Part I—Administrative

CHAPTER 1
GENERAL ADMINISTRATIVE PROVISIONS

SECTION 101

INTENT AND PURPOSE

SECTION 102

SCOPE

The scope statements encompass all portions of the code and are similar to the corresponding administrative provisions of the prescriptive codes. They provide an overall understanding of the limits and applications of the document. For example, the scope statement for Part II—Building notes that "this code provides requirements for structural strength, stability, sanitation, means of access and egress, light and ventilation, safety to life and protection of property from fire and, in general, to secure life and property from other hazards affecting the built environment."

There is a similar scope statement provided for Part III—Fire.

The purpose of the performance code is to promote innovative, flexible and responsive solutions that optimize the expenditure and consumption of resources while preserving social and economic value. This approach is unique to the structure of a performance-based code.

The intent statements have been expanded beyond the traditional intent of the prescriptive ICC family of codes to address varying levels of performance. In addition to these intent statements, specific goals in the form of objectives are found within each individual chapter to further delineate for all stakeholders the more detailed intended performance for the various goals mentioned in the intent statement such as egress and energy efficiency.

As noted, separate scope statements have been developed for Parts II and III of this code, whereas the code has a common administrative chapter in Part I. Part II—Building includes comprehensive performance provisions addressing all classes of hazards that may occur to or within a building and addressing the necessary functions to be provided by the built environment. These may include fire, structural stability, moisture, energy, plumbing and many other issues. The provisions of Part III—Fire apply to a specific subset of those hazards, specifically those involving safety from fire and hazardous materials and how the building can be used in a relatively safe manner.

Part III of this code goes beyond buildings, since it also deals with facilities, including contents, uses and processes. It is intended that Part III of this code be suitable for use as a stand-alone design tool for a performance-based design of facilities both within and independent of buildings. This is very similar to the prescriptive fire code, where the focus is on a particular process within a building instead of on the building itself. Further, the scope of Part III of this code can include, at the option of the adopting entity, some, none or all existing structures within the jurisdiction as delineated in the sample adopting ordinance. Part III of the code can be used as a tool in the measurement of current fire risk within all or part of a jurisdiction, as well as a comprehensive methodology to apply retrospective fire safety measures where appropriate.

SECTION 103

ADMINISTRATIVE PROVISIONS

The administrative section discusses how the performance code works in terms of the practical application of the code including stakeholder qualifications and responsibilities, document submittals, and review and construction verification techniques to demonstrate that the performance code objectives have been satisfied. Additionally, this section emphasizes the importance of the long-term maintenance needs of a performance-based design and the management of changes to those designs whether such changes are large or small.

The overall regulatory process regarding the administration of the code enforcement program (as outlined in Chapter 1 of the prescriptive ICC family of codes), appointment of the code official and staff, permit requirements and exceptions, fees, inspection types and requirements, and appeals is not included in the performance code administrative provisions for the following reasons:

- Requirements of the ICC family of codes are to be utilized as specifically referenced in the performance code provisions.
- A major emphasis of this code is the unique administrative approach necessary for a successful performance-based design.
- Performance-based design methods are, in most cases, only expected to be applied to portions of a building, structure or facility, or to some process or contents within a building; therefore, supplemental requirements to the prescriptive codes will be necessary.

The section also addresses various responsibilities shared by the partners in a performance-based design, ranging from the building or facility owner, to the design professionals, to the code official. The term "code official" is used multilaterally to incorporate building, fire, mechanical, plumbing and any other officials as may be designated by the adopting jurisdiction.

The model codes have traditionally incorporated alternate materials, alternate designs and alternate methods of construction. This code provides a framework and opportunity to utilize new materials and methods when design equivalence to the prescriptive code or achievement of objectives is demonstrated and accepted by the code official. This code provides a more disciplined, comprehensive approach with the intent of the code and the objective of each chapter clearly identified and administrative requirements clearly stated. The expectation is that design professionals should use this code as a tool to improve substantially the quality of written submittals. Further, the comprehensive structure of a performance code diverts the focus away from a single solution and instead emphasizes code intent and objectives, allowing for design solutions appropriate to a particular situation as opposed to designing to the minimum. The end product of a performance-based code will lead to consistent, thorough, innovative designs and techniques undertaken and reviewed in a structured manner. Additionally, this code intends to improve written submittals by design professionals by requiring documentation of project objectives, design compliance with code objectives, design basis using authoritative documents, and analysis.

Other resources include the following:

- *Code Official's Guide to Performance-Based Design Review* (SFPE and ICC, 2004)
- *Performance-Based Building Design Concepts, A Companion Document to the ICC Performance Code for Buildings and Facilities* (ICC 2004)
- *SFPE Engineering Guide to Performance-Based Fire Protection Analysis and Design of Buildings* (NFPA and SFPE, 2007)

103.1 Objective

The goal of the administrative chapter is to achieve and maintain safety through clarification of the responsibilities of the owner, design professional and code official; to provide requirements for preparation and submittal of performance-based design documents; and to provide for methods of verification and documentation as a systems approach to comply with the performance code objectives over the life of the design. This includes accountability of all stakeholders with respect to design, implementation of the design, maintenance and management of future changes to the use, facility or building.

