6	-40.8	-36.4	-29.8	-23.1	-28.9	-44.4	-39.6	-32.5
		2	15.3	-11.6	0.0	0.0	0.0	16.7	-12.7	0.0	0.0	0.0	18.2	-13.8	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-11.2	-24.3	-37.3	-33.3	-27.3	-12.3	-26.6	-40.8	-36.4	-29.8	-13.4	-28.9	-44.4	-39.6	-32.5
		2	18.3	-11.6	0.0	0.0	0.0	20.0	-12.7	0.0	0.0	0.0	21.8	-13.8	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-6.3	-24.3	-37.3	-33.3	-27.3	-6.9	-26.6	-40.8	-36.4	-29.8	-7.5	-28.9	-44.4	-39.6	-32.5
		2	18.3	-11.6	0.0	0.0	0.0	20.0	-12.7	0.0	0.0	0.0	21.8	-13.8	0.0	0.0	0.0

Table 27.6-2
MWFRS- Part 2: Wind Loads - Roof
Exposure C

MWFRS – Roof
V = 130–150 mph
h = 130–160 ft.

h (ft)	Roof Slope	Load Case	130 Zone 1	2	3	4	5	140 Zone 1	2	3	4	5	150 Zone 1	2	3	4	5
	Flat < 2:12 (9.46 deg)	1	NA	NA	-54.5	-48.6	-39.8	NA	NA	-63.2	-56.3	-46.2	NA	NA	-72.5	-64.6	-53.0
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-53.4	-36.3	-54.5	-48.6	-39.8	-62.0	-42.1	-63.2	-56.3	-46.2	-71.1	-48.4	-72.5	-64.6	-53.0
		2	7.7	-10.8	0.0	0.0	0.0	8.9	-12.6	0.0	0.0	0.0	10.3	-14.4	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-43.9	-35.5	-54.5	-48.6	-39.8	-51.0	-41.1	-63.2	-56.3	-46.2	-58.5	-47.2	-72.5	-64.6	-53.0
		2	15.2	-15.6	0.0	0.0	0.0	17.6	-18.1	0.0	0.0	0.0	20.2	-20.7	0.0	0.0	0.0
160	5:12 (22.6 deg)	1	-35.2	-35.5	-54.5	-48.6	-39.8	-40.9	-41.1	-63.2	-56.3	-46.2	-46.9	-47.2	-72.5	-64.6	-53.0
		2	20.2	-17.0	0.0	0.0	0.0	23.5	-19.7	0.0	0.0	0.0	27.0	-22.6	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-28.3	-35.5	-54.5	-48.6	-39.8	-32.8	-41.1	-63.2	-56.3	-46.2	-37.7	-47.2	-72.5	-64.6	-53.0
		2	22.4	-17.0	0.0	0.0	0.0	25.9	-19.7	0.0	0.0	0.0	29.8	-22.6	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-16.4	-35.5	-54.5	-48.6	-39.8	-19.0	-41.1	-63.2	-56.3	-46.2	-21.8	-47.2	-72.5	-64.6	-53.0
		2	26.7	-17.0	0.0	0.0	0.0	31.0	-19.7	0.0	0.0	0.0	11.4	-22.6	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-9.2	-35.5	-54.5	-48.6	-39.8	-10.7	-41.1	-63.2	-56.3	-46.2	-12.3	-47.2	-72.5	-64.6	-53.0
		2	26.7	-17.0	0.0	0.0	0.0	31.0	-19.7	0.0	0.0	0.0	35.6	-22.6	0.0	0.0	0.0
	Flat < 2:12 (9.46 deg)	1	NA	NA	-53.7	-47.9	-39.3	NA	NA	-62.3	-55.6	-45.6	NA	NA	-71.5	-63.8	-52.3
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-52.7	-35.8	-53.7	-47.9	-39.3	-61.1	-41.6	-62.3	-55.6	-45.6	-70.2	-47.7	-71.5	-63.8	-52.3
		2	7.6	-10.7	0.0	0.0	0.0	8.8	-12.4	0.0	0.0	0.0	10.1	-14.2	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-43.3	-35.0	-53.7	-47.9	-39.3	-50.6	-40.6	-62.3	-55.6	-45.6	-57.7	-46.6	-71.5	-63.8	-52.3
		2	15.0	-15.4	0.0	0.0	0.0	17.4	-17.8	0.0	0.0	0.0	20.0	-20.4	0.0	0.0	0.0
150	5:12 (22.6 deg)	1	-34.8	-35.0	-53.7	-47.9	-39.3	-40.3	-40.6	-62.3	-55.6	-45.6	-46.3	-46.6	-71.5	-63.8	-52.3
		2	20.0	-16.7	0.0	0.0	0.0	23.2	-19.4	0.0	0.0	0.0	26.6	-22.3	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-27.9	-35.0	-53.7	-47.9	-39.3	-32.4	-40.6	-62.3	-55.6	-45.6	-37.2	-46.6	-71.5	-63.8	-52.3
		2	22.1	-16.7	0.0	0.0	0.0	25.6	-19.4	0.0	0.0	0.0	29.4	-22.3	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-16.2	-35.0	-53.7	-47.9	-39.3	-18.8	-40.6	-62.3	-55.6	-45.6	-21.5	-46.6	-71.5	-63.8	-52.3
		2	26.4	-16.7	0.0	0.0	0.0	30.6	-19.4	0.0	0.0	0.0	11.3	-22.3	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-9.1	-35.0	-53.7	-47.9	-39.3	-10.6	-40.6	-62.3	-55.6	-45.6	-12.1	-46.6	-71.5	-63.8	-52.3
		2	26.4	-16.7	0.0	0.0	0.0	30.6	-19.4	0.0	0.0	0.0	35.1	-22.3	0.0	0.0	0.0
	Flat < 2:12 (9.46 deg)	1	NA	NA	-53.0	-47.2	-38.7	NA	NA	-61.4	-54.8	-44.9	NA	NA	-70.5	-62.9	-51.5
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-52.0	-35.3	-53.0	-47.2	-38.7	-60.3	-41.0	-61.4	-54.8	-44.9	-69.2	-47.0	-70.5	-62.9	-51.5
		2	7.5	-10.5	0.0	0.0	0.0	8.7	-12.2	0.0	0.0	0.0	10.0	-14.0	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-42.7	-34.5	-53.0	-47.2	-38.7	-49.5	-40.0	-61.4	-54.8	-44.9	-56.9	-45.9	-70.5	-62.9	-51.5
		2	14.8	-15.1	0.0	0.0	0.0	17.2	-17.6	0.0	0.0	0.0	19.7	-20.2	0.0	0.0	0.0
140	5:12 (22.6 deg)	1	-34.3	-34.5	-53.0	-47.2	-38.7	-39.7	-40.0	-61.4	-54.8	-44.9	-45.6	-45.9	-70.5	-62.9	-51.5
		2	19.7	-16.5	0.0	0.0	0.0	22.8	-19.1	0.0	0.0	0.0	26.2	-21.9	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-27.5	-34.5	-53.0	-47.2	-38.7	-31.9	-40.0	-61.4	-54.8	-44.9	-36.6	-45.9	-70.5	-62.9	-51.5
		2	21.7	-16.5	0.0	0.0	0.0	25.2	-19.1	0.0	0.0	0.0	28.9	-21.9	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-15.9	-34.5	-53.0	-47.2	-38.7	-18.5	-40.0	-61.4	-54.8	-44.9	-21.2	-45.9	-70.5	-62.9	-51.5
		2	26.0	-16.5	0.0	0.0	0.0	30.1	-19.1	0.0	0.0	0.0	11.1	-21.9	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-9.0	-34.5	-53.0	-47.2	-38.7	-10.4	-40.0	-61.4	-54.8	-44.9	-12.0	-45.9	-70.5	-62.9	-51.5
		2	26.0	-16.5	0.0	0.0	0.0	30.1	-19.1	0.0	0.0	0.0	34.6	-21.9	0.0	0.0	0.0
	Flat < 2:12 (9.46 deg)	1	NA	NA	-52.1	-46.5	-38.1	NA	NA	-60.5	-53.9	-44.2	NA	NA	-69.4	-61.9	-50.7
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-51.2	-34.8	-52.1	-46.5	-38.1	-59.3	-40.3	-60.5	-53.9	-44.2	-68.1	-46.3	-69.4	-61.9	-50.7
		2	7.4	-10.4	0.0	0.0	0.0	8.6	-12.0	0.0	0.0	0.0	9.8	-13.8	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-42.1	-33.9	-52.1	-46.5	-38.1	-48.8	-39.4	-60.5	-53.9	-44.2	-56.0	-45.2	-69.4	-61.9	-50.7
		2	14.6	-14.9	0.0	0.0	0.0	16.9	-17.3	0.0	0.0	0.0	19.4	-19.8	0.0	0.0	0.0
130	5:12 (22.6 deg)	1	-33.7	-33.9	-52.1	-46.5	-38.1	-39.1	-39.4	-60.5	-53.9	-44.2	-44.9	-45.2	-69.4	-61.9	-50.7
		2	19.4	-16.2	0.0	0.0	0.0	22.5	-18.8	0.0	0.0	0.0	25.8	-21.6	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-27.1	-33.9	-52.1	-46.5	-38.1	-31.4	-39.4	-60.5	-53.9	-44.2	-36.1	-45.2	-69.4	-61.9	-50.7
		2	21.4	-16.2	0.0	0.0	0.0	24.8	-18.8	0.0	0.0	0.0	28.5	-21.6	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-15.7	-33.9	-52.1	-46.5	-38.1	-18.2	-39.4	-60.5	-53.9	-44.2	-20.9	-45.2	-69.4	-61.9	-50.7
		2	25.6	-16.2	0.0	0.0	0.0	29.7	-18.8	0.0	0.0	0.0	10.9	-21.6	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-8.9	-33.9	-52.1	-46.5	-38.1	-10.3	-39.4	-60.5	-53.9	-44.2	-11.8	-45.2	-69.4	-61.9	-50.7
		2	15.0	-9.5	0.0	0.0	0.0	16.4	-10.4	0.0	0.0	0.0	34.1	-21.6	0.0	0.0	0.0

