

The ACI 318-05 Code New Items in 2005 & Future Work

By James K. Wight

The code development process for the 2005 edition of the ACI Building Code (ACI 318-05) was essentially finished during the ACI 2004 Fall Convention in San Francisco. All of the final technical and editorial changes were accepted, and the document was sent to ACI headquarters

for final checking before being published in January, 2005.

Based on input from structural engineers who use the Code, the 318 Committee decided that it would not be a good policy to continue making a large number

of technical changes on a three year cycle. Therefore, many significant technical changes are

targeted for the 2008 edition of the Code. The most noteworthy change in the 2005 edition of the Code is the introduction of a more consistent use of notation.

Consistent Notation

Historically, ACI 318 notation was developed on a chapter-specific basis. This approach gave rise to situations that could confuse users of the Code. The committee agreed early on in the 2005 cycle that code clarity would increase from use of consistent notation throughout the document, and a task group was formed to address this issue.

A typical example of notation confusion in earlier editions was when the same notation represented completely different concepts. As an example, notation c could mean the distance to the neutral axis from the extreme compression fiber, a spacing dimension, or a cover dimension, depending on context.

Another was that a single notation representing a concept be defined using similar, but not identical, language. For example, in chapter 10, M_u is the "factored moment at section", and in chapter 14, M_u is the "factored moment at section including P-delta effects".

Beginning with the 2005 edition, the committee has imposed a rule that each term used in 318 has a unique definition. One measurable result is that the 2005 Code has about 100 fewer terms than used in the 2002 Code.

Other Changes

To allow for congestion reduction, the use of spiral reinforcement with specified

yield strengths of up to 100,000 psi is now permitted, except in members resisting earthquake induced forces in high seismic performance categories.

For structures assigned to high seismic performance categories, provisions for shear reinforcement at slab-column connections were added to reduce the likelihood of slab punching shear failure during a significant seismic event.

The committee also used the 2005 edition to introduce needed clarifications or slight modifications to various areas, such as:

- skin reinforcement requirements;
- construction joint locations;
- maximum spacing of reinforcement;
- alternate design procedure for torsion;
- consistent use of the unified design approach throughout;
- maximum tensile stress permitted in post-tensioned, two-way slabs;
- development length requirements in seismic-resisting members;
- provisions related to anchorage to concrete.

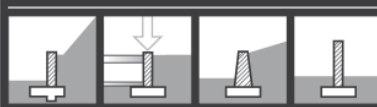
Welcome to Participate

During the recently finished public comment period, the committee received several comments that did not address the proposed changes to the Code, but rather questioned provisions that were in previous versions of the Code. These comments will be considered during the development of the 2008 edition of the Code. This situation, however, brings up a very important point. The Code Committee is continuously open

Speed of the ACI Code Process

There seems to be a common perception that the code development process within ACI Committee 318 moves too slowly. Other code-development groups, which are typically smaller and more focused, are able to quickly develop code-type documents. However, is faster necessarily better? Because of the broad expertise present in this committee, it is often difficult to get items approved quickly. However, it is better to take time and get the code change correct, rather than make a change that needs to be modified three years later.

The Code committee does not always move slowly, especially if a significant safety issue has been identified. During the Northridge earthquake (January 1994), there were some unexpected column failures in modern reinforced concrete buildings. These columns were not part of the primary lateral load resisting system for the building, and thus they were detailed as "gravity" columns. During the earthquake, these columns were subjected to interstory displacements that induced unexpected shear forces and bending moments. The shear forces created significant damage in these columns, and some spectacular structural failures. After the cause of these failures was identified, a requirement for a tighter spacing of transverse reinforcement over the full length of such columns was quickly included in the 1995 ACI Code. ■



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How the ACI Building Code Committee Operates

The ACI Building Code Committee has a total of forty-three voting members on the main committee. Membership is composed of practicing engineers, academics, material suppliers and representatives of government agencies. Members of the Code Committee are selected based on their technical expertise, experience as a structural designer, and prior work in other ACI technical committees. Proposed changes to the Code typically come to the main committee from eight subcommittees that are assigned to work in specific technical areas covered by the Code. The number of voting members on each subcommittee ranges from twelve to eighteen, with half of the voting members coming from the main committee. The other voting subcommittee members are selected to supplement and expand the technical expertise in the specific area covered by that subcommittee.

During the current code cycle, several task groups have also been formed to address a specific technical issue that either does not fit within the scope of the existing subcommittees, or is an urgent issue that must be resolved quickly. These task groups usually have from four to six members, with at least half of them being members of either the main committee or one of the subcommittees.

The work of the Code Committee is further supported by many of the other ACI technical committees. When these committees develop state-of-the-art reports and design recommendations on specific topics, information that is relevant to the Code is typically forwarded to the appropriate code subcommittee for consideration as an addition or modification of the Code. The reverse flow also occurs. That is, when a subcommittee wants additional information, or maybe a broader consideration of a technical issue, they will refer that issue to one of the other ACI technical committees for input. Some of the ACI technical committees are informally referred to as "feeder" committees, and have specific liaison members who attend all the meetings of the Code subcommittee whose work corresponds to that of the technical committee.

Because some of the ACI technical committees did not have a well-defined path for forwarding their technical developments to the Code Committee, a new subcommittee was formed during this code cycle to accept and consider "new items" for the Code. A scope of work was not defined for this subcommittee. Rather, their task was to be open to new concepts and new products that are not currently addressed by the Code. Examples could be the use of FRP reinforcement in structures and defining structural applications for fiber reinforced concrete. ■

for comments and questions about the Code, not just once every three years. Users of the Code are encouraged to submit questions or comments that arise during their use of the code for the design and construction of concrete buildings.


I invite you to participate in the code development process of ACI Committee 318. The Code Committee meets during each ACI Convention and all of the meetings of the main committee, the subcommittees, and the task groups are open to the public. Because of the size of

the main committee, public participation is usually limited to listening to the discussions and debates that occur during the meeting. However, for the subcommittee and task group meetings, ACI members and other interested parties often directly participate in the discussion of technical items that are under consideration. If you are not able to attend the ACI Conventions, you are welcome to submit questions or comments to the Code Committee, as noted above. Those questions can be submitted directly to ACI Headquarters in Farmington Hills, Michigan. ■

James K. Wight is the current Chairman of the ACI Building Code Committee. He is a professor in the Department of Civil and Environmental Engineering at the University of Michigan where he has over thirty years of experience teaching graduate and undergraduate courses on the design of reinforced concrete structures.

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