

# Judging Building Codes

Who is responsible for interpreting and writing the codes, anyway?

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BY KENNETH B. BONDY

**L**aws regulate the practice of structural engineering, perhaps more than any other profession. Those laws are called building codes, and virtually every U.S. city, county, and state has adopted one. In retrospect, it is perhaps a mistake that engineers have allowed building codes to become law because laws are ultimately interpreted by judges. This article discusses the consequences of a building code's judicial review.

Structural engineering is not an exact science; virtually every engineering decision involves judgment. Most engineering problems can be solved competently in more than one way. Making the practice of engineering a law, however, implies that each engineering problem has only one acceptable solution because a law should mean the same to all who are governed by it. Legislation of building codes inherently eliminates or minimizes engineering judgment. Engineers should have been more aware of the ramifications of this when they started writing building codes and seeing them adopted as laws. On the other hand, since the days of Hammurabi 4000 years ago, the public has always seemed to want the design of its buildings governed by laws. So it is unlikely that engineers could have completely avoided the legislation of their practice, even if they had offered some protest along the way.

Until recently, the practice of structural engineering has not been significantly affected by the legislation of building codes. Engineers write building codes, and in everyday practice, building officials (who generally are also engineers) enforce them. The design professional and the building official interpret the code requirements during the plan review process for each individual project. When code wording is unclear, or when there is

a difference of opinion between the design professional and the building official, the building official has the final authority on code interpretation. That is not only the custom and practice, but it is also specifically stated in the building code; it is, in fact, legally binding. The 2000 International Building Code (the most current, published, model building code) states:

“Section 104—Duties and Powers of Building Official 104.1 General. The building official is hereby authorized and directed to enforce the provisions of this code. The building official shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies, and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.”

All other model codes contain similar or identical statements describing the powers and responsibilities of the building official. In the 1997 Uniform Building Code (UBC), it is found in Section 104.2.1.

Over time, the continual process of plan review, and the exchange between design professionals and building officials on projects, has led to generally consistent code interpretation, even when the code wording is unclear. Thus, in practice, a general understanding has developed between design professionals and building officials as to the intent of the building code, and how to satisfy each code requirement in each building code jurisdiction. And, of course, the codes themselves become clearer with time, as current codes clarify previous codes.

## DOUBLE JEOPARDY

Many parts of the country have experienced a dramatic increase in construction defect litigation. When code interpretation is an issue in these lawsuits, the “final word” no longer belongs to the building official, it

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belongs to the judge. Because the building code is a legal document, and only a judge can rule on matters of law, interpretation of the code in construction defect lawsuits is made—not by the engineers who use, enforce, or write the codes—by a judge. It is unlikely that the judge has had any structural engineering training, and often the judge is reading the building code for the first time. Nonetheless, it is the judge who must make the final decision about code conformance. Of course, judges can hear expert engineering testimony to aid them in their decision, but the judge alone decides whether the code was satisfied or violated.

This puts a tremendous burden on judges and it puts every party responsible for building code compliance in a sort of “double jeopardy.” Code requirements must be satisfied first, in the original plan review and permitting process, and in that case, the building official is the final authority on code interpretation. If the building is ever the subject of litigation, and code requirements are at issue, the final authority is the presiding judge, who may agree or disagree with the original decisions of the design professionals and the building official. It is entirely possible that the original design of a building could be fully in conformance with existing and commonly understood code interpretations at the time of design and issuance of the permit. Yet, years later a judge could decide that, by his or her interpretation, the code was in fact violated, and those whom the judge decides are responsible for code conformance were negligent. Ironically, as pointed out previously, the law itself states that the building official is the final authority on code interpretation. Yet in litigation, the judge interprets the code and, years later, can override the decision of the building official.

A judge’s interpretation of the building code, particularly if it conflicts with the prevalent interpretation between design professionals and building officials, and even if it has no legal influence on other cases, will be cited by parties who may benefit from that interpretation. If a judge’s decision on code interpretation is appealed and upheld, the decision becomes case law. Thus, judicial decisions, in essence, will increasingly help fashion our building codes in the future, or, at the very least, participate in their writing and, in some cases, change the intent of building officials, code writers, and design professionals. The following example is from a recently tried case.

### HOMEOWNERS SUE CONCRETE MATERIAL SUPPLIER

*In Mesa Vista South Townhome Association v. California Portland Cement Corporation*, Orange County Superior Court Case #802639, a bench trial with no jury, owners of 40 homes built on soil containing elevated levels of water-soluble sulfates sued the concrete material supplier, alleging that the foundation concrete did not

satisfy the sulfate durability requirements of the originally governing 1991 UBC. I testified on behalf of the defendant in the trial. A significant part of my testimony dealt with code interpretation issues. My code testimony was based on my 39 years of structural engineering experience in Southern California, dealings with most Southern California building officials, and actual code-writing experience as a longtime member of ACI Committee 318, Structural Concrete Building Code, the committee that wrote the code sections at issue in the case.