103.2 Functional statements

The functional statements set forth the steps necessary for a successful performance-based design process. These steps range from the required technical competence of the design professionals, the documentation essential for a competent review and approval, the implementation of the approved performance-based design and verification of compliance, the long-term maintenance of the original design and the careful management of any changes.

Reference is made as well to the administrative provisions of the International Code Council's family of codes in regard to the dynamics of the agency's plan review, permit issuance, inspection procedures and enforcement policies. Any additional administrative procedures should be considered for inclusion in the adopting ordinance or regulations of the jurisdiction.

103.3 Performance requirements

This section is divided into code subsections by particular subject matter. The purpose is to focus on responsibility and methods of accountability regarding major activities. The methodology of managing performance-based design submittals, review, construction, inspection and testing relates to other code's practices but is expanded within this code based on several successful building department programs currently in place. Good documentation and the use of a quality assurance program for large or unique construction projects are highly recommended tools for managing performance-based design projects.

Emphasis is placed on building and facility maintenance to retain compliance with the performance-based design. Future remodeling, additions and changes of use are perpetual factors for existing buildings and require solid documentation to aid the

design professional's evaluation of a building and any associated use changes in the future. The administrative objectives are considered requirements related to responsibility, process and methods of verification. It is critical that all the elements work together to meet code objectives. A higher level of responsibility, accountability and documentation is required for performance-based designs to achieve safe buildings.

103.3.1 Building owner's responsibility

Prior to preliminary design development, it is necessary that the owner, through the principal design professional, secure a qualified design team of experts with experience in performance-based design techniques. A building or facility owner's costs may be substantially increased as a result of using a performance-based design, but the potential for creative design and a unique and functional building or facility may be obtained to meet the owner's objectives.

It is strongly recommended that all pertinent issues be discussed candidly among all stakeholders during the preliminary design phase to achieve "buy-in" by all parties and that a review of the higher-level objectives found in this code be undertaken. Stakeholders include the owner, operators, principal and other design professionals, code officials, contractors, representatives of the lenders, insurance and other firms who may have an impact on the design and use of the building. See the user's guide for Section 103.3.1.1 for a discussion of the considerations for the selection of this code.

A building or facility owner has a major responsibility when he or she chooses a performance-based design approach. This responsibility must be explored in depth from the conceptual and preliminary design forward, specifically examining how the owner or operator will operate and maintain the building in accordance with the approved design. The owner or a suitable representative should be actively involved in the design process, including meeting with the code official, to ascertain immediate and long-term responsibilities. If owners choose not to accept this responsibility, they will probably opt to direct their design professionals to utilize current prescriptive codes and standards.

103.3.1.1 Design professional

Traditionally, for prescriptive code projects, a project owner hires the design professionals, establishes the project vision, outlines the functional project criteria and provides instructions to the design team. On projects where more than one design professional is hired individually without having responsibility to one single design professional (architect or engineer) in charge, code officials have encountered cases where design documents were not coordinated and other cases where the multiple design professionals worked toward different objectives. This process resulted in design documents that required substantial revisions before plans could be approved to comply with the minimum standard of prescriptive codes. This lead to systems that were not compatible, and construction, operational and maintenance problems resulted.

In a performance-based design code, the practice above is not acceptable and steps must be taken on the front end of a project to ensure that all design work is coordinated and meets the code and design objectives. This can be overcome by the owner acquiring design services through one party, with one design professional having contractual responsibility and authority to acquire services from other design professionals, to provide direction and coordination, and to verify that all design professionals are working as a team in the design process.

The owner's action to hire a principal design professional as a single party who will direct and coordinate all design activities is the most critical prerequisite when selecting the performance code. If an owner does not wish to hire and empower a single principal design professional, it is strongly recommended that the owner *not use this code* for the project. The first step in this critical process is to get the owner's and design team's joint buy-in on several objectives of this code (e.g., establishing bounding conditions, developing an operations and maintenance manual, acknowledging the building owner's responsibility of code provisions and convincing the code official that use of the performance code will result in compliance with the objectives of the code).

After the principal design professional, other design professionals and the owner have thoroughly discussed the owner's vision, objectives, and conceptual design concepts that require use of this code versus a prescriptive code, it is necessary that the principal design professional assess the design team to determine if additional skilled design professionals are needed to begin evaluating the performance code and its application. After the design team has scoped the project design requirements and assessed the programming and schematic phase of the proposed project, a thorough discussion is needed among the owner, the principal design professional and the design professional of each design discipline to obtain buy-in and understanding of their respective responsibilities. It is recommended that the team review the proposed project at this time with the code official to verify that the developed proposal will work within the code objectives and to assess its application to the project. Also, the code official's feedback and peer review feedback, where applicable, are necessary relative to the code official's acceptance of the conceptual proposal to date and the use of this code. The code official should be involved with a project's design team from the conceptual stage through completion of construction to assure input and buy-in of the design approach among both the members of the design team and the code official. The intent of the concept report and design reports listed in Section 103.3.4.2 of the code is to ensure formally that communication and buy-in are maintained throughout the design phase of the project. Further, it is recommended that the owner also include the contractors, lenders and operating staff to obtain buy-in of a performance-based design project.

