



Wood Products and Resilience of the Built Environment

By Kenneth Bland, P.E.

In recent years, the term “resilience” has become a buzzword used by interest groups to demonstrate how products fit into efforts to adapt the built environment to expected changes in weather patterns, increases in storm frequency, and other natural disasters. Historically, engineers have used the term to define the structural performance of buildings under extreme conditions, but today it is used by a much broader group of stakeholders that are interested in proper preparation, response, and recovery. As more interests try to define what resilience means to them, it highlights the need for a comprehensive discussion by the stakeholders. This article demonstrates a need for a standard definition of resilience and further describes how building codes and wood industry design standards work together to mitigate the consequences of natural disasters on structures.

The International Code Council (ICC), developers of a family of building related codes, has a keen interest in the national conversation to define resilience. In response to a growing number of interests pursuing a proprietary position with respect to a definition, ICC launched the Alliance for National and Community Resilience (ANCR), with the fitting acronym “anchor.” ANCR is just finding its way into the resilience discussion but, at a recent meeting, their spokesman expanded the conversation from how to better address natural *disasters* to a comprehensive understanding of how unexpected *disruptions* can impact all levels of society from the smallest neighborhood to the massive response of the federal government. This initiative by ICC and its partners in ANCR, including the American Wood Council (AWC), will hopefully make the resilience discussion about much more than preparing for and recovering from natural disasters.

Since publication of the first U.S. building codes in the late 19th century, the updating of code provisions has relied on a mix of experience and science to improve the response of structures subject to natural hazards (e.g., wind, seismic, and flood). In most instances, these changes have resulted in more robust building design and construction, leading to overall better structural performance under extreme

events. More recently, as the severity and financial costs from natural disasters becomes an increasing burden to society, increased attention has been paid to enhancing life safety and property protection measures in new and existing structures. For example:

- In tornado-prone regions, safe rooms are required in certain occupancies of new construction and incorporated voluntarily in others.
- In hurricane-prone regions, glazed openings in new buildings are required to be protected in special wind-borne debris regions.
- In seismic hazard regions, both mandatory and voluntary programs for the upgrade of existing seismically-vulnerable structures have been implemented.
- In flood hazard regions, requirements for building elevations vary based on a building’s flood risk category and locally designated flood elevation requirements.

Model Codes and Resilient Construction

Since there is not a common understanding or definition of the term “resilience,” some industries have seen this as an opportunity to propose self-serving definitions that favor one product over another. There is a need for a nationally-accepted definition that would permit performance-based design and construction of all building types and materials to be identified as “resilient.”

Fortunately, modern model building codes promulgated by the ICC and the National Fire Protection Association provide criteria that result in resilient design and construction of the built environment. Conversely, at present, no less than ten federal agencies have varying definitions and classifications of “resilience.” These different interpretations can cause even greater confusion to designers, builders and those responsible for ensuring a safe building environment. Further, some building material interests are promoting a need for more restrictive code requirements that can only be achieved by their products. The 10 second sound bite that modern codes do not provide

for resilient construction should be left on the cutting room floor. There are ample tools to help designers and builders exceed code requirements if a greater level of resilience is sought, including resources provided by the wood products industry.

Agreeing that today’s minimum code requirements provide for resilient construction is an essential starting point to launch the conversation. Prescriptive requirements are the result of historical performance, professional judgment, and risk/benefit. With the code as the baseline, industry is positioned to develop and implement tools that provide added levels of performance. For the wood products industry, demonstrating that wood buildings are engineered for resilience is at the core of its message.

Building codes rely on wood design standards to provide the necessary guidance for designers to meet higher performance goals, which in turn provide greater resistance to loads. In some instances, the code mandates the use of these standards. In other cases, they are voluntary or provide an alternative. For engineered design, loads associated with natural hazards, design criteria, and values of material resistance are prescribed by the codes and reference standards. These design requirements provide a baseline performance and level of risk of the built environment that represents a consensus of design professionals, producers, code officials, and general interest.

Careful consideration should be given when recommendations to enhance resilience are provided from other sources. The recommendations must be coordinated with those of the U.S. model building codes to avoid inadvertent weakening of building requirements. This inadvertent weakening could occur through novel resilience schemes that are based on non-standard loads or non-standard values of material resistance. In principle, increasing performance in one area of the code to enhance resiliency should not weaken a different area of the code.■

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