CHAPTER 1

Managing the Risk of Construction Defects—Or Risking Money, Effort, and Forethought to Get Construction Right

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CHAPTER 1: MANAGING THE RISK OF CONSTRUCTION DEFECTS

I. Introduction

In subsequent chapters of this book, authors examine more closely the common types of construction defects, the legal theories of liability (and defenses that can help potentially responsible parties avoid liability), the damages that injured parties can recover on account of construction defects, how to insure against potential liability and damages, and the nitty-gritty details of resolving construction defect disputes. However, before this book turns to those topics, this chapter provides some thoughts on how to avoid defects by getting construction right in the first place, through examination of some practical risk management techniques employed by successful owners, contractors, and designers to minimize or mitigate building defects.

II. Understanding Risk

To develop potential techniques to reduce or manage the risk of construction defects, we must first understand the nature of the risk presented by a project. How risk manifests itself varies from project to project. Different projects with different characteristics will manifest different types of defects. For example, consider rainwater that infiltrates into the living space of a home. When this happens, a fundamental purpose of the construction has not been achieved because the building fails to provide shelter from precipitation. Or consider the heating system in a home that fails to provide a comfortable temperature; again, the reasonable expectation of being provided a comfortable living environment has not been fulfilled. Similarly, a manufacturing facility that fails to achieve a specified rate of production may be deemed defective even though the construction meets all applicable building code requirements. All of the above, as varied as they are, could be considered construction defects.

Many kinds of deficiencies can be classified as construction defects, including:

- a design that fails to meet professional standards, or applicable codes;
- the failure of the contractor to execute the work in a workmanlike manner;
- the failure of the contractor to follow plans and specifications, or otherwise follow contractual requirements; and
- the use of materials, equipment, or systems that are not of the quality required or permitted by the contract.

1. As the foregoing list implies, a construction defect may involve work or services that fall below the standard promised or reasonably expected by the purchaser, a lessening in the utility and/or value of the project, or the appropriateness or suitability of the work. See generally 2 Philip L. Bruner & Patrick J. O'Connor, Jr., Bruner & O'Connor on Construction Law §§ 7:212–219 (2002).
III. Understanding the Consequences of Design Defects

We will use the generic term “building defects” to encompass all these categories. The term “building defect,” therefore, is broader than just an error in construction; it includes and reflects the entire range of potential shortcomings and causes for which an owner might ultimately want to seek recompense.\(^2\)

A design defect exists when a problem is attributable to a condition that is constructed in conformance with the plans and the specifications. Design defects may be categorized as either errors or omissions.\(^3\)

An error in the design implies that an element of the building was designed incorrectly such that, for the building to perform properly, work must be removed and replaced pursuant to a different design. A classic example of a design error is a window flashing design or detail that mistakenly directs water into, instead of away from, occupied space.

An omission implies that in the first instance the designer failed to include a component necessary for the building or facility to perform properly. As a result, correction of the omission typically involves installing additional components in the project. The failure to specify a necessary flashing in a window design would be an omission.

The correction of errors and omissions can lead to arguments about whether the correction constitutes a betterment.\(^4\) The concept of betterment recognizes that if the original design omits an element, the owner did not pay for this item during the original construction. Because the owner would have paid a higher cost had the missing element been part of the original design, the owner is not permitted to recover this cost as an item of damages. Likewise, the owner is not entitled to recover as damages the cost of enhancements to the original design.\(^5\) Stated differently, the owner is not permitted to be placed in a better position than it would have occupied had the design been free of errors or omissions.

\(^2\) It is generally accepted that normal wear and tear are not defects for the purposes of construction claims. See, e.g., Richards v. Powercraft Homes, Inc., 678 P.2d 427, 430 (Ariz. 1984).

\(^3\) While the design professional is most often the target of claims of design defects, the contractor, too, can be responsible for such defects if the contractor has assumed design responsibility in the contract with the owner, either as a design-builder, or as the designer of certain aspects of the project (e.g., by agreeing that the work performed will meet a performance specification).