103.3.1.2 Principal design professional

The building, facility or project owner retains the services of a design professional; establishes the project visions, goals and functional needs; and places primary responsibility for the overall design with a principal design professional. One of the key elements highlighted within the performance requirements is the need for overall coordination of documents by the principal design professional as designated by the owner. The success of a performance-based design lies in the development of a performance solution to reach the desired objectives. Since there is often more than one design professional as a member of the design team, the owner should empower a single principal design professional with the authority to coordinate the design professionals in order to achieve a coordinated and complete performance-based design.

103.3.1.3 Peer review

To assist in the quality assurance process, the code official may require an independent design professional or recognized special expert to perform a peer review of one or more components of the performance-based design. If the code official does require such a review, the owner is obligated to furnish it at his or her expense. The peer reviewer plays an important prescreen role for the jurisdiction and serves as a critical review on assumptions, design approaches, hazard scenarios and other technical aspects of the design prior to local agency submittal. Peer review is most effective at the beginning of the development of designs, preferably long before proposed construction documents are submitted to the code official.

103.3.1.4 Costs

As stated in Sections 103.3.1.1 and 103.3.1.3 of the code, the owner is responsible to acquire and fund all the design and support services including peer reviews, special experts and field observation by the principal and other design professionals. Section 103.3.1.4 covers any other additional responsibilities, such as contract review as required by the code official.

103.3.1.5 Document retention

Once a performance-based design has been approved and implemented, the owner is obligated to retain all documentation required on the premises and available for review by the code official. Post-implementation inspections may raise any number of questions concerning the assumptions, bounding conditions or other aspects of the original design. Part of the design documentation, more specifically the operations and maintenance manual, becomes the inspection handbook for that building or facility or part thereof. Changes to the original design, when proposed or noted on verification tours, must be evaluated in conjunction with this chapter and the original design documents to determine the proper course of action. Electronic storage and management tools such as BuildingSMART will be beneficial for such document retention and updating in the future.

103.3.1.6 Maintenance

Maintenance of the performance-based design is perhaps the most challenging aspect of performance codes. Quite often the performance solution will deviate substantially from traditional building and fire codes. Although the fire department or code agencies may inspect such buildings or facilities for compliance, this section provides a better understanding for building and facility owners as to limitations and features in terms of the risk and hazards that may result based on their action or inaction. Some events at an arena, for example, may require more security personnel or crowd managers given the associated occupancy characteristics or the technical or behavioral hazards; for example, an event with a large number of small children.

103.3.1.7 Changes

A second aspect of maintaining a design revolves around changes that normally occur within buildings and facilities. Section 103.3.1.7 clearly prescribes that the owner shall ensure that all changes, including processes and systems, do not increase the hazard level beyond the level established in the original design. A second but equally important concept is a requirement that all changes impacting the performance-based design be documented and made available for review by the code official.

103.3.1.8 Special expert

This code allows for the use of special experts (characterized in Appendix D) when the scope of work is limited to that which does not result in the practice of architecture or engineering. There is a significant amount of potential performance-based design work, such as in the fields of hazardous materials, contents and process safety management, and fire protection design, that is exempt in many jurisdictions from practice laws. These special experts may well be the most effective resource in these specialized areas. To impart some minimum discipline in the use of these experts, it is the stated intent of the code that such individuals or firms meet the qualifications listed in Appendix D.

103.3.1.9 Occupant requirements

Where the life of a performance-based design relies to any degree on human decisions or actions, the owner of a building or facility has a continuing obligation to provide all occupants and employees who may have a role in the performance-based design, however limited, with the requisite training to develop the skills to undertake those roles and empowerment to apply such training. For example, a performance-based design that relies on a staff-coordinated assisted evacuation requires development of a plan and attendant drilling. The owner is obligated to be sure that such training is kept current and that all new, temporary or replacement employees are promptly provided with the information and training needed to effect the response. The notion of empowerment speaks to situations wherein the staff that is expected to perform an action in an emergency is unable to do so by rules or by being placed in a position, physically or otherwise, effectively disabling their response. If such a situation has a reasonable likelihood of developing, the design team should de-emphasize the human response factor in favor of other strategies.