Specifically, the plaintiffs alleged that the water-cement ratio (*w/c*) of the concrete supplied exceeded the 0.45 limit specified in Table 26-A-3 of the 1991 UBC for severe sulfate exposure, and thus violated the code. The defendant argued that Table 26-A-3 was not applicable to residential foundation concrete and at the time the homes were designed and built was rarely specified in California by licensed design professionals or required by building officials for residential foundation concrete.

### Code interpretation was critical

A key issue in the case was the distinction between the two code categories of structural concrete: reinforced and plain. Requirements for these two categories of structural concrete are fully contained within the 1991 UBC, Chapter 26. The 1991 UBC requirements for reinforced concrete are generally identical to those of ACI 318-89, “Building Code Requirements for Reinforced Concrete,” a document, as its title indicates, intended only for reinforced concrete (for plain concrete, ACI 318-89 refers to another ACI document). UBC requirements for plain concrete are substantially different than those from ACI and are clearly identified as such in Chapter 26. The defendant argued that the foundations for these homes, as in virtually all Southern California wood-framed homes, were designed as plain concrete:<sup>1</sup> that plain concrete was permitted by 1991 UBC for foundations in wood-framed California homes (2622a); that Table 26-A-3 is in a section of the code (2604f), taken directly from ACI 318-89, applicable only to reinforced concrete; and Table 26-A-3 does not appear, nor is it referenced in the parts of the code applicable to plain concrete (2622 and two other clearly identified sections, 2621a [shotcrete] and 2615f [pedestals and footings]). Therefore, argued the defendant, Table 26-A-3 does not apply to the foundation concrete in the homes, and the code had not been violated. The defendant further pointed out that its interpretation of the code was not unusual; rather, it was the prevalent,

<sup>1</sup>The defendant attempted to introduce a consensus-based, published opinion from the Slab-on-Ground Committee of the Post-Tensioning Institute affirming that the specific type of foundation designed and built in this case was in fact plain concrete, rather than reinforced concrete, but the judge refused to allow its introduction on the grounds that it was hearsay.

common, and virtually universal interpretation in Southern California at the time the homes were designed and built, and for decades prior to that.

The plaintiff argued that Table 26-A-3 applied to all concrete, plain and reinforced; that the foundations in the homes were in fact reinforced concrete, not plain concrete;<sup>2</sup> and that the failure to limit the  $w/c$  to 0.45 was a code violation involving negligence on the part of the concrete material supplier, who should have known that the code required the lower  $w/c$  for sulfate resistance, and should have provided it.

### Judge rules for plaintiff

The judge agreed emphatically with the plaintiff and awarded almost \$6 million to them for repairs to the foundations, which included increasing their resistance to sulfates. In the judge's finding on negligence per se, he decided, by his reading of the code, that everything contained within Chapter 26 of the 1991 UBC applies equally to both plain and reinforced concrete. Therefore, it did not matter whether the foundations were plain or reinforced concrete. The failure to satisfy Table 26-A-3, said the judge, was a code violation involving negligence per se on the part of the concrete material supplier.

In support of his decision, the judge cited Section 2601 of the UBC, which states: "The design of structures in concrete of cast-in-place or precast construction, plain, reinforced or prestressed, shall conform to the rules and principles specified in this Chapter."

In the judge's opinion, this clearly means that all requirements contained within Chapter 26 applied equally to plain, reinforced, and prestressed concrete. He stated in his decision: "In other words, by the plain, unambiguous words of the UBC, Chapter 26 applies to all concrete, not just reinforced concrete...."

Section 2601, however, can also be interpreted, just as plainly and unambiguously, to mean that Chapter 26 does contain all requirements for plain, reinforced, and prestressed concrete, and that they are contained in separate, clearly identified sections (specifically, 2622, 2621a, and 2615 for plain concrete; 2618 and portions of 2611 for prestressed concrete; and the balance, taken directly from ACI 318-89, for reinforced concrete). What was "plain and unambiguous" to the judge in his interpretation of the code was not all that clear to the writers of the code, me included, and generations of design professionals and building officials who wrote, used, and consistently interpreted the code in a completely different way.

The judge's decision has extraordinary ramifications, far beyond just the sulfate durability issues in the case,

<sup>2</sup>A plaintiff expert testified that the foundations contained anchor bolts and therefore could not be considered plain concrete.

and, in my opinion, it has the potential to bankrupt the home-building industry. Some of these ramifications are discussed in the following.

### Plain concrete does not exist

The judge decided, in effect, that there is no difference in the code requirements for plain and reinforced concrete. This will come as quite a surprise to the members of ACI Committee 318, who defined plain concrete in the early 1970s to distinguish it from reinforced concrete. Chapter 26 of the 1991 UBC contains all of the requirements for both plain and reinforced concrete; by deciding that all those requirements apply equally to both plain and reinforced concrete, the judge obviated the necessity for separate categories of structural concrete. As a member of ACI Committee 318 in the early 1970s when the category of structural plain concrete was being developed, I know that the intent of the committee was to isolate the requirements for plain and reinforced concrete, not to mingle them. Why would there be a need for two categories of structural concrete if ACI Committee 318 did not intend them to be significantly different?