Table 27.6-2
MWFRS – Part 2: Wind Loads – Roof
Exposure C

MWFRS – Roof
V = 160–200 mph
h = 130–160 ft.

h (ft)	Roof Slope	Load Case	160 Z1	160 Z2	160 Z3	160 Z4	160 Z5	180 Z1	180 Z2	180 Z3	180 Z4	180 Z5	200 Z1	200 Z2	200 Z3	200 Z4	200 Z5
160	Flat < 2:12 (9.46 deg)	1	NA	NA	-82.5	-73.6	-60.3	NA	NA	-104.4	-93.1	-76.3	NA	NA	-128.9	-114.9	-94.3
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-80.9	-58.3	-82.5	-73.6	-60.3	-102.5	-69.6	-104.4	-93.1	-76.3	-126.5	-86.0	-128.9	-114.9	-94.3
		2	11.7	-16.4	0.0	0.0	0.0	14.8	-20.8	0.0	0.0	0.0	18.2	-25.7	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-66.5	-53.7	-82.5	-73.6	-60.3	-84.2	-68.0	-104.4	-93.1	-76.3	-104.0	-83.9	-128.9	-114.9	-94.3
		2	23.0	-23.6	0.0	0.0	0.0	29.2	-29.8	0.0	0.0	0.0	36.0	-36.8	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-53.4	-53.7	-82.5	-73.6	-60.3	-67.6	-68.0	-104.4	-93.1	-76.3	-83.4	-83.9	-128.9	-114.9	-94.3
		2	30.7	-25.7	0.0	0.0	0.0	38.8	-32.5	0.0	0.0	0.0	47.9	-40.1	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-42.9	-53.7	-82.5	-73.6	-60.3	-54.3	-68.0	-104.4	-93.1	-76.3	-67.0	-83.9	-128.9	-114.9	-94.3
		2	33.9	-25.7	0.0	0.0	0.0	42.9	-32.5	0.0	0.0	0.0	52.9	-40.1	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-24.8	-53.7	-82.5	-73.6	-60.3	-31.4	-68.0	-104.4	-93.1	-76.3	-38.8	-83.9	-128.9	-114.9	-94.3
		2	40.5	-25.7	0.0	0.0	0.0	51.2	-32.5	0.0	0.0	0.0	63.2	-40.1	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-14.0	-53.7	-82.5	-73.6	-60.3	-17.7	-68.0	-104.4	-93.1	-76.3	-21.9	-83.9	-128.9	-114.9	-94.3
		2	40.5	-25.7	0.0	0.0	0.0	51.2	-32.5	0.0	0.0	0.0	63.2	-40.1	0.0	0.0	0.0
150	Flat < 2:12 (9.46 deg)	1	NA	NA	-81.4	-72.6	-59.5	NA	NA	-103.0	-91.8	-75.3	NA	NA	-127.2	-113.4	-93.0
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-79.9	-57.5	-81.4	-72.6	-59.5	-101.1	-68.7	-103.0	-91.8	-75.3	-124.8	-84.8	-127.2	-113.4	-93.0
		2	11.5	-16.2	0.0	0.0	0.0	14.6	-20.5	0.0	0.0	0.0	18.0	-25.3	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-65.7	-53.0	-81.4	-72.6	-59.5	-83.1	-67.1	-103.0	-91.8	-75.3	-102.6	-82.8	-127.2	-113.4	-93.0
		2	22.7	-23.3	0.0	0.0	0.0	28.8	-29.4	0.0	0.0	0.0	35.5	-36.4	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-52.7	-53.0	-81.4	-72.6	-59.5	-66.7	-67.1	-103.0	-91.8	-75.3	-82.3	-82.8	-127.2	-113.4	-93.0
		2	30.3	-25.3	0.0	0.0	0.0	38.3	-32.1	0.0	0.0	0.0	47.3	-39.6	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-42.3	-53.0	-81.4	-72.6	-59.5	-53.5	-67.1	-103.0	-91.8	-75.3	-66.1	-82.8	-127.2	-113.4	-93.0
		2	33.4	-25.3	0.0	0.0	0.0	42.3	-32.1	0.0	0.0	0.0	52.2	-39.6	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-24.5	-53.0	-81.4	-72.6	-59.5	-31.0	-67.1	-103.0	-91.8	-75.3	-38.3	-82.8	-127.2	-113.4	-93.0
		2	39.9	-25.3	0.0	0.0	0.0	50.5	-32.1	0.0	0.0	0.0	62.4	-39.6	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-13.8	-53.0	-81.4	-72.6	-59.5	-17.5	-67.1	-103.0	-91.8	-75.3	-21.6	-82.8	-127.2	-113.4	-93.0
		2	39.9	-25.3	0.0	0.0	0.0	50.5	-32.1	0.0	0.0	0.0	62.4	-39.6	0.0	0.0	0.0
140	Flat < 2:12 (9.46 deg)	1	NA	NA	-80.2	-71.5	-58.6	NA	NA	-101.5	-90.5	-74.2	NA	NA	-125.3	-111.7	-91.6
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-78.7	-56.7	-80.2	-71.5	-58.6	-99.6	-67.7	-101.5	-90.5	-74.2	-123.0	-83.6	-125.3	-111.7	-91.6
		2	11.4	-16.0	0.0	0.0	0.0	14.4	-20.2	0.0	0.0	0.0	17.7	-24.9	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-64.7	-52.2	-80.2	-71.5	-58.6	-81.9	-66.1	-101.5	-90.5	-74.2	-101.1	-81.6	-125.3	-111.7	-91.6
		2	22.4	-22.9	0.0	0.0	0.0	28.4	-29.0	0.0	0.0	0.0	35.0	-35.8	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-51.9	-52.2	-80.2	-71.5	-58.6	-65.7	-66.1	-101.5	-90.5	-74.2	-81.1	-81.6	-125.3	-111.7	-91.6
		2	29.8	-25.0	0.0	0.0	0.0	37.7	-31.6	0.0	0.0	0.0	46.6	-39.0	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-41.7	-52.2	-80.2	-71.5	-58.6	-52.8	-66.1	-101.5	-90.5	-74.2	-65.2	-81.6	-125.3	-111.7	-91.6
		2	32.9	-25.0	0.0	0.0	0.0	41.7	-31.6	0.0	0.0	0.0	51.4	-39.0	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-24.1	-52.2	-80.2	-71.5	-58.6	-30.6	-66.1	-101.5	-90.5	-74.2	-37.7	-81.6	-125.3	-111.7	-91.6
		2	39.4	-25.0	0.0	0.0	0.0	49.8	-31.6	0.0	0.0	0.0	61.5	-39.0	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-13.6	-52.2	-80.2	-71.5	-58.6	-17.2	-66.1	-101.5	-90.5	-74.2	-21.3	-81.6	-125.3	-111.7	-91.6
		2	39.4	-25.0	0.0	0.0	0.0	49.8	-31.6	0.0	0.0	0.0	61.5	-39.0	0.0	0.0	0.0
130	Flat < 2:12 (9.46 deg)	1	NA	NA	-79.0	-70.4	-57.7	NA	NA	-100.0	-89.1	-73.1	NA	NA	-123.4	-110.0	-90.2
		2	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0	NA	NA	0.0	0.0	0.0
	3:12 (14.0 deg)	1	-77.5	-55.8	-79.0	-70.4	-57.7	-98.1	-66.7	-100.0	-89.1	-73.1	-121.1	-82.3	-123.4	-110.0	-90.2
		2	11.2	-15.7	0.0	0.0	0.0	14.1	-19.9	0.0	0.0	0.0	17.5	-24.6	0.0	0.0	0.0
	4:12 (18.4 deg)	1	-63.7	-51.4	-79.0	-70.4	-57.7	-80.6	-65.1	-100.0	-89.1	-73.1	-99.5	-80.3	-123.4	-110.0	-90.2
		2	22.1	-22.6	0.0	0.0	0.0	27.9	-28.6	0.0	0.0	0.0	34.5	-35.3	0.0	0.0	0.0
	5:12 (22.6 deg)	1	-51.1	-51.4	-79.0	-70.4	-57.7	-64.7	-65.1	-100.0	-89.1	-73.1	-79.9	-80.3	-123.4	-110.0	-90.2
		2	29.4	-24.6	0.0	0.0	0.0	37.2	-31.1	0.0	0.0	0.0	45.9	-38.4	0.0	0.0	0.0
	6:12 (26.6 deg)	1	-41.1	-51.4	-79.0	-70.4	-57.7	-52.0	-65.1	-100.0	-89.1	-73.1	-64.1	-80.3	-123.4	-110.0	-90.2
		2	32.4	-24.6	0.0	0.0	0.0	41.0	-31.1	0.0	0.0	0.0	50.6	-38.4	0.0	0.0	0.0
	9:12 (36.9 deg)	1	-23.8	-51.4	-79.0	-70.4	-57.7	-30.1	-65.1	-100.0	-89.1	-73.1	-37.1	-80.3	-123.4	-110.0	-90.2
		2	38.7	-24.6	0.0	0.0	0.0	49.0	-31.1	0.0	0.0	0.0	60.5	-38.4	0.0	0.0	0.0
	12:12 (45.0 deg)	1	-13.4	-51.4	-79.0	-70.4	-57.7	-17.0	-65.1	-100.0	-89.1	-73.1	-21.0	-80.3	-123.4	-110.0	-90.2
		2	38.7	-24.6	0.0	0.0	0.0	49.0	-31.1	0.0	0.0	0.0	60.5	-38.4	0.0	0.0	0.0