103.3.2 Design professional qualifications

The qualifications of design professionals—their knowledge of design, analysis, research, computation, documentation and professional standards in their respective areas of expertise—are prerequisites to a successful application of performance-based design provisions. Qualifications are regulated by professional registration laws within the state or jurisdiction in which the project is to be constructed. Appendix D of the code lists specific qualifications for design professionals involved in a performance-based design. These characteristics detail the level of expertise necessary in a complete design team, but are not requirements of each individual team member. In fact, many designs under Part III of this code may well be outside the scope of practice laws and may be performed by a special expert. The special expert, too, must possess the qualifications listed in Appendix D.

In addition to the registration requirements that may exist within the jurisdiction, the code official may require a formal declaration of education, training and experience of all design team members to ensure that sufficient expertise has been retained in all technical subject areas of the performance-based design. The performance-based solution is a systems approach, and all components must be addressed with a proper level of sophistication that can span many design disciplines.

Design professionals and other members of the design team (i.e., architect/engineer staff; interior, theater and kitchen designers; fire modelers; and computer support staff) have a responsibility to gain technical skills and performance-based design skills through professional and/or university programs before embarking on a design project using performance-based design techniques. The intent is that the design team must consist of sufficiently qualified individuals to carry out the responsibilities necessary to design the proposed project.

Other design professionals not qualifying under Appendix D may be authorized to prepare design documents where permitted in this code, provided that they are compatible with the performance provisions in the design documents.

The minimum qualifications and skills of the design professional will vary significantly based on the type of project and the degree of analysis that the project requires. It is safe to say that, as a general rule, a performance-based design will require more analysis than the same design undertaken using a prescriptive code. The main difference is that the decision-making process involves multiple objectives to demonstrate compliance with performance provisions and acceptable methods. It follows, then, that increased project documentation of these many decisions and corresponding solutions will be necessary. Therefore, the qualification and skill levels for design professionals may vary as a function of the size and complexity of the project design. It is incumbent upon the design professional to become competent in any areas of practice where new skills are required before undertaking a project based on performance design techniques.

The increased qualifications and required skills are particularly important for fire protection engineers, who will most likely need fire-modeling skills to analyze a sufficient range of scenarios. Design-team leadership skills also need increased attention and enhancement, since the techniques and processes discussed in the acceptable methods of each applicable objective must be met and documented. This will require extensive coordination skills in the leader to enable team members to produce a system design with compatible components. Further, many projects will be only partly based on performance design; many of the design features will remain prescriptive and must interface with the performance-design components.

Large, complex projects using performance approaches would most likely require highly qualified and skilled engineers in the structural, electrical, fire and mechanical disciplines that are necessary to undertake a major, complex building design.

103.3.3 Design professionals' and special experts' responsibilities

Performance-based provisions allow design professionals more freedom to develop innovative solutions and design techniques based on a desired performance as opposed to the traditional prescriptive code provisions that provide nominal bounds on the design. This freedom also establishes a concurrent responsibility for the professionals to utilize the design analysis process that is most appropriate to meet the code's objectives and as required for documentation by the authoritative documents or design guides. The design professional must possess in-depth knowledge or obtain skilled team members to deal with issues such as risks, load factors and occupant life-safety impacts. Each of these issues is addressed in the performance objective statements.

In cases where more than one design professional or discipline is involved in a performance-based design, the owner must designate the principal design professional who is responsible to ensure the performance design is comprehensive, coordinated and complete prior to submission for review. The design professionals of each discipline must work as a unit to provide a systems approach, and a single principal design professional is highly recommended to ensure that the coordination of every aspect of the design package is achieved. This section intends that all documents, reports, drawings, calculations and any other relevant materials be submitted through the principal design professional. The goal is to eliminate or at least minimize cases where independent submittals may lack coordination with the overall design and unduly delay or complicate the review process.

Principal design professionals are accountable to acquire the services of design professionals whose qualification characteristics meet a particular level such as those provided in Appendix D. Additionally, design professionals who are in responsible charge of each design discipline shall comply with Appendix D. Performance-based design is intended to be a systems approach, and the principal design professional and the design professionals of record for each discipline are accountable and must verify that all components of the design work together to meet the code and design objectives and that verification methods are prescribed in the design to show that the constructed building or structure meets these objectives.

The principal design professional's role includes the following:

- Coordinate the design professionals of each discipline to ensure that the design methodologies and assumptions are compatible for a systems-approach and that the performance code provisions and any applicable prescriptive code provisions are fully met.
- During the design phase, function as a point of contact for all participants, which includes the design professionals of each discipline and allied consultants, owners, contractors, peer reviewers and code officials, as applicable.
- Ensure that design documents are coordinated and comprehensively complete with appropriate delineation between plans and related documents, and that the submittal contains the necessary support documentation to establish that the design complies with all applicable code provisions.
- Function as a point of contact with the code official to ensure the complete design documents and applications are filed with the government entity for review, approval and permitting. Ensure timely response to questions, revisions and requests for additional information on any element of the submittal.
- Function as a point of contact for the design team following permit issuance or design approval and respond to changes, clarifications or additional information that may be required during the implementation or verification processes.