### All California homes are illegal

ACI Committee 318 developed the code category of plain concrete in part to waive minimum reinforcing steel requirements for reinforced concrete that were felt to be unnecessary for foundations and basement walls in light residential construction. The judge's decision means that these minimum requirements for reinforced concrete do apply to plain concrete residential foundations. Because virtually no residential foundation satisfies the minimum reinforcement requirements, the judge has, in effect, decided that the foundations supporting every wood-framed home ever built in UBC jurisdictions are illegal. For example, Section 2610f requires a minimum amount of reinforcement at any section of a flexural member equal to

$$A_s = \frac{200b_i d}{f_y}$$

Because it is in Chapter 26, this requirement applies equally to plain and reinforced concrete, according to the judge; therefore, it would apply to plain concrete residential foundations. Typical continuous residential foundations under wood stud-bearing walls resist differential soil movements, at least in part, by bending; therefore, they could be considered flexural members. It is not uncommon in California for these continuous wall foundations to have  $b$  and  $d$  dimensions of 12 and 14 in. (300 and 350 mm), respectively; therefore, for Grade 60 ( $f_y = 60$  ksi [400 MPa]) reinforcement, Section 2610f would require 0.56 in.<sup>2</sup> (360 mm<sup>2</sup>) of longitudinal reinforcement at both the top and the bottom of the footing.

Many residential foundations in California are built with no longitudinal reinforcement, many with one No. 4 bar top and bottom, and some with one No. 5 bar top and bottom. None of these foundations contain the minimum amount of reinforcing required by Section 2610f. In fact, I am unaware of any ground-supported residential foundation built in California that satisfies this requirement. The judge's decision means, therefore, that based on this code requirement alone, virtually every residential foundation ever built in California, or any other UBC jurisdiction, is illegal.

### Material suppliers are responsible for engineering design?

The concrete material supplier in this case, according to the judge, was responsible for building code requirements contained in a part of the code titled "Engineering Regulations..." (Part V, 1991 UBC). In the current 1997 UBC, the analogous requirements are in Volume 2, titled "Structural Engineering Design Provisions." If, as the judge ruled, material suppliers are responsible for code requirements in this part of the code, which is clearly intended for trained and licensed design professionals, then I see no reason why a hardware store selling nails for use in plywood shearwalls would not be responsible for the spacing of the nails. If the actual spacing violates the structural engineering requirements stated in the code, the hardware store is negligent, according to the judge. Precisely the same logic that led the judge to his decision also leads directly to this bizarre conclusion. This judge has, of course, completely ignored the function of the design professional who, based upon his or her engineering training, experience, and licensure, decides and specifies the spacing of the nails or the strength and durability requirements for the concrete.

### WHAT'S THE SOLUTION?

This is a striking example of a case in which a judge's after-the-fact interpretation of the building code bears no resemblance to the way the code was consistently interpreted in day-to-day practice and is radically different from the intent of the writers of the code. In reaching his decision, the judge gave no weight to the fact that building officials in the State of California rarely, if ever, interpreted the code in the way he did, including the building official who issued the permits and certificates of occupancy on the homes at issue in the case. The judge clearly did not consider, or perhaps understand, the ramifications of his decision on virtually all California residential construction. Nonetheless, because the building code is a law, and the final authority on interpretation of laws lies with the judge, the judge's interpretation prevails. I might point out that the judge's decision may be appealed, but even if it is overturned, the chilling ramifications of judges interpreting building codes are evident.

There are several things that engineers could do to remedy this situation through their professional organizations. First, existing code wording must be reviewed and made more clear so judges reading the codes for the first time will not drastically misinterpret the intent of the committee writing them. This may require reviews of codes by lawyers prior to publication. Second, legislation should be developed and proposed to limit the authority of judges in "second-guessing" building officials who have reviewed plans and issued permits and certificates of occupancy on projects in accordance with established "interpretations, policies, and procedures" as stated by law. This will help to avoid the untenable "double jeopardy" situation faced now by all parties responsible for building code conformance.

Finally, legislation should be developed, proposed, and adopted to clearly and precisely define who is responsible for engineering requirements of the code; is it just the licensed engineer who prepares the plans, or is it everyone who supplies any services or materials on a project, as the judge decided in *Mesa Vista South*? Currently there are those within the construction community who feel that everyone is responsible for compliance with engineering requirements; there are others who feel that licensed design professionals are required to include all applicable code requirements into their plans and specifications (as the code itself states they must); and contractors and material suppliers are responsible only for building and supplying in accordance with those plans and specifications. Because the public seems to want engineering requirements legislated, they have the obligation to clarify, by legislation, who is responsible for those engineering requirements. Until it is done, the division of responsibilities between design professionals, contractors, and material suppliers on construction projects will be unknown and at the whim of the courts.

Selected for reader interest by the editors after independent expert evaluation and recommendation.



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