

WHY BUILDING REGULATIONS?

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ABSTRACT

Building regulations – Why do we have them? In the United States and likely in other countries building regulations were first formed to avoid conflagrations. Avoiding conflagrations avoided large spread public welfare catastrophes which would have a negative impact on overall quality of life and economic health. Interestingly the overall goal was not necessarily life safety of occupants but was simply for the greater good. As time has progressed society expects more and more from buildings such as protection of individual occupants from fire and other hazards such as earthquakes and basic needs such as sanitation. Prescriptive regulations went from restriction of chimney, wall and roof construction to codes dealing with sanitation, accessibility, lighting, and many other elements. Building regulations are generally the silent protector to the general public and are generally not well recognized unless a situation where regulations are either inadequate or are not enforced occurs. This generally tends to occur after large events such as earthquakes, hurricanes (typhoons) and fires with extensive economic and life loss. Unfortunately we sometimes learn lessons about the effectiveness of appropriately implemented and enforced building regulations through large loss events that we have yet to experience. The other situation where they tend to be recognized is when they are seen as a barrier to the design and construction community and to trade in general. This paper will explore, from a building official's perspective, the importance and challenges associated with building regulations and their enforcement. Part of the discussion will focus upon the US (ICC) system and how it has evolved to accommodate the needs of society and the building industry. This paper will set the stage for discussing performance regulations, how they relate to prescriptive regulations and the important elements that must be addressed to accomplish the same ideals that traditional building codes have been built upon.

Introduction

As has been discussed in many meetings building regulations (controls) have been in existence since the code of Hammurabi (1795-1750 BC) and even those laws were likely based upon earlier ones. These regulations of course took “an eye for an eye” approach that, while definitely performance based, would be inappropriate by today's standards but would certainly create a high level of accountability. In more recent history building regulations have been shaped by large losses primarily related to conflagrations (London 1666 and Chicago 1871). Such conflagrations sometimes occurred after major events such as the San Francisco earthquake in 1902. There are countless events such as these that have resulted from human actions which have occurred historically and still occur today but thankfully they are fewer and farther between. These early losses were the

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initial drivers for modern day building regulations which initially focused on mitigation for the greater societal good versus life safety. U.S. regulations started with prohibition of thatched roofs and wooden chimneys. After the Chicago fire the major motivation for adoption of regulations was actually the insurance companies refusing to do business in the cities without such regulations.

As time progressed conflagrations began decreasing due to improved regulation and society became more sensitized to life loss and more demanding of a certain quality of life. In the late 1800s, in the US, building regulations began covering issues such as natural disaster mitigation, exiting and plumbing. The origin of most model construction requirements are solutions to real health and safety threats which evolved to provide an acceptable level of protection. Regulations have grown further to address many issues including durability of construction materials (building envelope), accessibility and even sound transmission.

For many years there was not a dramatic change in how construction occurred and it was not until construction innovation began to gain energy that the building codes starting resembling the more complex documents they are today. Examples include the introduction of equipment and systems such as elevators, HVAC systems and also innovations in structural engineering which allowed the construction of tall and unusual buildings. These changes made building regulation a much more complicated business than it had once been. Thicker code books, more inspections and detailed plan reviews were required. Buildings once designed and constructed by construction trades then required sophisticated engineering expertise. In more recent history technology is ever changing and makes it even more complex for building regulations to keep up with current technologies. The evolution and growing complexity of prescriptive requirements led to the creation of standards writing bodies to manage the detailed aspects of construction. These standards and also design guides have become an important backbone of building regulations.

Another aspect of the evolution of codes has been the movement from building regulations written independently by cities, counties and states to regional codes. In response to urgings from the design and construction industry, the three regional US codes were combined resulting in the *International Building Code* published first in 2000 and also in 2003. In 2003 a completing code was introduced. Currently there are two model building codes available in the United States that include the *International Building Code* (ICC 2003)¹ and *NFPA 5000* (NFPA 2003)².