Height above ground level, z		Exposure		
		B	C	D
ft	(m)			
0-15	(0-4.6)	0.70	0.85	1.03
20	(6.1)	0.70	0.90	1.08
25	(7.6)	0.70	0.94	1.12
30	(9.1)	0.70	0.98	1.16
40	(12.2)	0.76	1.04	1.22
50	(15.2)	0.81	1.09	1.27
60	(18)	0.85	1.13	1.31

Notes:

1 The velocity pressure exposure coefficient K_z may be determined from the following formula:

For 15 ft. $\leq z \leq z_g$ For $z < 15$ ft.

$K_z = 2.01 (z/z_g)^{2/\alpha}$ $K_z = 2.01 (15/z_g)^{2/\alpha}$

Note: z shall not be taken less than 30 feet in exposure B.

2. α and z_g are tabulated in Table 26.9-1.

3. Linear interpolation for intermediate values of height z is acceptable.

4. Exposure categories are defined in Section 26.7.

Main Wind Force Resisting System – Part 1		$h \leq 60$ ft.
Figure 28.4-1	External Pressure Coefficients (GC_{pf})	**Low-rise Walls & Roofs**
Enclosed, Partially Enclosed Buildings		
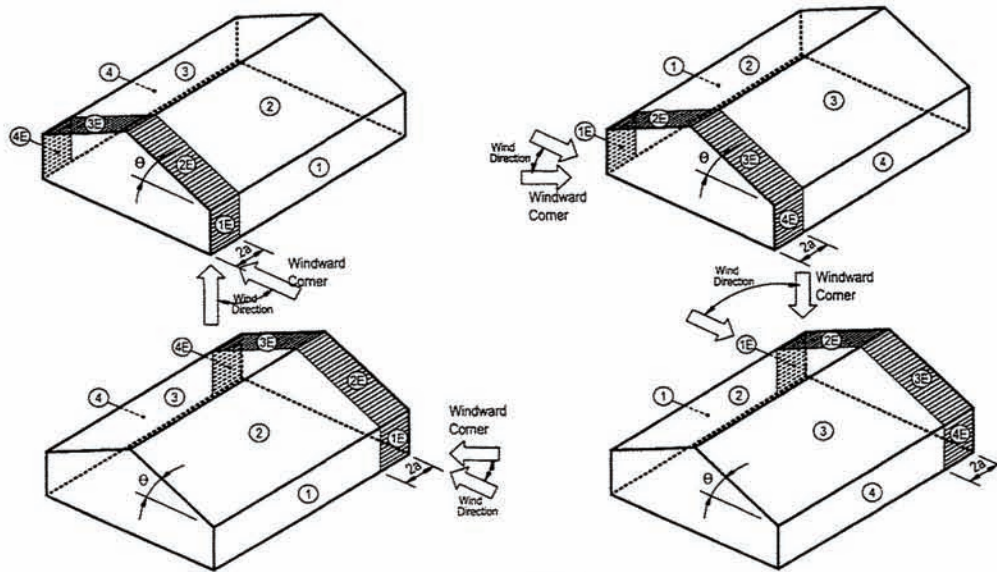
Load Case A
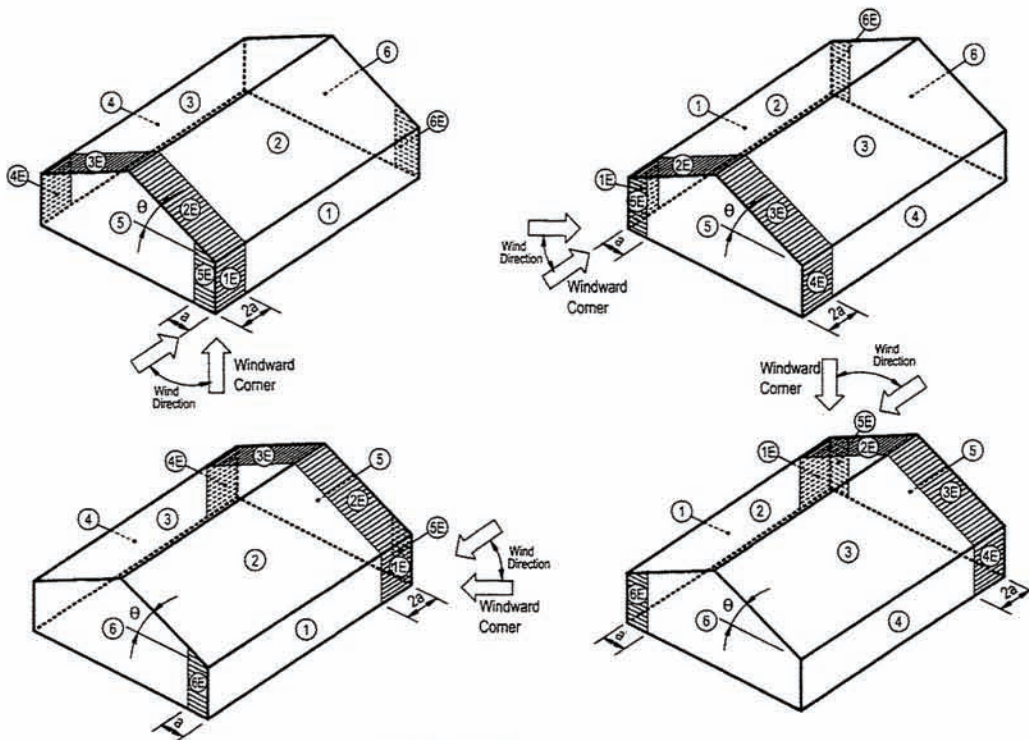
Load Case B