All design professionals involved in a performance-based design, including the principal design professional, must apply the appropriate performance requirements and select suitable and compatible acceptable methods when using this code. The proper application entails adequate design analysis and support documentation to validate the design approach and to verify that design objectives have been met. This includes research, assumptions, computations and supporting documentation in the form of authoritative documents or design guides that, among other things, determine testing and verification methods. Two critical aspects of the submittal are that the design professional references specific documents or design guides, and that the design professional clearly demonstrates how the documents and design guides apply to the particular design solutions. Assumptions should not be made that nationally recognized standards demonstrate compliance with performance code provisions. Some standards may apply, but others may not. Additionally, test applications traditionally used by a standard may have to link more appropriately with performance code objectives.

Construction management may be critical for an owner in order to ensure code compliance, but such services are generally the option of the owner. Given the complexities and uniqueness of a performance-based design, this code explicitly requires that the design professionals review the completed construction elements and systems to verify compliance with bounding conditions and the approved design range of acceptability. The code official is further empowered to require the principal design professional to file a verification report attesting that the design bounding conditions and critical elements designated as part of the approved design have been implemented properly as a condition of issuance of any required certificates.

The design professionals have an ancillary responsibility to the owner in addressing the overall cost effectiveness of the design throughout the life of the building or facility. All too often, money saved in the initial design and implementation costs results in a building or facility that is extremely limited in function, if specifically designed for one purpose. For example, a warehouse or process area designed for the storage, handling or use of a particular commodity may or may not be suited to additional quantities or different classes of commodities, unduly limiting the owner's options. Similarly, an assembly space that is severely limited regarding interior finishes or fuel loads may not adequately accommodate seasonal decorations or events. A realistic analysis of long-term use and maintenance needs must occur to produce an effective performance-based design that will accommodate the owner or tenant's future needs.

103.3.4 Design documentation

Design professionals are responsible to prepare and submit a complete and integrated set of construction documents to the code official, including the following types of information:

- Plans and specifications.
- Calculations to demonstrate that the design analysis meets the standard requirements for professional practices and acceptable methods.
- Computer modeling and analysis with program name and description, program objectives, input and output units, characteristics and related information for plan review verification of compliance with the performance provisions, design objectives and professional standard of practice.
- Assumptions, limitations and factors of safety used in the analysis and design.
- Identity of applicable design components that comply with performance code provisions and the design data to demonstrate compliance, including interface with the prescriptive code provisions on a system basis.
- Identity of design performance levels and objectives determined in Chapter 3.
- Identity of performance criteria utilized.
- Description of scenarios with applicable data used to demonstrate various design approaches and conditions that meet performance provisions.
- Description of the methods used to demonstrate that a standard of care was taken when using a building systems-design approach.
- Scope of inspection and testing requirements to demonstrate compliance with design and code provisions.
- Scope of quality assurance techniques proposed to demonstrate that construction systems comply with the construction documents.
- Commission requirements for final inspection, testing and functional operations to demonstrate compliance with approved design.
- Identity of maintenance requirements and their frequency that an owner must undertake in the future use of the building (e.g., inspections, testing, service or maintenance activities).

Proper documentation is essential in performance-based design to clearly identify the objectives of the analysis, the approach or methods taken, the use of automated design and other tools used in the final design, and the substantiation that the design meets the project objectives.

Documentation to support the design should include the following information when applicable and must be maintained for the life of the building:

- Geotechnical, site hazard and other applicable analytical and test reports that provide substantiation or are used in the design.
- Calculations to demonstrate the methods and assumptions of analysis based on recognized analytical methods and mathematical models.
- Technical references to publications that have been accepted by an appropriate professional peer review process.
- Computer analyses supported by documentation that include the program name, a brief description and type of analysis and application, the program output with units and descriptions and how the program is used to support the design. Statements of uncertainty, assumptions and limitations must be included. Reference Appendix E for requirements in using computer models.
- Statements describing methods, techniques and means of verification to demonstrate compliance with performance provisions and how applicable elements are integrated in the design as a system.
- Statement of requirements for testing, inspection and maintenance to identify the basis and criteria for acceptance of the building and applicable components.
- Statement of responsibilities of the building owner after construction to ensure compliance with design parameters.

If utilizing emergency responders as part of a design, the design professional needs to take into consideration the reliability of the organization providing the emergency response service as well as the level of response that can be provided over the life of the building or facility. It is assumed that emergency responders under the direct control of the owner, such as an on-site fire brigade at a manufacturing plant that is staffed by properly trained employees of the owner, can be relied upon in the design process provided the level of response is documented and the key characteristics of the emergency responders are designated as bounding conditions. This approach would require a reassessment of the design should the level of response be reduced by such factors as reduced staffing, less training, longer response times, inadequate equipment, etc., as required by Section 103.3.11.3. How-

ever, where emergency response is a service provided by a government entity or public/private organization that is not under the direct control of the owner, a jurisdiction may be reluctant to allow the design to rely on a specified level of response because of the legal ramifications of having to ensure that such level of response will be maintained over the life of the building or facility. The jurisdiction should have the final say on what level of emergency response, if any, the design assumes will be available so that the design will not become deficient should the level of emergency response be reduced by the jurisdiction because of a lack of available funds or for other reasons such as changes in response times, water supply or other conditions beyond the immediate control of the jurisdiction or the organization providing the emergency responders.

