## Application-Specific Standards

There is an increasing demand for application-specific standards for design and construction of concrete elements. Time demands related to the daily activities of design professionals, contractors, specifiers, officials, testing agencies, and others involved in design and construction have created a desire among these groups for application-specific standards in concise packages for the intended applications.

ACI committee efforts, as shown in Fig. 1, have been addressing this trend. Initially, ACI generated one standard related to design and construction, which is now ACI 318, "Building Code Requirements for Structural Concrete." Today, there are 16 standards providing code requirements for general and specific applications. In addition, ACI maintains 32 other standards which are specifications, acceptance criteria, and test methods. The demand continues to increase the number of standards, especially with regard to concise information for specific applications.

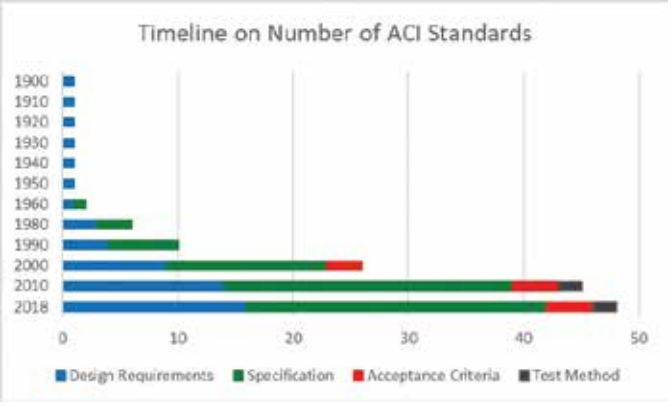


**Fig. 1: Number of standards maintained by ACI**

The amount of criteria in building codes adopted by state and local jurisdictions is quite voluminous. The International Code Council (ICC) produces 15 model codes that commonly serve as the basis for state and local codes. The National Fire Protection Association produces three model codes that are also considered as the basis of state and local codes. As design and construction criteria continue to become more sophisticated and complex, it is increasingly more difficult to process application-specific criteria in these code development processes. Thus, there is an additional need for more concise information in documents that are suitable as references in the model codes.

## References for Ordinances

Sidewalks and driveways serve as an example where more complete packaging of information would be beneficial to the user. Many local jurisdictions and housing developments have requirements for the design and construction of sidewalks and driveways. However, there is no ACI document that specifically addresses the topics of sidewalks and driveways, so a specifier is tasked with pulling the necessary requirements from several ACI documents. Starting with ACI Committee 330, Concrete Parking Lots and Site Paving, useful information can be found in ACI 330.1, "Specification for Unreinforced Concrete Parking Lots and Site Paving." To comply with ACI 330.1, however, the user is directed to ACI 301, "Specifications for Structural Concrete." Section 2.1.1 of ACI 330.1-14 states:

"Provide concrete meeting the requirements of 4.2.2.7 of ACI 301 based on the exposure classes defined in the Contract Documents. Concrete shall comply with ASTM C94 and the following requirements."

The specifier needs to know which exposure classifications are applicable to the project. The descriptions of exposure classifications are provided in ACI 318. It becomes increasingly clear from the user's perceptive that there should be a more concise method of determining the appropriate criteria for the design and construction of sidewalks and driveways.

## Referenced Standards

The development of minimum design criteria would be beneficial to users involved in parking lot and site paving design. Minimum base and concrete thicknesses for common soil conditions and loads on various types of pavements would be a benefit to the user. For lit parking areas, sidewalks, and drives, criteria on light reflectance and discerning curbs would be valuable. Where paving is to be considered as a portion of green or sustainable site development, a standard could contain criteria on solar reflectance, proper applications of pervious pavements, and other sustainability attributes of concrete paving systems. There has been interest in having such criteria referenced in ASHRAE 189.1, "Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings."

Interest has been expressed at the Structural Engineering Institute for specific design and construction criteria addressing transmission tower foundations. Information from ACI 301, ACI 318, and ACI 207.1R, "Guide to Mass Concrete," could be compiled to produce a document for reference in American Society of Civil Engineers (ASCE) standard ASCE 10, "Design of Latticed Steel Transmission Structures," and related publications.

There are also opportunities for standards development to improve state and local building codes. Minimum design and construction criteria for nonstructural slabs-on-ground could fill a void in the building codes. ICC maintains the

"International Swimming Pool and Spa Code." Users could benefit from references to minimum design and construction criteria for concrete swimming pools. Criteria could be specific to in-ground permanent residential swimming pools and spas, public swimming pools, and aquatic recreation facilities. A standard may also need to differentiate between interior and exterior pools and in-ground pools and pools on interim floors or rooftops.

In the absence of the design and construction criteria for swimming pools, some users gravitate to ACI 350, "Code Requirements for Environmental Engineering Concrete Structures and Commentary," to obtain the information they seek. However, the criteria in ACI 350 may not be applicable or sufficiently stringent for swimming pools. For example, the permissible leakage rates allowed in ACI 350 typically would not be deemed appropriate for swimming pools.

## Committee Activity Continues

Committees continue to develop standards for the advancement of concrete technology and to help ensure the intent of state and local building codes are appropriately satisfied where concrete is used. Some new standards under development address:

- Thermal properties of concrete and masonry for use in code compliance, by Joint ACI-TMS Committee 122, Energy Efficiency of Concrete and Masonry Systems;
- Thermal bridging or thermal anomalies in concrete and masonry assemblies, also by Joint ACI-TMS Committee 122;
- "Standard Practice for Obtaining Durability in Design" and "Standard Practice for Executing Durable Concrete Construction," by ACI Committee 201, Durability; and
- "Performing Service Life Evaluation," by ACI Committee 365, Service Life Prediction.

While application specific design and construction requirements are better suited for the user, there are challenges. ACI committees will need experts willing to champion refinements to guides and existing standards to satisfy the needs. Requirements appearing in multiple documents will require additional coordination among a growing number of documents related to a single topic.

ACI is a society of volunteers. While some examples have been presented here, the volunteers are best suited to identify where there is a demand for new or improved ACI standards, especially those who participate in standards and codes development maintained by other organizations. ACI members identifying needs, or willing to champion efforts to better avail concrete technology to users, should present their ideas to appropriate committee chairs. This is especially applicable where the public will benefit from appropriate standards that set requirements for use in building codes, ordinances, and regulations for public works.