Basic Load Cases

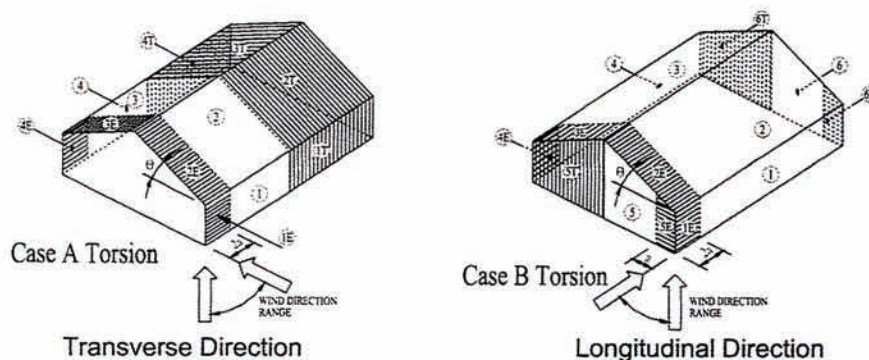| Figure 28.4-1 (cont.)	External Pressure Coefficients (GC_{pf})	Low-rise Walls & Roofs
Enclosed, Partially Enclosed Buildings		

Roof Angle θ (degrees)	LOAD CASE A							
	Building Surface							
	1	2	3	4	1E	2E	3E	4E
0-5	0.40	-0.69	-0.37	-0.29	0.61	-1.07	-0.53	-0.43
20	0.53	-0.69	-0.48	-0.43	0.80	-1.07	-0.69	-0.64
30-45	0.56	0.21	-0.43	-0.37	0.69	0.27	-0.53	-0.48
90	0.56	0.56	-0.37	-0.37	0.69	0.69	-0.48	-0.48

Roof Angle θ (degrees)	LOAD CASE B											
	Building Surface											
	1	2	3	4	5	6	1E	2E	3E	4E	5E	6E
0-90	-0.45	-0.69	-0.37	-0.45	0.40	-0.29	-0.48	-1.07	-0.53	-0.48	0.61	-0.43

Notes:
1. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
2. For values of θ other than those shown, linear interpolation is permitted.
3. The building must be designed for all wind directions using the 8 loading patterns shown. The load patterns are applied to each building corner in turn as the Windward Corner.
4. Combinations of external and internal pressures (see Table 26.11-1) shall be evaluated as required to obtain the most severe loadings.
5. For the torsional load cases shown below, the pressures in zones designated with a "T" (1T, 2T, 3T, 4T, 5T, 6T) shall be 25% of the full design wind pressures (zones 1, 2, 3, 4, 5, 6).
   Exception: One story buildings with h less than or equal to 30 ft (9.1m), buildings two stories or less framed with light frame construction, and buildings two stories or less designed with flexible diaphragms need not be designed for the torsional load cases.
   Torsional loading shall apply to all eight basic load patterns using the figures below applied at each Windward Corner.
6. For purposes of designing a building's MWFRS, the total horizontal shear shall not be less than that determined by neglecting the wind forces on the roof.
   Exception: This provision does not apply to buildings using moment frames for the MWRFS.
7. For flat roofs, use θ = 0° and locate the zone 2/3 and zone 2E/3E boundary at the mid-width of the building.
8. The roof pressure coefficient (GC_{pf}), when negative in Zone 2 and 2E, shall be applied in Zone 2/2E for a distance from the edge of roof equal to 0.5 times the horizontal dimension of the building parallel to the direction of the MWFRS being designed or 2.5 times the eave height at the windward wall, whichever is less; the remainder of Zone 2/2E extending to the ridge line shall use the pressure coefficient (GC_{pf}) for Zone 3/3E.
9. Notation:
   a: 10 percent of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m).
   h: Mean roof height, in feet (meters), except that eave height shall be used for θ ≤ 10°.
   θ: Angle of plane of roof from horizontal, in degrees.

Case A Torsion

Transverse Direction

Case B Torsion

Longitudinal Direction

Torsional Load Cases

Case A

Case B

Notes:
1. Pressures shown are applied to the horizontal and vertical projections, for exposure B, at h=30 ft (9.1m). Adjust to other exposures and heights with adjustment factor λ.
2. The load patterns shown shall be applied to each corner of the building in turn as the reference corner. (See Figure 28.4-1)
3. For Case B use $\theta = 0°$.
4. Load cases 1 and 2 must be checked for $25° < \theta \le 45°$. Load case 2 at 25° is provided only for interpolation between 25° and 30°.
5. Plus and minus signs signify pressures acting toward and away from the projected surfaces, respectively.
6. For roof slopes other than those shown, linear interpolation is permitted.
7. The total horizontal load shall not be less than that determined by assuming $p_S = 0$ in zones B & D.
8. Where zone E or G falls on a roof overhang on the windward side of the building, use E_{OH} and G_{OH} for the pressure on the horizontal projection of the overhang. Overhangs on the leeward and side edges shall have the basic zone pressure applied.
9. Notation:
   a: 10 percent of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m).
   h: Mean roof height, in feet (meters), except that eave height shall be used for roof angles <10°.
   θ: Angle of plane of roof from horizontal, in degrees.

Main Wind Force Resisting System – Method 2		h ≤ 60 ft.
Figure 28.6-1 (cont'd) — **Design Wind Pressures**		**Walls & Roofs**
Enclosed Buildings		

Simplified Design Wind Pressure , p_{S30} (psf) *(Exposure B at h = 30 ft. with I = 1.0)*

Basic Wind Speed (mph)	Roof Angle (degrees)	Load Case	Horizontal Pressures				Vertical Pressures				Overhangs	
			A	B	C	D	E	F	G	H	EOH	GOH
110	0 to 5°	1	19.2	-10.0	12.7	-5.9	-23.1	-13.1	-16.0	-10.1	-32.3	-25.3
	10°	1	21.6	-9.0	14.4	-5.2	-23.1	-14.1	-16.0	-10.8	-32.3	-25.3
	15°	1	24.1	-8.0	16.0	-4.6	-23.1	-15.1	-16.0	-11.5	-32.3	-25.3
	20°	1	26.6	-7.0	17.7	-3.9	-23.1	-16.0	-16.0	-12.2	-32.3	-25.3
	25°	1	24.1	3.9	17.4	4.0	-10.7	-14.6	-7.7	-11.7	-19.9	-17.0
		2	------	------	------	------	-4.1	-7.9	-1.1	-5.1	------	------
	30 to 45	1	21.6	14.8	17.2	11.8	1.7	-13.1	0.6	-11.3	-7.6	-8.7
		2	21.6	14.8	17.2	11.8	8.3	-6.5	7.2	-4.6	-7.6	-8.7
115	0 to 5°	1	21.0	-10.9	13.9	-6.5	-25.2	-14.3	-17.5	-11.1	-35.3	-27.6
	10°	1	23.7	-9.8	15.7	-5.7	-25.2	-15.4	-17.5	-11.8	-35.3	-27.6
	15°	1	26.3	-8.7	17.5	-5.0	-25.2	-16.5	-17.5	-12.6	-35.3	-27.6
	20°	1	29.0	-7.7	19.4	-4.2	-25.2	-17.5	-17.5	-13.3	-35.3	-27.6
	25°	1	26.3	4.2	19.1	4.3	-11.7	-15.9	-8.5	-12.8	-21.8	-18.5
		2	------	------	------	------	-4.4	-8.7	-1.2	-5.5	------	------
	30 to 45	1	23.6	16.1	18.8	12.9	1.8	-14.3	0.6	-12.3	-8.3	-9.5
		2	23.6	16.1	18.8	12.9	9.1	-7.1	7.9	-5.0	-8.3	-9.5
120	0 to 5°	1	22.8	-11.9	15.1	-7.0	-27.4	-15.6	-19.1	-12.1	-38.4	-30.1
	10°	1	25.8	-10.7	17.1	-6.2	-27.4	-16.8	-19.1	-12.9	-38.4	-30.1
	15°	1	28.7	-9.5	19.1	-5.4	-27.4	-17.9	-19.1	-13.7	-38.4	-30.1
	20°	1	31.6	-8.3	21.1	-4.6	-27.4	-19.1	-19.1	-14.5	-38.4	-30.1
	25°	1	28.6	4.6	20.7	4.7	-12.7	-17.3	-9.2	-13.9	-23.7	-20.2
		2	------	------	------	------	-4.8	-9.4	-1.3	-6.0	------	------
	30 to 45	1	25.7	17.6	20.4	14.0	2.0	-15.6	0.7	-13.4	-9.0	-10.3
		2	25.7	17.6	20.4	14.0	9.9	-7.7	8.6	-5.5	-9.0	-10.3
130	0 to 5°	1	26.8	-13.9	17.8	-8.2	-32.2	-18.3	-22.4	-14.2	-45.1	-35.3
	10°	1	30.2	-12.5	20.1	-7.3	-32.2	-19.7	-22.4	-15.1	-45.1	-35.3
	15°	1	33.7	-11.2	22.4	-6.4	-32.2	-21.0	-22.4	-16.1	-45.1	-35.3
	20°	1	37.1	-9.8	24.7	-5.4	-32.2	-22.4	-22.4	-17.0	-45.1	-35.3
	25°	1	33.6	5.4	24.3	5.5	-14.9	-20.4	-10.8	-16.4	-27.8	-23.7
		2	------	------	------	------	-5.7	-11.1	-1.5	-7.1	------	------
	30 to 45	1	30.1	20.6	24.0	16.5	2.3	-18.3	0.8	-15.7	-10.6	-12.1
		2	30.1	20.6	24.0	16.5	11.6	-9.0	10.0	-6.4	-10.6	-12.1
140	0 to 5°	1	31.1	-16.1	20.6	-9.6	-37.3	-21.2	-26.0	-16.4	-52.3	-40.9
	10°	1	35.1	-14.5	23.3	-8.5	-37.3	-22.8	-26.0	-17.5	-52.3	-40.9
	15°	1	39.0	-12.9	26.0	-7.4	-37.3	-24.4	-26.0	-18.6	-52.3	-40.9
	20°	1	43.0	-11.4	28.7	-6.3	-37.3	-26.0	-26.0	-19.7	-52.3	-40.9
	25°	1	39.0	6.3	28.2	6.4	-17.3	-23.6	-12.5	-19.0	-32.3	-27.5
		2	------	------	------	------	-6.6	-12.8	-1.8	-8.2	------	------
	30 to 45	1	35.0	23.9	27.8	19.1	2.7	-21.2	0.9	-18.2	-12.3	-14.0
		2	35.0	23.9	27.8	19.1	13.4	-10.5	11.7	-7.5	-12.3	-14.0
150	0 to 5°	1	35.7	-18.5	23.7	-11.0	-42.9	-24.4	-29.8	-18.9	-60.0	-47.0
	10°	1	40.2	-16.7	26.8	-9.7	-42.9	-26.2	-29.8	-20.1	-60.0	-47.0
	15°	1	44.8	-14.9	29.8	-8.5	-42.9	-28.0	-29.8	-21.4	-60.0	-47.0
	20°	1	49.4	-13.0	32.9	-7.2	-42.9	-29.8	-29.8	-22.6	-60.0	-47.0
	25°	1	44.8	7.2	32.4	7.4	-19.9	-27.1	-14.4	-21.8	-37.0	-31.6
		2	------	------	------	------	-7.5	-14.7	-2.1	-9.4	------	------
	30 to 45	1	40.1	27.4	31.9	22.0	3.1	-24.4	1.0	-20.9	-14.1	-16.1
		2	40.1	27.4	31.9	22.0	15.4	-12.0	13.4	-8.6	-14.1	-16.1

