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Occupancy Category and Importance Factor

Introduction

Occupancy Category and Importance Factor are parameters utilized in a building’s structural design. The Structural Engineer utilizes them in calculating flood, wind, snow, seismic and ice design loads. However, there may be instances where increasing these factors above the “code-prescribed minimums” are desired.

Occupancy Category

The *International Building Code* (IBC) assigns an Occupancy Category to buildings based on their Nature of Occupancy. The *Nature of Occupancy* describes the facility’s intended use and anticipated occupant load. The *Occupancy Category* is assigned based upon the Nature of Occupancy. It is represented by a roman numeral (I, II, III or IV), ordered from lowest to highest, where Category I represents a low hazard to human life and Category IV represents an essential facility. Essential facilities are those intended to remain operational during and after an extreme environmental event, such as a hurricane or snowstorm.

Occupancy Category	Nature of Occupancy* (for Buildings and Other Structures)
I	LOW hazard to human life in event of failure <i>Examples:</i> Agricultural, Temporary & Minor Storage Facilities
II	Those NOT listed in Occupancy Categories I, III or IV <i>Examples:</i> Office, Retail & Commercial Buildings
III	SUBSTANTIAL hazard to human life in event of failure <i>Examples:</i> Schools, Jails, Buildings with Public Assembly Areas containing greater than 300 occupants
IV	Designated as an ESSENTIAL facility <i>Examples:</i> Hospitals, Police, Fire & Rescue Stations, Designated Emergency Shelters, Critical National Defense Facilities

* Reference Table 1604.5 of *IBC 2006* for full description of each Category.

Importance Factor

Importance Factor is determined from *Design Loads for Buildings and Other Structures* (ASCE 7) based on the Occupancy Category. It is utilized in calculating flood, wind, snow, seismic and ice design loads. The Importance Factor is a multiplier that increases or decreases the base design loads. Typically, the **base design loads** are outlined by the code as a 2% annual probability of exceedence (2% in 50 years for seismic loads). Therefore, an elevated Importance Factor creates proportionally higher design loads (i.e., a wind Importance Factor of 1.15 is a 15% increase in design wind loads).

Occupancy Category	Importance Factors*		
	Wind, I_W	Snow, I_S	Earthquake, I_E
I	0.87**	0.80	1.00
II	1.00	1.00	1.00
III	1.15	1.10	1.25
IV	1.15	1.20	1.50

* Reference *ASCE 7-05* for further information

** Wind Importance Factor is 0.77 when Wind Speed > 100 mph

Considerations

The Occupancy Category and Importance Factor are outlined by IBC and ASCE 7 as minimum required guidelines, with the primary intent of protecting the life and safety of the public. This does not necessarily include protecting the aesthetics or functionality of the structure after a severe event. In other words, the structure is designed not to fail, but may endure significant damage (structural or otherwise). This damage may prevent full functionality of the facility after a severe event. This is the reason the code increases the Importance Factor for Occupancy Categories III and IV. A higher Importance Factor improves the reliability (safety factor) of the structure, which helps protect its occupants (school), as well as its function (hospital), during and after a major environmental event. There may be instances where increasing these parameters above “code minimums” should be considered such as:

- Facilities’ ability to function after a major environmental event
- Increased Safety Factor
- Future use of Facility
- Building Design Life Span
- Insurance Carrier Requirements

The desire to increase the Importance Factor should be made aware to the Structural Engineer as early in the project as possible.

Feel free to contact our office for further information on this topic.



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SPEIGHT, MARSHALL & FRANCIS, P.C.



2125 McComas Way, Suite 103
Virginia Beach, Virginia 23456



www.smandf.com



(757) 427-1020



(757) 427-5919