\(^4\) For an excellent discussion of betterment, see Bales, et al., The ‘Betterment’ or Added Benefit Defense, 26 Construction Lawyer 14 (2006). See also 6 Bruner & O’Connor, supra note 1 §§ 19:26–29.

\(^5\) See, e.g., St. Joseph Hospital v. Corbetta Construction Company, 316 N.E.2d 51 (Ill. App. 1974) (owner responsible for added cost of replacing defective interior wall paneling system with a more expensive system, because owner would have paid added cost had the more expensive system been specified originally).
While a project owner is not entitled to get work for free, the owner is entitled to recover the incremental cost, if any, of adding the missing element in a late or out-of-sequence time frame. Thus, for example, if it would have cost the owner $1,000 to install an omitted item in proper sequence during construction, but it will now cost $1,750 to retrofit the same item after completion of work, then in such a case, the owner’s damages would be the $750 that the owner would not have paid had the work been specified correctly from the start.

Whether classified as an error or an omission, a design defect can result in significant damages and liability to the designer. Although the owner may be responsible for the cost of betterments, design defects often also give rise to other unexpected expenses, such as the costs incurred due to the owner's loss of use of the facility, or damage to third parties other than the owner, which the owner may be able to recover as damages from the responsible party.

IV. Managing the Risks of Design Defects

To the extent reasonably feasible, all parties involved in any project want to minimize and prevent design defects, including both design errors and design omissions. One way to minimize design errors is to use traditional design approaches if at all possible. Decades ago, designers utilized established architectural standards, so that designs for commercial applications relied on design solutions that were conventional within the particular segment of the industry being served. When one considers buildings designed using masonry unit construction between 1950 and 1970, for example, the details and materials called for by the designer were generally similar and consistent. They were tried and true.

The advent of computer-aided design and rapidly evolving materials and building systems has had a radical impact on the design of buildings and this, in turn, has brought enhanced design risk. Designers now may select from a dizzying array of materials and systems, many of which may have had only limited application. Rather than relying primarily upon time-tested architectural standards, designers these days often turn to manufacturer-supplied information—product literature, design programs, and installation recommendations—that the designers may not fully understand. The drive for innovation, cost savings, new aesthetics, marketability, energy requirements, and other green considerations encourages designers to incorporate ever-new and more innovative elements or systems in their buildings. However, a building design that incorporates materials, systems, or processes with which the designer is not entirely familiar—whether considered revolutionary and cutting edge, or simply unique in the experience of the designer—has a greater potential to contain design deficiencies than does a design that is tried and true.

IV. Managing the Risks of Design Defects

Even casual observers can note the enormous differences in available building materials in recent years. The white weather barrier bearing the name TYVEK® was nonexistent until recently, and now it is ubiquitous. Bright yellow sheathing, also nonexistent until recently, is now found on construction sites from coast to coast. Simply walking the aisles of home improvement warehouses reveals the enormous changes and advances in building products. From the sealants and coatings, to the plastics and recycled materials used in place of traditional wood or metal, the extent to which modern buildings rely on emerging technologies is remarkably evident. Just out of sight, but of no less significance, are advances in heating, ventilating, air-conditioning, security, controls, and data conveyance systems, which are evolving apace with the production of more advanced microprocessors and other technological capabilities.

In short, the vast array of available building materials and technologies that are placed into the marketplace on a regular basis can be overwhelming for even the most capable of designers. Can designers fully understand all that they may need to know about an untried system or material that is being considered for inclusion in the design? More than likely, the answer to this question is no, and the designer will instead rely heavily on the product literature and information—prepared to enhance the marketing of the product—produced by the manufacturer. Under the constraints involved in the design of a typical building, designers rarely have sufficient time or resources to permit them to acquire a complete understanding of the materials or systems that will be utilized in their design. Moreover, many such materials or systems are so new that they may not have a sufficient track record; indeed, even the manufacturers may not yet fully know the capabilities and limitations of their new products or systems.