Unit Conversions – 1.0 ft = 0.3048 m; 1.0 psf = 0.0479 kN/m²

Figure 28.6-1 (cont'd)	**Design Wind Pressures**	
Enclosed Buildings		**Walls & Roofs**

Simplified Design Wind Pressure , p$_{S30}$ (psf) *(Exposure B at h = 30 ft.)*

Basic Wind Speed (mph)	Roof Angle (degrees)	Load Case	Zones									
			Horizontal Pressures				Vertical Pressures				Overhangs	
			A	B	C	D	E	F	G	H	E$_{OH}$	G$_{OH}$
160	0 to 5°	1	40.6	-21.1	26.9	-12.5	-48.8	-27.7	-34.0	-21.5	-68.3	-53.5
	10°	1	45.8	-19.0	30.4	-11.1	-48.8	-29.8	-34.0	-22.9	-68.3	-53.5
	15°	1	51.0	-16.9	34.0	-9.6	-48.8	-31.9	-34.0	-24.3	-68.3	-53.5
	20°	1	56.2	-14.8	37.5	-8.2	-48.8	-34.0	-34.0	-25.8	-68.3	-53.5
	25°	1	50.9	8.2	36.9	8.4	-22.6	-30.8	-16.4	-24.8	-42.1	-35.9
		2	------	------	------	------	-8.6	-16.8	-2.3	-10.7	------	------
	30 to 45	1	45.7	31.2	36.3	25.0	3.5	-27.7	1.2	-23.8	-16.0	-18.3
		2	45.7	31.2	36.3	25.0	17.6	-13.7	15.2	-9.8	-16.0	-18.3
180	0 to 5°	1	51.4	-26.7	34.1	-15.8	-61.7	-35.1	-43.0	-27.2	-86.4	-67.7
	10°	1	58.0	-24.0	38.5	-14.0	-61.7	-37.7	-43.0	-29.0	-86.4	-67.7
	15°	1	64.5	-21.4	43.0	-12.2	-61.7	-40.3	-43.0	-30.8	-86.4	-67.7
	20°	1	71.1	-18.8	47.4	-10.4	-61.7	-43.0	-43.0	-32.6	-86.4	-67.7
	25°	1	64.5	10.4	46.7	10.6	-28.6	-39.0	-20.7	-31.4	-53.3	-45.4
		2	------	------	------	------	-10.9	-21.2	-3.0	-13.6	------	------
	30 to 45	1	57.8	39.5	45.9	31.6	4.4	-35.1	1.5	-30.1	-20.3	-23.2
		2	57.8	39.5	45.9	31.6	22.2	-17.3	19.3	-12.3	-20.3	-23.2
200	0 to 5°	1	63.4	-32.9	42.1	-19.5	-76.2	-43.3	-53.1	-33.5	-106.7	-83.5
	10°	1	71.5	-29.7	47.6	-17.3	-76.2	-46.5	-53.1	-35.8	-106.7	-83.5
	15°	1	79.7	-26.4	53.1	-15.0	-76.2	-49.8	-53.1	-38.0	-106.7	-83.5
	20°	1	87.8	-23.2	58.5	-12.8	-76.2	-53.1	-53.1	-40.2	-106.7	-83.5
	25°	1	79.6	12.8	57.6	13.1	-35.4	-48.2	-25.6	-38.7	-65.9	-56.1
		2	------	------	------	------	-13.4	-26.2	-3.7	-16.8	------	------
	30 to 45	1	71.3	48.8	56.7	39.0	5.5	-43.3	1.8	-37.2	-25.0	-28.7
		2	71.3	48.8	56.7	39.0	27.4	-21.3	23.8	-15.2	-25.0	-28.7

Adjustment Factor
for Building Height and Exposure, λ

Mean roof height (ft)	Exposure		
	B	**C**	**D**
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61
30	1.00	1.40	1.66
35	1.05	1.45	1.70
40	1.09	1.49	1.74
45	1.12	1.53	1.78
50	1.16	1.56	1.81
55	1.19	1.59	1.84
60	1.22	1.62	1.87

Unit Conversions – 1.0 ft = 0.3048 m; 1.0 psf = 0.0479 kN/m^2

Height above ground level, z		Exposure		
		B	C	D
ft	(m)			
0-15	(0-4.6)	0.57	0.85	1.03
20	(6.1)	0.62	0.90	1.08
25	(7.6)	0.66	0.94	1.12
30	(9.1)	0.70	0.98	1.16
40	(12.2)	0.76	1.04	1.22
50	(15.2)	0.81	1.09	1.27
60	(18)	0.85	1.13	1.31
70	(21.3)	0.89	1.17	1.34
80	(24.4)	0.93	1.21	1.38
90	(27.4)	0.96	1.24	1.40
100	(30.5)	0.99	1.26	1.43
120	(36.6)	1.04	1.31	1.48
140	(42.7)	1.09	1.36	1.52
160	(48.8)	1.13	1.39	1.55
180	(54.9)	1.17	1.43	1.58
200	(61.0)	1.20	1.46	1.61
250	(76.2)	1.28	1.53	1.68
300	(91.4)	1.35	1.59	1.73
350	(106.7)	1.41	1.64	1.78
400	(121.9)	1.47	1.69	1.82
450	(137.2)	1.52	1.73	1.86
500	(152.4)	1.56	1.77	1.89

Notes:

1. The velocity pressure exposure coefficient K_z may be determined from the following formula:

   For 15 ft. $\leq z \leq z_g$ For $z < 15$ ft.

   $K_z = 2.01 (z/z_g)^{2/\alpha}$ $K_z = 2.01 (15/z_g)^{2/\alpha}$

2. α and z_g are tabulated in Table 26.9.1.