The plan review process relies heavily on adequate documentation to demonstrate complete submittal and thorough review of the design to verify code compliance. Performance-based design review will require review of additional documents not required in prescriptive design submittals.

The design documents must also identify when and where special inspection and testing are required to verify compliance. Special requirements shall be specified by the design professional in the design documents as requirements for off-site fabrication and on-site construction. All required inspections and tests require verification before the total project can be approved and occupied. The performance codes require verification techniques, which are elements not required for prescriptive code designs due to the overlapping requirement of prescriptive codes. Contractors and inspectors must follow the design documents and not accept deviations to approved plans based on past industry practice.

Documentation begins during the design process as a methodology of tracking and verifying that analysis and application of scenarios of good design practice have been conducted. Documentation should demonstrate compliance with performance code objectives, review and acceptance by code officials, construction inspection and testing, and issuance of certificate of occupancy to demonstrate that occupancy conditions and related community requirements are met. This documentation is necessary during the life of the building to verify that the use and maintenance comply with occupancy conditions. Additionally, the documentation is critical during future remodeling, renovations, additions and changes of use.

Section 103.3.4.2 allows the code official to require (1) a concept report; (2) a design report; and (3) an operations and maintenance manual. These reports compile formal documents for the preliminary design (programming and schematic) phase, design analysis and development of plans and specifications for construction, and future use and maintenance of a project. The reports are intended to improve project communications and conceptual understanding for projects by providing data for each report as follows:

1. **Concept report.** The concept report must include general project information, project scope, building description, occupant characteristics and risks, project goals and objectives, proposed event scenarios, methods of evaluation and proposed acceptance, documentation and qualification of design team, and owner's representatives and contractors. The concept report is to inform the code official of the design concepts and to achieve consensus that the preliminary design approach is acceptable. The conceptual site and building plan should provide sufficient information and setback data so that hazards and separations can be evaluated similar to a code analysis using the prescriptive building code for occupancies, height, area and setbacks.
2. **Design report.** The design report documents project scope, goals and objectives, steps taken for analytical analyses with identification of performance criteria, parameter input assumptions and limitations, magnitude of design loads, computer model data and scenarios for evaluating acceptance ranges, final design, evaluation, criteria design assumptions with bounding conditions, critical design features and final design bounding conditions, commissioning testing requirements with acceptance criteria and supporting documents and references. The principal design professional should provide copies of supporting documents and references necessary for a professional review to be completed. Design guidelines, handbooks and other applicable authoritative documents prepared by professional associations may expand or further clarify applications of the above terms and recommend the use of certain performance-based design processes.
3. **Operations and maintenance manual.** The operations and maintenance manual is a formal document for the facility owner and operator that incorporates design, builder and manufacturer requirements in the form of actions that need to be performed on a regular basis to ensure that the components of the performance-based design are in place and operating properly. The manual must identify the restrictions or limitations placed on the use and operation of the facility so that the facility stays within the bounding conditions of the approved performance design. Such restrictions may, for example, include fuel load limits in an assembly occupancy. The manual should contain the following:
    - Limitations on facility operations because of design bounding conditions.
    - Identification and description of critical systems.
    - Description of required system interactions.
    - Periodic maintenance and testing requirements.
    - Emergency and typical operational responsibility.
    - Staff training.
    - Manufacturer's requirements for operation and maintenance of equipment.
    - Materials and systems affected.
    - Power and utility support requirements.

- Emergency and backup plan for critical component failure.
- A documentation plan for supervision of operations, maintenance and testing of required items in the manual.

The practice of requiring written reports at various phases of a project to demonstrate compliance with the prescriptive code has worked very well for several jurisdictions that experience large, complex projects and submittals of alternate materials, designs and methods that include performance-based designs. These reports have demonstrated equivalency or compliance with prescriptive codes and include elements such as fire modeling, fire protection, exiting and other life-safety features, special inspections and testing requirements.

Performance-based design projects are more successful when project criteria and reviews are included from the conceptual stage through design review and construction with an agreed upon, documented quality assurance program. A quality-assurance team approach is recommended during the design and construction process to improve communication and thereby improve the working relationships to obtain a building that meets performance code requirements. The team should include design professionals, representatives of the code official for plan review and inspection, a special inspection and testing (third-party) agency and the contractor(s).

Design documents are the basis of design approval and the governing requirement for construction and verification by inspectors and testing agencies for compliance. Deviations from the approved construction documents require the contractor to consult with the architect or engineer to evaluate and approve revisions against the project objectives before obtaining approval from the code official. The process also helps in securing the owner's concurrence for construction to comply with construction documents. Consequently, there is less leeway given to the contractor for not complying with the plans, since the contractor and owner should have a front-end commitment with all the parties.