In addition, advances in technology may dictate the need for more sophisticated building operations personnel. Thus, an assembly offered in the marketplace may create an opportunity to save costs during construction, but may then give rise to additional operations and maintenance (O&M) costs down the line. Such costs may come as a rude surprise to building owners if they are not properly anticipated during the planning stage. Moreover, an owner whose operations and maintenance departments are understaffed, undertrained, and ill equipped to manage sophisticated building systems may experience degradation in the performance of those systems that is perceived to constitute a construction defect.

In short, the introduction of new technology and innovative design approaches has played a critical role in the increase in building defect claims over the past two decades. If the parties to a project recognize the higher risk associated with creative or innovative designs, materials, and systems, they can take steps to minimize these risks, including subjecting a design to more extensive review or analysis. The next section identifies several of the strategies available to project participants to provide more complete assessment of innovative components to address—and minimize—the risk of design defects.
V. Strategies for Minimizing Design Defects

A. External Peer Review

Detailed peer review of a design prior to commencing construction is one of the most valuable options available for minimizing design defect risk. Such a review can aid in verifying the comprehensiveness and internal consistency of the design, and help in identifying design deficiencies, particularly where the design utilizes innovative, customized, or untested elements. A peer review can be accomplished by engaging an independent design professional or panel of such professionals with particular expertise and experience in the type of design or construction contemplated by the design documents. These independent designers will normally be compensated on an hourly basis for the time spent reviewing and commenting on the plans and specifications, thus adding to the owner's cost of the design for the project. But the cost of a peer review can be a small fraction of the cost to correct deficiencies identified after construction is complete. The peer review allows an owner and a design team to have the benefit of a variety of design perspectives and expertise, as well as the simple advantage of another set of eyes, to help improve the quality of the design documents.

B. Owner or Tenant Involvement

Involving the ultimate end users of a facility in a design review process—whether independent of or in tandem with peer review—will similarly enhance the final design product, especially in terms of space allocation, circulation patterns, and maintenance requirements. Intensive involvement by the ultimate users in the design process can prevent costly waste or disappointment when the building is delivered upon completion. Moreover, end user input ensures that the finished layout and components will satisfy the expectations of the ultimate users of the facility. At the same time, an involved owner can address functional issues such as “Do I really want to pay for automatic door-closing devices on all interior doors?” and maintenance issues such as “How do I service an HVAC unit located 40 feet above the atrium floor?” A design that accommodates the eventual need to remove and replace consumable components could result in dramatic cost savings over the operational lifespan of the facility. Changes to the design are much more effectively accomplished prior to construction. If the owner does not have appropriately qualified in-house staff to perform this type of review, the parties can include this function in a peer review protocol.

C. Don’t Rush the Designer

Allow the appropriate time for the design to be created. All too often when the parties discover design defects, the design professional points to an
accelerated design phase, or an abbreviated design phase, as the culprit. When there are defects, designers often contend that they were not afforded the time necessary to perform adequate coordination reviews and checks and therefore should not be liable for the resulting costs. They will argue that they did not perform outside the boundaries of what was reasonable under the circumstances (i.e., their conduct conformed with the appropriate and applicable standard of care), and, therefore, that they were not negligent despite a poor outcome. When an owner dictates that time is of paramount importance, that owner should recognize that there may be a corollary to the maxim “time is money”: reduced time equals an increased potential for design deficiencies. Recognizing the expanded risks attendant to expedited design is a critical first step in minimizing the potential consequences.

D. Treat the Design as an Integrated Package

“Fast-track” sequencing, or sequential design packages for different components of a project, can similarly increase the potential for building design defects. There is a greater potential that the design will not be fully coordinated when the design professional must issue the design documents in phases. As thinking evolves and is refined during the design process, the designers may overlook the need to go back and conform earlier design elements to subsequent design decisions, or they may lack the time to do so.