3. Linear interpolation for intermediate values of height z is acceptable.

4. Exposure categories are defined in Section 26.7.

Velocity Pressure Exposure Coefficients, K_h and K_z				
Table 30.3-1				

Height above ground level, z		Exposure		
		B	**C**	**D**
ft	**(m)**			
0-15	(0-4.6)	0.70	0.85	1.03
20	(6.1)	0.70	0.90	1.08
25	(7.6)	0.70	0.94	1.12
30	(9.1)	0.70	0.98	1.16
40	(12.2)	0.76	1.04	1.22
50	(15.2)	0.81	1.09	1.27
60	(18)	0.85	1.13	1.31
70	(21.3)	0.89	1.17	1.34
80	(24.4)	0.93	1.21	1.38
90	(27.4)	0.96	1.24	1.40
100	(30.5)	0.99	1.26	1.43
120	(36.6)	1.04	1.31	1.48
140	(42.7)	1.09	1.36	1.52
160	(48.8)	1.13	1.39	1.55
180	(54.9)	1.17	1.43	1.58
200	(61.0)	1.20	1.46	1.61
250	(76.2)	1.28	1.53	1.68
300	(91.4)	1.35	1.59	1.73
350	(106.7)	1.41	1.64	1.78
400	(121.9)	1.47	1.69	1.82
450	(137.2)	1.52	1.73	1.86
500	(152.4)	1.56	1.77	1.89

Notes:

1. The velocity pressure exposure coefficient K_z may be determined from the following formula:

    For 15 ft. $\leq z \leq z_g$ For $z < 15$ ft.

    $K_z = 2.01 (z/z_g)^{2/\alpha}$ $K_z = 2.01 (15/z_g)^{2/\alpha}$

    Note: z shall not be taken less than 30 feet in exposure B.

2. α and z_g are tabulated in Table 26.9.1.

3. Linear interpolation for intermediate values of height z is acceptable.

4. Exposure categories are defined in Section 26.7.

Components and Cladding – Method 1		h ≤ 60 ft.
Figure30.5-1	**Design Wind Pressures**	**Walls & Roofs**
Enclosed Buildings		

Flat Roof

Hip Roof (7° < θ ≤ 27°)

Gable Roof (θ ≤ 7°)

Gable Roof (7° < θ ≤ 45°)
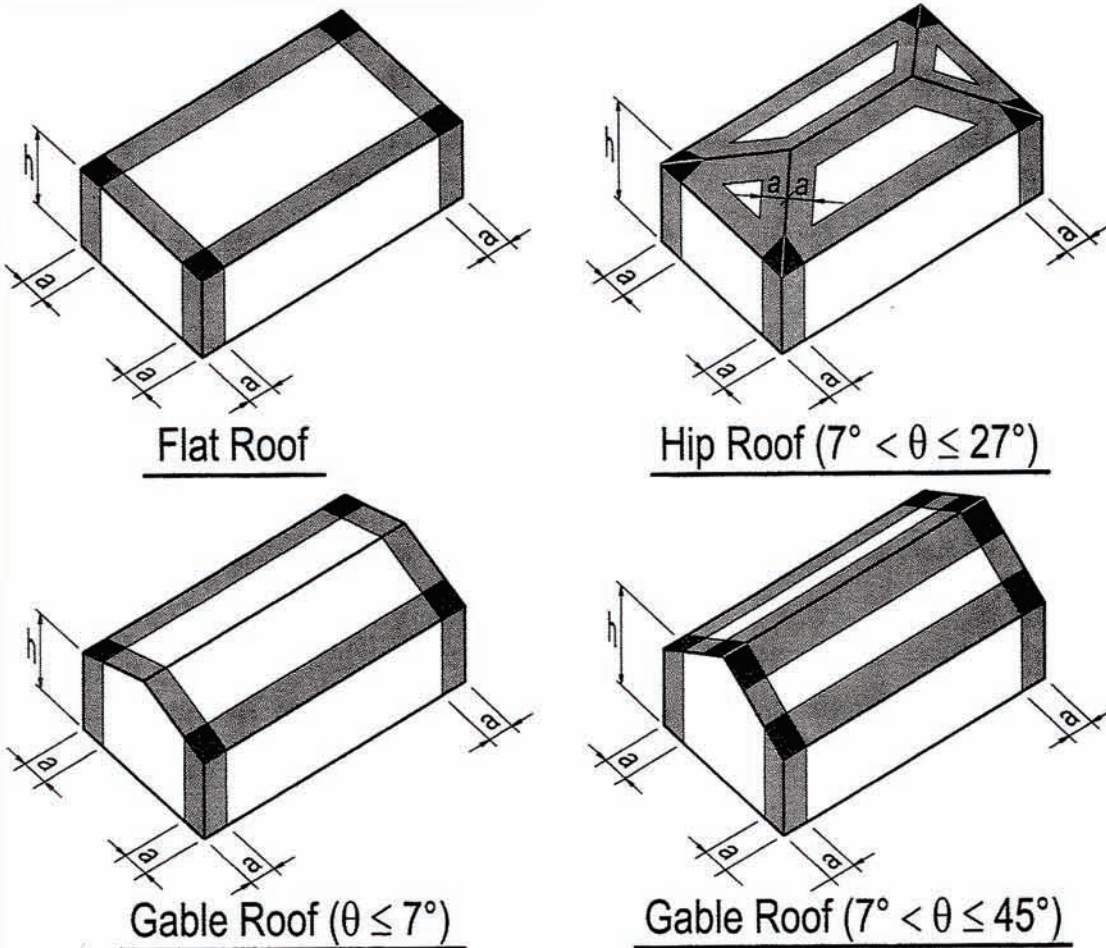
Interior Zones
Roofs - Zone 1 / Walls - Zone 4

End Zones
Roofs - Zone 2 / Walls - Zone 5

Corner Zones
Roofs - Zone 3

Notes:
1. Pressures shown are applied normal to the surface, for exposure B, at h=30 ft (9.1m). Adjust to other conditions using Equation 30.5-1.
2. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
3. For hip roofs with θ ≤ 25°, Zone 3 shall be treated as Zone 2.
4. For effective wind areas between those given, value may be interpolated, otherwise use the value associated with the lower effective wind area.
5. Notation:
   a: 10 percent of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m).
   h: Mean roof height, in feet (meters), except that eave height shall be used for roof angles <10°.
   θ: Angle of plane of roof from horizontal, in degrees.