Standard plan design document submittals are accepted by code officials in many jurisdictions for multiple types of uses within a single jurisdiction. The design professional who is requested to prepare this type of design should contact the code official before initiating a design to determine if the local jurisdiction's procedures authorize standard plan or multiple-use design documents. A design professional proposing a performance-based design using this code for a standard plan should contact the code official to verify that both approaches are accepted and to learn how the jurisdiction's procedures apply to the proposed project.

103.3.5 Design submittal

The principal design professional for projects with multiple design professionals must coordinate all design documentation for compatibility and completeness and ensure that the documentation required in Sections 103.3.2 through 103.3.4 is included in the submittal to the code official. Projects with one design professional must meet the same standards prior to submittal. Design documents must clearly indicate the areas where performance and prescriptive codes apply, so that it is clear to the reviewer which code provisions apply.

Documents should be submitted in accordance with the procedures of the jurisdiction and in sufficient detail to obtain permits for the project. Reports and preliminary documents required by the code official, such as concept reports, design reports and operations and maintenance manuals, may be required earlier than full design document submittal to obtain permits so that conceptual or phase reviews can be made.

103.3.6 Review and approval

Before approving and issuing a permit, the code official or other designated individuals are responsible to review or ensure that construction documents meet the requirements of the performance code as well as the prescriptive code provisions that are being utilized as part of the design. Although performance-based designs will probably be submitted less than 10 percent of the time, they most likely will complicate the plan review process. Additionally, the 10-percent figure represents those buildings where a significant number of the design systems are performance-based. There will be many designs that are primarily based on the prescriptive codes but incorporate minor performance-based elements.

Performance-based design goes far beyond the traditional design perception that document submittals are automatically acceptable and require little or no review when signed and sealed by a design professional. Registration and a license to practice engineering do not necessarily constitute acceptable qualifications to undertake a performance-based design.

The code official will have a higher level of success in the design document review process when the design professional has complied with the documentation requirements of Section 103.3.4.

The code official can still undertake review in a traditional manner for a majority of the projects. Section 103 is focused primarily on performance-based design related projects. It is very important that the code official evaluate the skills of the department before undertaking such a review. Understanding review limitations and addressing these limitations ahead of time will help to ensure a successful and thorough review. This understanding of limitations includes evaluating the educational qualifica-

tions and experience needed to review performance-based designs and analyses as stated in Appendix D. The code official may consider one or more of the following options to develop a plan for ensuring qualified plan review:

1. Determine if the staff has sufficient education, engineering or architectural registrations, and levels of continuing education needed to perform the tasks.
2. Initiate a program to upgrade plan reviewers' educational and professional qualifications.
3. Acquire contract review services via a consultant plan reviewer with applicable qualifications.
4. Utilize a peer review process as stated in Section 103.3.6.3 that will provide individuals or a team meeting an appropriate level of qualifications, standards of ethics and accountability.

When the code official accepts a consultant as a contract reviewer in lieu of their own staff's review of construction documents, documentation must be provided for the code official's acceptance indicating that verification of the performance and prescriptive code provisions have been met. This document should become part of the official records for the project and the basis of approving the design documents and issuing a permit(s).

After the design documents and supporting documents and reports are verified as meeting this code and other applicable codes, permits should be issued in accordance with code official procedures.

Costs for review of design documents and for inspections should be the burden of the owner. Since costs for services are expected to exceed the fees collected for typical plan review and inspection services, the code official should amend the local code to include cost recovery for services rendered on all projects using performance code provisions.

103.3.6.3 Contract and peer review

In the design and construction of buildings and structures, the traditional process of analysis and design by design professionals, plan review and inspection by code officials, and special inspection by quality assurance personnel (where applicable) has worked well in the past. This traditional approach is at times challenged by the increasing sophistication and complexity of modern methods of analysis, design and construction. Design professionals who use these methods have a responsibility to provide code officials with adequate information to enable the officials to perform the necessary evaluations in an environment that is becoming increasingly competitive. But the code officials may lack the resources to adequately evaluate the conceptual basis and intent of these methods and their conformance with the construction codes that the officials are charged with enforcing. This section provides a mechanism for a jurisdiction to seek outside help for the review of such designs. The mechanism is termed a contract review, which is essentially a plan review conducted by a consultant or other third party. This review is considered a replacement for review by the jurisdiction. A peer review, on the other hand, is a review on a higher, more theoretical and analytical level. This is not considered a replacement for plan review and will be discussed extensively within the user's guide for this section.