E. Build a Mock-up and Test It Thoroughly

In most construction projects, design elements are utilized repetitively, often hundreds or thousands of times. Consequently, a deficiency in a single design drawing or sketch can lead to hundreds or thousands of deficiencies in the same building, with an enormous cost to correct. Constructing a mock-up of an often-repeated design component, and then testing and evaluating that design in a constructed condition, can be remarkably valuable for identifying design deficiencies. Utilizing mock-ups for repetitive components also facilitates assessing constructability and identifying difficulties in constructing the design as intended. Mock-ups also convey the design intent to the constructor more clearly than drawings alone. Recognizing design elements that will be repeated, constructing a mock-up or sample, and testing the performance of that mock-up is a simple and prudent process that is employed far less frequently than common sense would dictate.

Beyond utilizing mock-ups for repetitive elements, it is also advisable to test systems or materials that are regarded as more innovative or about which there is less certainty as to how that design component will perform. As unusual as it may seem, it may be particularly beneficial to require the designer to identify those components of the design for which it has less confidence or experience and then test a mock-up or model.
F. Use Available Technology

The use of three-dimensional computer modeling software, including Building Information Modeling (BIM) systems, allows for enhanced constructability review, coordination, and dimensional consistency. Even without using a BIM platform, consider sharing design documents in electronic format with the constructor and selected subcontractors.

G. Early Coordination Between the Constructor and the Designer

Ensuring that the designer and constructor appropriately coordinate and collaborate to address the full range of issues attendant to a particular design component can be especially beneficial in minimizing both design and construction errors. Emerging project delivery methods draw heavily on this kind of collaboration and coordination, from the earliest stages of a project. As technology and competing materials and systems enter the marketplace, designers often permit the utilization of a variety of options at the election of the contractor. Consequently, the designer may not actually know what material or system the contractor is going to use in construction and therefore cannot assess the full impact of that component on the overall performance of the building. It is in the interests of all project participants that the designer and the builder establish and then maintain good communication throughout the project.

H. Engage a Construction Manager

One of the typical duties of a construction manager is the performance of constructability reviews while the design is ongoing. A construction manager can also help verify that details supplied by equipment manufacturers or fabricators are coordinated with design intent. The construction manager will not guarantee the quality of the design documents and should not typically be expected to review the drawings from the standpoint of how the design will perform, but it can help to enhance the level of coordination and review prior to commencing construction. Thus, for example, while a construction manager would not normally be expected to verify that the floor as designed can accommodate the loads anticipated, it can often productively review the plans and specifications with an eye to constructability, identifying dimensional inconsistencies and “clashes” before construction starts.

7. See, e.g., AIA Document A133–2009, Standard Form of Agreement Between Owner and Construction Manager as Constructor, § 2.1.2.2; ConsensusDOCS 500, Standard Agreement and General Conditions Between Owner and Construction Manager, § 3.2.2.
I. Take Great Care with Value Engineering

A contractor or construction management firm can offer value engineering options to reduce the overall construction cost for the owner. Nevertheless, owners should proceed cautiously with value engineering: although value engineering alternatives may result in immediate cost reductions, they can also present the design team with sudden changes to the design that they must then address in short time frames. Simply because a contractor or construction manager has suggested a value engineering idea does not mean that the proposal is based on any kind of meaningful design review. Thus, an owner must regard value engineering suggestions as an invitation for detailed review and assessment by the designer before deciding to implement the suggestions. In this regard, because contractors and construction managers are reluctant to assume design responsibility, the cost of the additional design effort required to implement the proposed modification may significantly diminish the potential cost savings. Nevertheless, it is critical that all implications of a proposed value engineering suggestion be fully thought through so that an apparent opportunity to save a small amount of money does not give rise to a design deficiency that may end up increasing costs.8

J. Seek the Input of Specialists, Including Consultants, Contractors, and Construction Managers

When the parties recognize that a project includes components or systems that are unique or complex, the addition of specialists to the design team for input on the design can be invaluable. With innovative materials or techniques, it becomes more difficult for a designer to possess sufficient familiarity with every product or to possess the breadth of expertise necessary to identify and address all potential design concerns. Engaging an expert in a particular discipline is prudent and potentially necessary to minimize the risk of defects or to fully describe the operational and maintenance requirements of a new technology so that the owner can make an informed choice. While a contractor or construction manager may be able to offer input from prior experiences in using or installing similar systems and components, which can also assist in avoiding building defects, a constructor should not be mistaken for an expert in the design of building systems and components. It also should be recognized that constructor recommendations are typically received long after design decisions are made. Accordingly, in such situations, the owner should consider engaging specialty designers early in the design process.