Figure 30.5-1 (cont'd) — Design Wind Pressures — **Walls & Roofs**

Enclosed Buildings

Net Design Wind Pressure, p_{net30} (psf) *(Exposure B at h = 30 ft.)*

	Zone	Effective wind area (sf)	110		115		120		130		140		150		160		180		200	
Roof 0 to 7 degrees	1	10	8.9	-21.8	9.7	-23.8	10.5	-25.9	12.4	-30.4	14.3	-35.3	16.5	-40.5	18.7	-46.1	23.7	-58.3	29.3	-72.0
	1	20	8.3	-21.2	9.1	-23.2	9.9	-25.2	11.6	-29.6	13.4	-34.4	15.4	-39.4	17.6	-44.9	22.2	-56.8	27.4	-70.1
	1	50	7.6	-20.5	8.3	-22.4	9.0	-24.4	10.6	-28.6	12.3	-33.2	14.1	-38.1	16.0	-43.3	20.3	-54.8	25.0	-67.7
	1	100	7.0	-19.9	7.7	-21.8	8.3	-23.7	9.8	-27.8	11.4	-32.3	13.0	-37.0	14.8	-42.1	18.8	-53.3	23.2	-65.9
	2	10	8.9	-36.5	9.7	-39.9	10.5	-43.5	12.4	-51.0	14.3	-59.2	16.5	-67.9	18.7	-77.3	23.7	-97.8	29.3	-120.7
	2	20	8.3	-32.6	9.1	-35.7	9.9	-38.8	11.6	-45.6	13.4	-52.9	15.4	-60.7	17.6	-69.0	22.2	-87.4	27.4	-107.9
	2	50	7.6	-27.5	8.3	-30.1	9.0	-32.7	10.6	-38.4	12.3	-44.5	14.1	-51.1	16.0	-58.2	20.3	-73.6	25.0	-90.9
	2	100	7.0	-23.6	7.7	-25.8	8.3	-28.1	9.8	-33.0	11.4	-38.2	13.0	-43.9	14.8	-50.0	18.8	-63.2	23.2	-78.1
	3	10	8.9	-55.0	9.7	-60.1	10.5	-65.4	12.4	-76.8	14.3	-89.0	16.5	-102.2	18.7	-116.3	23.7	-147.2	29.3	-181.7
	3	20	8.3	-45.5	9.1	-49.8	9.9	-54.2	11.6	-63.6	13.4	-73.8	15.4	-84.7	17.6	-96.3	22.2	-121.9	27.4	-150.5
	3	50	7.6	-33.1	8.3	-36.1	9.0	-39.3	10.6	-46.2	12.3	-53.5	14.1	-61.5	16.0	-69.9	20.3	-88.5	25.0	-109.3
	3	100	7.0	-23.6	7.7	-25.8	8.3	-28.1	9.8	-33.0	11.4	-38.2	13.0	-43.9	14.8	-50.0	18.8	-63.2	23.2	-78.1
Roof > 7 to 27 degrees	1	10	12.5	-19.9	13.7	-21.8	14.9	-23.7	17.5	-27.8	20.3	-32.3	23.3	-37.0	26.5	-42.1	33.6	-53.3	41.5	-65.9
	1	20	11.4	-19.4	12.5	-21.2	13.6	-23.0	16.0	-27.0	18.5	-31.4	21.3	-36.0	24.2	-41.0	30.6	-51.9	37.8	-64.0
	1	50	10.0	-18.6	10.9	-20.4	11.9	-22.2	13.9	-26.0	16.1	-30.2	18.5	-34.6	21.1	-39.4	26.7	-49.9	32.9	-61.6
	1	100	8.9	-18.1	9.7	-19.8	10.5	-21.5	12.4	-25.2	14.3	-29.3	16.5	-33.6	18.7	-38.2	23.7	-48.4	29.3	-59.8
	2	10	12.5	-34.7	13.7	-37.9	14.9	-41.3	17.5	-48.4	20.3	-56.2	23.3	-64.5	26.5	-73.4	33.6	-92.9	41.5	-114.6
	2	20	11.4	-31.9	12.5	-34.9	13.6	-38.0	16.0	-44.6	18.5	-51.7	21.3	-59.3	24.2	-67.5	30.6	-85.4	37.8	-105.5
	2	50	10.0	-28.2	10.9	-30.9	11.9	-33.6	13.9	-39.4	16.1	-45.7	18.5	-52.5	21.1	-59.7	26.7	-75.6	32.9	-93.3
	2	100	8.9	-25.5	9.7	-27.8	10.5	-30.3	12.4	-35.6	14.3	-41.2	16.5	-47.3	18.7	-53.9	23.7	-68.2	29.3	-84.2
	3	10	12.5	-51.3	13.7	-56.0	14.9	-61.0	17.5	-71.6	20.3	-83.1	23.3	-95.4	26.5	-108.5	33.6	-137.3	41.5	-169.5
	3	20	11.4	-47.9	12.5	-52.4	13.6	-57.1	16.0	-67.0	18.5	-77.7	21.3	-89.2	24.2	-101.4	30.6	-128.4	37.8	-158.5
	3	50	10.0	-43.5	10.9	-47.6	11.9	-51.8	13.9	-60.8	16.1	-70.5	18.5	-81.0	21.1	-92.1	26.7	-116.6	32.9	-143.9
	3	100	8.9	-40.2	9.7	-44.0	10.5	-47.9	12.4	-56.2	14.3	-65.1	16.5	-74.8	18.7	-85.1	23.7	-107.7	29.3	-132.9
Roof > 27 to 45 degrees	1	10	19.9	-21.8	21.8	-23.8	23.7	-25.9	27.8	-30.4	32.3	-35.3	37.0	-40.5	42.1	-46.1	53.3	-58.3	65.9	-72.0
	1	20	19.4	-20.7	21.2	-22.6	23.0	-24.6	27.0	-28.9	31.4	-33.5	36.0	-38.4	41.0	-43.7	51.9	-55.3	64.0	-68.3
	1	50	18.6	-19.2	20.4	-21.0	22.2	-22.8	26.0	-26.8	30.2	-31.1	34.6	-35.7	39.4	-40.6	49.9	-51.4	61.6	-63.4
	1	100	18.1	-18.1	19.8	-19.8	21.5	-21.5	25.2	-25.2	29.3	-29.3	33.6	-33.6	38.2	-38.2	48.4	-48.4	59.8	-59.8
	2	10	19.9	-25.5	21.8	-27.8	23.7	-30.3	27.8	-35.6	32.3	-41.2	37.0	-47.3	42.1	-53.9	53.3	-68.2	65.9	-84.2
	2	20	19.4	-24.3	21.2	-26.6	23.0	-29.0	27.0	-34.0	31.4	-39.4	36.0	-45.3	41.0	-51.5	51.9	-65.2	64.0	-80.5
	2	50	18.6	-22.9	20.4	-25.0	22.2	-27.2	26.0	-32.0	30.2	-37.1	34.6	-42.5	39.4	-48.4	49.9	-61.3	61.6	-75.6
	2	100	18.1	-21.8	19.8	-23.8	21.5	-25.9	25.2	-30.4	29.3	-35.3	33.6	-40.5	38.2	-46.1	48.4	-58.3	59.8	-72.0
	3	10	19.9	-25.5	21.8	-27.8	23.7	-30.3	27.8	-35.6	32.3	-41.2	37.0	-47.3	42.1	-53.9	53.3	-68.2	65.9	-84.2
	3	20	19.4	-24.3	21.2	-26.6	23.0	-29.0	27.0	-34.0	31.4	-39.4	36.0	-45.3	41.0	-51.5	51.9	-65.2	64.0	-80.5
	3	50	18.6	-22.9	20.4	-25.0	22.2	-27.2	26.0	-32.0	30.2	-37.1	34.6	-42.5	39.4	-48.4	49.9	-61.3	61.6	-75.6
	3	100	18.1	-21.8	19.8	-23.8	21.5	-25.9	25.2	-30.4	29.3	-35.3	33.6	-40.5	38.2	-46.1	48.4	-58.3	59.8	-72.0
Wall	4	10	21.8	-23.6	23.8	-25.8	25.9	-28.1	30.4	-33.0	35.3	-38.2	40.5	-43.9	46.1	-50.0	58.3	-63.2	72.0	-78.1
	4	20	20.8	-22.6	22.7	-24.7	24.7	-26.9	29.0	-31.6	33.7	-36.7	38.7	-42.1	44.0	-47.9	55.7	-60.6	68.7	-74.8
	4	50	19.5	-21.3	21.3	-23.3	23.2	-25.4	27.2	-29.8	31.6	-34.6	36.2	-39.7	41.2	-45.1	52.2	-57.1	64.4	-70.5
	4	100	18.5	-20.4	20.2	-22.2	22.0	-24.2	25.9	-28.4	30.0	-33.0	34.4	-37.8	39.2	-43.1	49.6	-54.5	61.2	-67.3
	4	500	16.2	-18.1	17.7	-19.8	19.3	-21.5	22.7	-25.2	26.3	-29.3	30.2	-33.6	34.3	-38.2	43.5	-48.4	53.7	-59.8
	5	10	21.8	-29.1	23.8	-31.9	25.9	-34.7	30.4	-40.7	35.3	-47.2	40.5	-54.2	46.1	-61.7	58.3	-78.0	72.0	-96.3
	5	20	20.8	-27.2	22.7	-29.7	24.7	-32.4	29.0	-38.0	33.7	-44.0	38.7	-50.5	44.0	-57.5	55.7	-72.8	68.7	-89.9
	5	50	19.5	-24.6	21.3	-26.9	23.2	-29.3	27.2	-34.3	31.6	-39.8	36.2	-45.7	41.2	-52.0	52.2	-65.8	64.4	-81.3
	5	100	18.5	-22.6	20.2	-24.7	22.0	-26.9	25.9	-31.6	30.0	-36.7	34.4	-42.1	39.2	-47.9	49.6	-60.6	61.2	-74.8
	5	500	16.2	-18.1	17.7	-19.8	19.3	-21.5	22.7	-25.2	26.3	-29.3	30.2	-33.6	34.3	-38.2	43.5	-48.4	53.7	-59.8

Note: For effective areas between the those given above the load may be interpolated, otherwise use the load associated with the lower effective area.

The final value, including all permitted reductions, used in the design shll not be less than that required by Section 30.2.2.

Unit Conversions -- 1.0 ft = 0.3048 m; 1.0 sf = 0.0929 m²; 1.0 psf = 0.0479 kN/m²

Components and Cladding – Method 1		h ≤ 60 ft.
Figure 30.5-1 (cont'd)	**Design Wind Pressures**	**Walls & Roofs**
Enclosed Buildings		

Roof Overhang Net Design Wind Pressure, p_{net30} (psf)
(Exposure B at h = 30 ft.)