With the ever increasing complexity of the built environment, industry demands codes that provide both the flexibility of performance codes and the predictability of prescriptive codes. Large facilities with exotic designs cry for performance-based design and regulation, but developers of the local supermarket or fast food restaurant want regulations which don't require the analysis to justify a performance design and prefer prescriptive codes. Many times there is need for both approaches on the same project. A perfect example is semiconductor manufacturing where processes change so quickly and the window for marketing of new products is so short, the only practical way to address

regulations for the innovative process portion of the facility is through performance based analysis. But, for the offices, lunch rooms and rest rooms it is much more efficient to use the tried and true prescriptive requirements. Clearly there is a need for both and for both approaches to be compatible.

More history on the evolution of building regulations, primarily in the United States Can be found in the book titled “Building Department Administration” (O’Bannon, R. 1989)³

Building Regulations

Codes can be described as “Policy Makers interpretations of society’s expectations of health, safety and amenity” (Custer, R., Meacham, B. 1997)⁴. Property protection is addressed in US model codes as they relate to the greater good or public welfare. Historically this was one of the primary reasons for building regulations.

Codes can provide a reasonable level of safety and certainty with respect to building compliance standards. In the US 97% of states and local government take advantage of the model codes that are available. There is a good deal of reliance on model codes and model code organizations to support the consistent, predicable use and application of codes and standards. Model organizations provide the mechanism to keep codes contemporary, competitive and responsive to new technologies, issues and threats.

In the US where litigation is common, code compliance with a nationally recognized standard may provide a certain amount of insulation from legal damages.

As noted the scope of such regulations has changed as societies expectations evolve. Building codes now deal with such things as Civil Rights issues with regard to accessibility and environmental issues in regard to energy efficiency. Codes are ever changing. Increased fire resistance in the structural provisions for very tall buildings to delay or prevent collapse is now being considered for the *International Building Code*. Serviceability after large events is key in occupancies such as hospitals especially as those facilities are even more important.

Enforcement Challenges

Silent Reliance

“No news is good news” fits perfectly for successful implementation and enforcement of building regulations. This is sometimes the downside of doing a good job. There is very little recognition or understanding of building regulations and enforcement by the general public. The regulations themselves are created to reduce loss through prevention and mitigation. When something is prevented little credit is given to the effort of the code development and enforcement community. Safety in buildings is highly under appreciated and taken for granted. Unfortunately, it is only when a failure occurs that building regulations and the enforcement community are in the spotlight. Failures, as

noted earlier, are the primary drivers of change to the building regulations. Therefore there is usually a silent reliance by the general public that all buildings are safe and are protected from all events at all times. This reliance incorrectly includes events that building codes really have not specifically addressed such as arson or terrorism. The other assumption by the public is that there are enough inspectors and related personnel reviewing these buildings to ensure complete safety when this is generally not the case. Most Buildings and fire prevention departments are understaffed for the number of buildings within a jurisdiction. Community support greatly varies from one jurisdiction to another. In actuality the ultimate responsibility for code compliance is really that of the building owner, but most Americans assume the responsibility is with the government. In other countries such responsibilities may be better understood. The way in which building regulations are adopted also vary greatly from state to state. In addition there have been many editions of the building codes under which buildings could have been approved and there is a variety of levels of enforcement capabilities from jurisdiction to jurisdiction.

There is also a common misunderstanding that the building regulations address all aspects of construction when in fact there are many issues related to workmanship and quality that are far beyond basic safety, health and amenity concerns covered by the building regulations. These issues are generally considered by local regulators as consumer in nature and driven by market demands.

Budget constraints

As a result of the excellent job of properly enforced and implemented building regulations seems to have resulted in complacency in providing adequate funding in the area of enforcement. At the same time more and more products are coming on the market and buildings continue to become more complex along with the addition of new issues such as accessibility and building security. There are more systems and products that require maintenance than in the past with less and less resources to monitor such features. Historically in the United States the building department has been a function of local government and been responsible for initial building construction and not for maintenance. The fire department has been the primary body given maintenance responsibility.