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K. Integrate the Functions of the Entire Project Team

One project delivery system, known as Integrated Project Delivery (IPD), has gained increasing attention. IPD, in essence, is a delivery method that seeks to completely integrate the key project participants in a collaborative process to reduce waste and optimize efficiency through all phases of the project. IPD departs from the traditional approach of having each participant in the project operating under a separate contract and working on its respective functions independently. Instead, IPD creates a unified team consisting of the owner, the designer, and the constructor, and sometimes major subcontractors, such as mechanical or electrical. Each member of the IPD team has a stake in the successful outcome of the project, and they often agree to share in both the savings (when they complete the project below the budgeted cost) and the cost overruns (when the project is over budget) in a manner that is predetermined. By aligning the interests of the design and construction disciplines on the project, the design can be developed with the benefit of the coordinated efforts of all such. In fact, it is common to see IPD teams working in one consolidated office or location—in one “big room”—so as to promote communication and exchange between and among the participants. In this “big room,” the design team and the construction team are literally sited within the same office space, to facilitate and expedite an exchange of ideas, to build trust, and to enhance communications among them. Anecdotal evidence indicates that such approaches help minimize all types of construction defects—i.e., design errors and omissions and construction errors—and that simply utilizing the “big room” structure, even with more traditional contractual relationships, has enhanced coordination between the design and construction teams to the benefit of the project.

L. Lean Construction Programs

During the last ten years, the construction industry has begun to apply the principles of lean manufacturing and production to the construction process. Spearheading this effort is the Lean Construction Institute, a nonprofit entity devoted to supporting the application of lean production techniques in the design and construction context. According to the Lean Construction Institute, lean construction techniques work to facilitate “the reliable release of work between specialists in design, supply and assembly” to assure “value is delivered to the customer and waste is reduced.” Lean construction redefines

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9. A brief description of IPD can be found in CONSTRUCTION LAW (ABA 2009) at 88–89. A more extensive discussion can be found at 2 BRUNER & O’CONNOR, supra note 1, § 6.18.

VI. Managing the Risk of Building Defects During Construction

systems commonly referred to as EIFS. The use of these systems initially suffered both from the inexperience of designers in specifying where and how to incorporate the materials into a project (a design defect), as well as from the inexperience of contractors responsible for installing these materials and systems (leading to construction defects). To make matters worse, some EIFS manufacturers did not have adequate product literature or information to guide contractors and designers. As a result, the finished product too often suffered from problems ranging from the incorrect application of the finish material, to use of incompatible materials, to a failure to recognize small but critical manufacturer’s instructions. For a number of years, problems with EIFS were so systemic that insurers began to exclude coverage for EIFS from general liability insurance policies.

However, over time, contractors developed more experience in using the materials, and some contractors even came to specialize in the application of EIFS. At the same time, manufacturers’ literature evolved considerably, and designers became increasingly adept in designing for the use of EIFS. Consequently, many contractors who were refusing to use EIFS have reversed that position because they now can bring appropriate experience to bear in working with this type of system.

The problems surrounding the introduction of EIFS serve as a good example of how a material that may appear to be easily adaptable from tried-and-true systems, stucco in this case, can demand considerably more specialized application than first thought. But the gradual “reacceptance” of EIFS is also an example of how a product previously regarded as inherently problematic has gained greater acceptance once designers, builders, and manufacturers learned how best to work with it.