	Zone	Effective Wind Area (sf)	Basic Wind Speed V (mph)							
			110	115	130	140	150	160	180	200
Roof 0 to 7 degrees	2	10	-31.4	-34.3	-43.8	-50.8	-58.3	-66.3	-84.0	-103.7
	2	20	-30.8	-33.7	-43.0	-49.9	-57.3	-65.2	-82.5	-101.8
	2	50	-30.1	-32.9	-42.0	-48.7	-55.9	-63.6	-80.5	-99.4
	2	100	-29.5	-32.3	-41.2	-47.8	-54.9	-62.4	-79.0	-97.6
	3	10	-51.6	-56.5	-72.1	-83.7	-96.0	-109.3	-138.3	-170.7
	3	20	-40.5	-44.3	-56.6	-65.7	-75.4	-85.8	-108.6	-134.0
	3	50	-25.9	-28.3	-36.1	-41.9	-48.1	-54.7	-69.3	-85.5
	3	100	-14.8	-16.1	-20.6	-23.9	-27.4	-31.2	-39.5	-48.8
Roof > 7 to 27 degrees	2	10	-40.6	-44.4	-56.7	-65.7	-75.5	-85.9	-108.7	-134.2
	2	20	-40.6	-44.4	-56.7	-65.7	-75.5	-85.9	-108.7	-134.2
	2	50	-40.6	-44.4	-56.7	-65.7	-75.5	-85.9	-108.7	-134.2
	2	100	-40.6	-44.4	-56.7	-65.7	-75.5	-85.9	-108.7	-134.2
	3	10	-68.3	-74.6	-95.3	-110.6	-126.9	-144.4	-182.8	-225.6
	3	20	-61.6	-67.3	-86.0	-99.8	-114.5	-130.3	-164.9	-203.6
	3	50	-52.8	-57.7	-73.7	-85.5	-98.1	-111.7	-141.3	-174.5
	3	100	-46.1	-50.4	-64.4	-74.7	-85.8	-97.6	-123.5	-152.4
Roof > 27 to 45 degrees	2	10	-36.9	-40.3	-51.5	-59.8	-68.6	-78.1	-98.8	-122.0
	2	20	-35.8	-39.1	-50.0	-58.0	-66.5	-75.7	-95.8	-118.3
	2	50	-34.3	-37.5	-47.9	-55.6	-63.8	-72.6	-91.9	-113.4
	2	100	-33.2	-36.3	-46.4	-53.8	-61.7	-70.2	-88.9	-109.8
	3	10	-36.9	-40.3	-51.5	-59.8	-68.6	-78.1	-98.8	-122.0
	3	20	-35.8	-39.1	-50.0	-58.0	-66.5	-75.7	-95.8	-118.3
	3	50	-34.3	-37.5	-47.9	-55.6	-63.8	-72.6	-91.9	-113.4
	3	100	-33.2	-36.3	-46.4	-53.8	-61.7	-70.2	-88.9	-109.8

Adjustment Factor
for Building Height and Exposure, λ

Mean roof height (ft)	Exposure		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61
30	1.00	1.40	1.66
35	1.05	1.45	1.70
40	1.09	1.49	1.74
45	1.12	1.53	1.78
50	1.16	1.56	1.81
55	1.19	1.59	1.84
60	1.22	1.62	1.87

Unit Conversions – 1.0 ft = 0.3048 m; 1.0 sf = 0.0929 m²; 1.0 psf = 0.0479 kN/m²

Wind Load
Design Criteria 3.0
Examination

Wind Load Design Criteria III
Examination

1. In Florida, the standard for design of structures to resist wind loads is:
    a. The Building Department in the jurisdiction in which the project lies
    b. ASCE 7-10
    c. Southern Building Code Congress International
    d. Florida Building code

2. A major portion of storm damage to structures in past storm events had been due to:
    a. Weakness in openings
    b. Lack of adequate connections
    c. Inadequate field inspections
    d. Inadequate plans and specifications

3. Florida is vulnerable to hurricanes:
    a. Approaching from the Atlantic Ocean
    b. Approaching from the Gulf of Mexico
    c. Approaching from any direction
    d. Approaching in counter-clockwise direction about the eye of the storm

4. Which of the following elements do not have to be considered in designing buildings for high wind areas:
    a. Main wind force resisting system
    b. Components and cladding
    c. External pressures
    d. Wind-borne debris impacts

5. Wind gusts that greatly exceed a sustained wind speed are a result of:
    a. A tornado
    b. A hurricane effect
    c. A slowly changing wind direction
    d. An atmospheric pressure change

6. External pressure and forces:
    a. Cause inward-acting pressure on windward walls
    b. Cause outward-acting pressures on leeward walls
    c. Create aerodynamic effects
    d. All of the above

7. Maximum internal pressures will be realized in:
    a. An open building
    b. A partially enclosed building
    c. An enclosed building having no permeability
    d. The type of building does not matter

8. Certain information relating to wind loads needs to be shown on construction documents:
    a. If the structure is in a wind borne debris region
    b. If the structure is in a high velocity hurricane zone
    c. If wind loads govern the design of the lateral force resisting system of the building
    d. To comply with the Florida Building Code

9. When determining wind loads for building, the basic wind speed map to be used:
    a. Shall be selected based on the geographical area in which the project lies
    b. Shall be selected based on the design procedure to be utilized
    c. Is determined by the risk category of the building being designed
    d. Is determined by the Building Official in the jurisdiction in which the building is located.

10. Historical wind event data reveals that most building failures have occurred as a result of:
    a. Door and window openings which break up the continuity of the shear walls resisting the wind forces
    b. Improper connection design or installation
    c. The lack of tension connections between shear walls and the foundation
    d. Miscalculation of wind forces

11. The initial resistance to a wind force acting on the upper half of a single story building is:
    a. The shear walls parallel to the wind direction
    b. The building foundation
    c. The roof diaphragm
    d. Connections at the top and bottom of the windward wall

12. Section 1609.1.1 of the Florida building Code specifies how wind forces on every building or structure are to be determined:
    a. An exception allows a simplified procedure to be used for building 60 feet high or less
    b. An exception allows a simplified procedure to be used for building 30 feet high or less
    c. There are no exceptions
    d. There are eight (8) exceptions subject to certain provisions

13. As an alternative to ASCE 7-10, Section 1609.6 of the Florida building Code permits an alternate all-heights method to be used to determine wind effects on regularly shaped buildings. In order to use this method the building:
    a. Can be of any height
    b. Must be 60 feet or less in height
    c. Must be 30 feet or less in height
    d. Must be 75 feet or less in height

14. In using the directional procedure (ASCE 7-10, Part 1) for determining the design wind loads on buildings the velocity pressure is:
    a. Determined by a formula
    b. Obtained from Figure 27.3-1
    c. Based on the exposure category
    d. Based on the wind directionality factor

15. Designs performed pursuant to Part 2 of the directional procedure obtain wind pressures:
    a. By using prescribed equations
    b. Directly from a table
    c. From wind speed maps
    d. From the Building Official

16. An enclosed building, 30 feet in height, complies with all the conditions required for the wind load design to be performed using the Envelope procedure, Part 2. Given the basic wind speed of 130 mph, Exposure C and a roof angle of 20 degrees, what is the horizontal pressure in Zone C
    a. 17.8 psf
    b. 24.7 psf
    c. 34.6 psf
    d. 37.1 psf

17. The determination of the MWFRS wind loads on low-rise buildings may be made:
    a. Using the directional procedure
    b. Using the envelope procedure
    c. Using the wind tunnel procedure
    d. Either b or c above

18. The MWFRS of an enclosed building 60 feet in height
    a. May be designed pursuant to the Florida Building Code, Section 1609.6
    b. May be designed pursuant ASCE 7-10, Directional Procedure
    c. May be designed pursuant to ASCE 7-10, Envelope Procedure
    d. May be designed using any of the above procedures

19. Under any design procedure utilized (ASCE 7-10 or FBC Section 1609) the minimum design wind load on the wall area of the MWFRS for an enclosed or partially enclosed building shall be:
    a. 16 psf
    b. 8 psf
    c. 10 psf
    d. There is no minimum

20. A proposed low-rise enclosed building having a height of 30 feet the be located in an Exposure C area subject to a basic wind speed of 140 mph. What is the design wind pressure on the wall of the components and cladding of a 10 sq. ft effective wind area situated in Zone 4?
    a. 35.3 psf – 38.2 psf
    b. 33.7 psf – 36.7 psf
    c. 49.4 psf – 53.5 psf
    d. 35.3 psf – 47.2 psf