The growing sophistication and complexity of these methods also leads to greater numbers of individual components, systems and processes that are interrelated to each other in ways that may not be well understood. The necessary understanding can often only be achieved by combining the resources of several consultants whose knowledge may be limited to that of individual components of particular systems. The methods often rely on materials, components and assemblies where acceptance may have been established by a series of tests in accordance with one or more nationally recognized consensus standards, but compatibility and relevance to the methods may not be fully established or understood. The code official is placed in the unenviable position of attempting to synthesize an often-vast amount of information in a coherent manner and in a limited amount of time in order to evaluate adequately these methods.

Peer review has the potential to enhance the quality and reliability of the design, review and construction of buildings, structures and facilities. It provides additional assurance of the completed project's performance by adding an independent and experienced voice to the process. The review would be performed by registered architects, engineers or special experts with knowledge and experience comparable to or exceeding those of the project's design professionals and comparable to the technical, conceptual and theoretical aspects of the project. It would not be a substitute for traditional plan review by code officials. Rather, it would be an additional review to test for the validity of the design and assist the code official in understanding how the design provides for minimum levels of public safety.

The concept of peer review and its importance has been recognized for numerous years by several organizations and professions, notably the structural engineering profession. Guidelines have been prepared and recommendations made to encourage the use of peer review for buildings where structural design uses analytical methods that are state-of-the-art or that are beyond the boundaries of what is currently acceptable by the structural engineering community. The reader is encouraged to study the following documents for more information:

- "Performance-Based Seismic Engineering Guidelines, Part I, Strength Design Adaptation," Draft 1, revised May 5, 1998, Sections 3.7 - 3.10.
- "Recommended Guidelines for the Practice of Structural Engineering in California," second edition, October, 1995, Chapter 4.

- "Recommended Lateral Force Requirements and Commentary," Structural Engineers Association of California, sixth edition, 1996, Sections 104.7 and 201.
- Section 3420 of the 2007 *California Building Code*.
- The Society of Fire Protection Engineers also provides peer review guidelines that are available to set a baseline for such reviews. "Guidelines for Peer Review in the Fire Protection Design Process," 2009.

The advent of performance-based codes increases the need for peer review of other professions involved in the design of buildings, structures and facilities. As innovative design methods and analytical procedures are developed for use in performance-based designs, peer review will become an increasingly important tool in assessing the use of these resources.

An important aspect of any process is an agreement on the meaning of the terms used to describe its components and concepts. The terms used today for peer review vary in their meaning, depending on the point of view or focus of the organization or agency that prepares guidelines for the peer review's implementation. See Chapter 2 of the code for definitions of the following terms as they relate to peer review.

- Design documents.
- Consultant.
- Contract review.
- Peer review.
- Plan review.
- Quality assurance.
- Third-party review.

Buildings and structures designed in accordance with the provisions of prescriptive codes normally do not need to be considered candidates for peer review. However, virtually all project designs based on prescriptive code conformance have certain materials, components or systems whose acceptance is performance-based. The practice of structural engineering, for instance, is largely performance-based, incorporating the provision for rationality. Any system or method of construction must be based on a rational analysis in accordance with well-established principles of mechanics. The use of this and similar concepts will become more and more prevalent in other professions as performance-based codes are used. The reader should not assume that peer review is not warranted for projects designed to meet the requirements of prescriptive codes. A great example outside structural engineering is smoke control design, which is within the purview of the prescriptive building code. Similar to structural requirements in the prescriptive code, a rational analysis is required; in addition, there are elements such as the selection of a design fire that requires a higher level of review than a typical plan review can provide. Such designs could involve computational fluid dynamics models.

The code official decides when peer review will be required and the peer reviewer's scope of work. Generally, there are several conditions that prompt a code official to consider peer review for a project:

- One whose design is based on concepts, analytical methods and design procedures that go beyond the boundaries of what is currently thought to be acceptable by current code and professional standards. (See Sections 104.3.3 and 104.3.4 and Appendix C).
- One whose design is based on authoritative documents or design guides but is state-of-the-art and demands specialized knowledge to understand its underlying intent and objectives.
- One whose complexity or technical demands are beyond the resources normally available to the code official.
- One whose scope is such that review during the conceptual development of the design is considered critical to the eventual progression to construction documents.

The choice of a peer reviewer is critical to the effective use of peer review. Peer reviewers must be independent of the design professional, consultants, quality assurance personnel and contractors involved in the project. They must not have any vested interest in the project—financial, political, professional, personal or otherwise. They should also avoid and be free of all known or potential conflicts of interest. Individuals should not participate in a peer review process if they have any previous employment by, or financial interest in, any of the firms or companies involved in the design, review, inspection and construction of the project in its recent past.

The committee recommends 3 years as a reasonable limit. If this is deemed unreasonable, the time limit could be reduced upon mutual agreement of all the parties involved.

Obviously, peer reviewers need to be qualified to perform the review. They should have a level of knowledge and experience at least comparable to that of the design professionals whose work they are reviewing. They should also have proven expertise in the design of projects of comparable complexity and theoretical demands. It is vital that the process of peer review be fair, objective and have a level of sophistication that matches that of the project's design and scope.