Sometimes a problem can arise from not knowing how various chemicals react with other materials. For example, a floor tile installation subcontractor cleans its work with a particular chemical, not knowing that the fumes would damage the finish of architectural metal surface interior panels and details previously installed on that floor level. Or, similarly, a contractor selects an unspecified sealant or caulk, not knowing that the sealant is incompatible with the surface to which it is to adhere, or not recognizing that a specified sealant will not cure appropriately in the climatic conditions at the time of installation.

Many of the strategies for minimizing potential design deficiencies discussed above can also be used to prevent construction defects. The use of mock-ups, for example, coupled with testing of the mock-ups, offers the contractor an opportunity to experience constructing the component and a chance to better identify means of verifying compliance with applicable requirements before installing that component throughout a building. Mock-ups can also be mandated in the design documents as a required element of the work. Even without such a mandate, the constructor can elect to create a mock-up to enhance the efficiency of its work schedule by clarifying the design requirements prior to initiating the work, thereby minimizing any confusion.
Mock-ups can also be particularly helpful in identifying potential defects that are a product of difficulties involved in the installation process. The process of constructing a mock-up may reveal the difficulty or impossibility of installing a component as designed. For example, if a window detail calls for flashing to be installed in a particular position, constructing a mock-up may reveal that it is not possible for workers to access the flashing such that it can be installed in that manner because there is too little room to insert a tool or to see if the flashing was set correctly. Identifying such problems early enables a reconfiguration of the design that will function correctly and can be properly installed.

With the advent of techniques such as BIM, virtual mock-ups can be constructed at significantly reduced cost. Nevertheless, while BIM can be helpful in identifying design and construction issues, the experience of building a physical mock-up may still be advisable for the reasons set forth above.

Similarly, it is also wise to identify newer technologies and approaches incorporated in the design prior to the start of construction work to enable the contractor to focus particular attention on areas in which it may not be sufficiently knowledgeable or experienced. The contractor can then identify where it needs to bring experienced subcontractors onto the project or to employ other controls to ensure that the work is performed as required. Control measures the contractor may utilize to manage the risk of construction defects include:

- requiring the manufacturer’s personnel to be on-site to inspect and verify performance of the work;
- conducting enhanced or more intensive on-site inspections by the design and construction team;
- incorporating additional time in the project schedule, so that the work is performed by a few experienced workers as opposed to a larger, less experienced crew, or to ensure that the component is installed under appropriate conditions (climatic conditions, for example); and
- limiting overtime or shift work, which could adversely affect quality.

The primary challenge for the contractor (and the owner) in avoiding construction defects is eliminating human error from the construction process. The approaches described in this chapter can help to minimize human error and the building defects that flow from it.
keeping the building and its equipment in peak operating condition. To avoid this problem, the owner’s project planning should include the commissioning of key systems, the preparation of comprehensive maintenance protocols, and training of maintenance personnel.

Ideally, consideration of the operation and maintenance functions should begin during the design phase, in an effort to ensure that the owner (or operator) can perform these functions with reasonable levels of efficiency. Once again, cost savings options selected during the design phase can result in excessive cost in operations and maintenance—a penny saved in design can often result in many dollars spent down the line, if the parties do not consider the full implications and life-cycle costs of apparently money-saving design decisions. In addition, attention to operations and maintenance issues during design can help reduce instances of key components being placed in locations that render them unserviceable.

The time to commence the operations and maintenance phase of a project is generally before substantial completion, and it begins with a comprehensive commissioning plan.12 A thorough commissioning phase of a construction project is a valuable tool to minimize inappropriate use of building systems. It provides for the verification that all the major building systems and special equipment are operating as per the design intent. An appropriate commissioning phase can be included in the design specifications for the project. Proper operations and maintenance should begin at the time of commissioning. Indeed, the owner should have an understanding of the operational and maintenance requirements at the time of commissioning. Absent such an understanding avoidable damage to components can occur shortly after they are placed into use.

Projects seeking certification from the Green Building Certification Institute as LEED-compliant13 are required to have a fundamental commissioning plan for heating, ventilation, air-conditioning, electrical, and water systems, with verification by an independent commissioning agent as a prerequisite of LEED certification. With the burgeoning popularity of LEED project certification, rigorous commissioning requirements are becoming more prevalent in new construction. The Green Building Initiatives’ Green Globes program also encourages the commissioning of equipment.