There is a finite amount of money available to run local government. Permit fees should be a fee for the service of enforcement, but are more often seen by elected officials as a revenue source. Building safety budgets are typically affected by the local economy and must compete against other issues that society sees as more pressing, such as a rise in crime rates. When crime is up, inspection budgets usually suffer. Also, when the economy is good there is often a reluctance to hire too many staff due to the inevitable downturn and potential of having to lay employees off. At the same time even when more personnel are required the compensation offered may not be as appealing as the private sector.

It should be noted that some building departments are self-supporting and are not as subject to the budget restraints in a typical city or town. Economic downturns can be a greater factor in these cases because they are managed more like a private business.

Regulations and the Building Industry

As noted the evolution of building regulations has been such that they have increased in complexity. There are many building systems, construction techniques and innovative construction systems being used everyday. As innovation increases the regulations and associated supporting documents become more complex.

From a historic standpoint the focus of basic building regulations has not typically been to stimulate innovation or international trade. These concerns are issues that have become more prevalent only as the building industry as a whole has become more complex and internationally based. Building regulations started as means of community survival when that was a main priority to society but with time the increase in the complexity of such regulations, the inclusion of social issues and decrease in large losses due to regulation, the regulations themselves are now unfortunately seen as a barrier to construction and innovation. This is due to a perceived delay or added cost of compliance. As a society we have forgotten the important contribution construction regulations provide and the contribution they will continue to provide to our modern civilization.

Also as noted building departments are not usually funded or staffed to a level to handle the rapid pace of change in the construction industry. Everyone is being asked to do more with less. Many building departments are taking advantage of tools such as automation, the internet, electronic permitting and expedited project management to compensate for the increased complexity of their job. Also tools such as product Evaluation Services through code organizations speeds the process of new products and systems being approved. Generally if a product is approved by a body such as ICC Evaluation Services a building department will accept that the product is at least equivalent to the current building codes.

At the same time building regulations also provide industry a benchmark for product performance. If the code has a certain requirement and their product meets that requirement it is a critical marketing point. It provides a level of confidence to consumers. It really depends on the perspective of the stakeholder. More requirements may be beneficial to some stakeholders but less beneficial to others.

The Future

The existence of building regulations goes back several thousand years and has varied in level of detail and accountability. It is clear that society is interested in a minimum level of safety and in more recent history, quality of life. The overall system of building regulations has become far more complex with a multitude of standards, design guides, tests, product approvals programs and enforcement needs. This complexity has lead

several countries to pursue performance regulations to better understand and communicate what the building regulations have been trying to achieve. There is potential for a more systematic code system but the ideals of building regulations and the history of their purpose needs to be kept in mind.

Additionally there are challenges to on the enforcement and implementation of building regulations. From a standpoint of the enforcement community, safety and general code compliance with adopted codes is the priority. International trade and innovation at least at a local level in the United States is not their main motivation and participation in the global marketplace is not a priority. The vast majority of US communities adopt model codes and there is reliance on model code organizations to keep codes responsive and appropriate.

Potentially performance codes can communicate why and what building regulations are trying to accomplish and at the same time provide more open understanding of the purpose of enforcement. For the foreseeable future, both prescriptive and performance codes are required to meet the needs of the design and construction communities. They should not work in conflict, but as complementary systems.

Greater understanding of the importance of codes and improved support for enforcement by the general public and our political leaders is critical to continue to improve the safety and reliability of our building stock.

¹ International Code Council, *International Building Code*, 2003 Edition, ICC, Falls Church, VA, 2003

² National Fire Protection Association, *NFPA 5000*, 2002 Edition, NFPA, Quincy, MA, 2002

³ O'Bannon, R., *Building Department Administration*, ICBO, Whittier, CA, 1989

⁴ Custer, R., and Meacham, B., *Introduction to Performance-Based Fire Safety*, Society of Fire Protection Engineers and National Fire Protection Association, 1997