On complex projects as well as on certified sustainable projects, an independent commissioning agent is engaged at the commencement of the design process to develop an appropriate commissioning specification and plan

12. The National Conference on Building Commissioning defines commissioning as “the process of ensuring that systems are designed, installed, functionally tested and performing in conformity with the design intent.” See http://www.peci.org/ncbc/about/index.html (last visited December 13, 2011).
VII. Managing the Risk of Building Defects Resulting from Operations and Maintenance

tailored to the particular needs of the project. Numerous organizations publish standards for comprehensive commissioning plans. These organizations include the U.S. General Services Administration, which publishes “The Building Commissioning Guide” for its own projects\(^\text{14}\) the National Institute of Building Sciences, which publishes “The Whole Building Design Guide”;\(^\text{15}\) the American Society of Heating, Refrigerating and Air-conditioning Engineers, which publishes “ASHRAE Guideline 0-2005, The Commissioning Process”;\(^\text{16}\) and Portland Energy Conservation, Inc., which publishes “Model Commissioning Plan & Guide Specifications.”\(^\text{17}\) The American Institute of Architects publishes “Standard Form of Architects Services: Commissioning, AIA Document B211-2007.”\(^\text{18}\)

As building systems become more technologically complex and sophisticated, it is increasingly more valuable to train the operations and maintenance staff in the recommended methods of using the equipment in their care. The operational requirements of computer-controlled or menu-driven equipment may not be intuitive or obvious, even for individuals with experience in managing other projects or facilities.

A proper commissioning program requires the combined inputs of the designer, constructor, and manufacturer, as well as the participation of a significant number of operations personnel. The program must be carefully crafted to include all key components; it does no good to annually calibrate the controls on the HVAC air handlers while forgetting to calibrate the controls for the Variable Air Volume terminal boxes serving the occupied spaces. In addition, operations staff must be educated about specific maintenance requirements associated with each separate component of each building system, including sealants, tapes, and washers, so that the systems do not suffer premature failure. The commissioning specification should include information about cleaning, replacement, and general life-cycle requirements of the equipment. Information about inappropriate cleaning agents can be as valuable as data on recommended procedures. Operations and maintenance staff need to be educated about the potential for adverse chemical reactions, because they may be unfamiliar with the very specific requirements of state-of-the-art equipment.


\(^{16}\) Available at www.techstreet.com/cgi-bin/browse?publisher_id=33&subgroup_id=34758 (last visited December 9, 2011).

\(^{17}\) Available at http://www.peci.org/model-commissioning-plan-guide-specifications (last visited December 14, 2011).

All too frequently a facility is inadvertently damaged by the actions of poorly trained operations or maintenance staff. Using a harsh or corrosive chemical to clean or lubricate a facility component can cause unexpected damage. For example, fumes from muriatic acid used to clean stone floor tile can permanently pit and discolor stainless steel finishes on nearby walls and escalators. It is important that the operations and maintenance staff be educated to take the appropriate precautions. A well-drafted commissioning specification can guide the operations and maintenance staff toward optimum use of the facility.

Employing a coordinated process of engaging the designers of specialized systems as well as the manufacturers and specialty contractors that provided a particular system to train those maintaining the building can also be critical to the proper operation of a building. The installer of a particular device may be able to describe how that device is operated, but another designer may be necessary to provide proper guidance in identifying how and when that device should be utilized such that an overall system performs appropriately. It is critical to recognize that as systems grow increasingly more complex or unique in the pursuit of greater efficiency and performance, the proper operation of a system may not be intuitive.

VIII. Managing the Risk of Building Defects
Discovered after Occupancy

Diligence and speed are the essential elements of a successful mitigation program after a project has been occupied and is in use. Because a small problem often inevitably becomes a larger problem if left unattended, it is most helpful to institute a program of regular inspection to identify small problems as they arise. Identified problems should be addressed expeditiously. Indeed, in this regard it is important to remember that many standard form insurance policies will not cover building defects that have become aggravated due to an owner’s failure to mitigate the loss.

As a starting matter, the owner or operator should notify all potentially responsible parties of a problem as soon as possible. In fact, many states have enacted statutory mandates requiring such notification as part of more comprehensive requirements regarding presuit investigation and repair by the potentially responsible party.19 In addition, the owner should share the results

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of any expert investigations it has performed with the potentially responsible parties, to make sure that the responsible parties understand both the essential aspects of the defective condition that must be remedied and the scope of repair work that will be performed.

In general, since buildings are constructed in place and by people, a certain level of imperfection should be expected to appear over time, leading to the need for repair and correction. Buildings can also be damaged by conditions for which they are not designed. For example, a joint between bricks may require repointing or can be damaged if children use the brick wall as a back stop. Problems such as this must be expected in any prudent maintenance program to ensure that small problems are not permitted to escalate into something far greater.

IX. Managing the Site While Repairs Are Pending

When a building defect is discovered, the first priority is to protect the people using the building. The second priority is to minimize the damage to the building itself and to mitigate collateral damage. The third priority is to assess the situation and find a remedy. An owner who is on notice of a dangerous condition on its property can be liable for the consequences in the event of an injury caused by the dangerous condition and may lose the ability to recover the cost of conducting a repair or correction if the owner fails to take prudent action to mitigate the damages once the problem becomes apparent.

When a potential defect is identified, it is critical to conduct an initial assessment of the potential consequences. At the same time, however, it may be imperative to protect people or property that could be injured or damaged as a result of the building defect. Owners should immediately give consideration to the potential for further personal injury or property damage and should promptly conduct an appropriate investigation of the condition to assess means of containing the damage, since the well-recognized legal responsibility to mitigate damages is no less applicable in the context of building defects.

To achieve a satisfactory remediation result, all parties involved in a defect issue should share the results of any investigation or analysis they have performed with all other project team members, including the owner, the designer, and the constructor. Sharing such information enables those potentially involved to assess their own responsibility and to identify efficient solutions. By engaging other project participants in the process as early as possible, an owner can minimize its potential failure to mitigate damages.

In addition, however, by affording others an early opportunity to observe the defective conditions, an owner can minimize its exposure to claims that it failed to preserve evidence.

Even when a manufacturer takes responsibility for the defect and assumes responsibility for managing the remedial work, the prudent owner will seek
independent advice from a qualified professional regarding the preparation of a repair protocol or specification. Moreover, even when a defect has become obvious, the underlying cause of the defect may not be so clear. In one example, shortly after a high-rise office tower was occupied, numerous chunks of the exterior limestone façade began falling from the walls onto the public courtyard below. Although the building’s defect was obvious, the cause was unknown. The constructor claimed the problem was a design defect, and the designer claimed it was a construction defect. Only after a year of monitoring stresses and temperature changes on all four sides of the structure as well as analyzing the plans and removing limestone panels to verify actual construction techniques used to attach the stone to the building were structural engineers engaged by the owner and the constructor able to assess the true cause of the spalling. Ultimately, they agreed that the structural design and the construction techniques both contributed to the condition that caused the stone to buckle and spall from the walls.

The process of investigating and determining the true cause of a building defect can be quite involved, especially when the problem or building system is complex. The steps taken by an owner in responding to an apparent defect can have serious consequences both from the practical perspective of facilitating an efficient and economical correction without the need for costly litigation, and in not opening the door to avoidable defense claims should litigation ensue to recover damages attributable to the defect.

X. Conclusion

Thoughtful planning and coordination of the design, procurement, and installation phases of a construction project can mitigate the risk of design defects, construction defects, and operational deficiencies. The overriding concepts are basic: (1) preventive efforts during design and construction, (2) proper and well-informed maintenance and operation of the project once placed in service, and (3) a prompt and prudent response when a potential defect appears.