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The Art of Managing Construction Risks

A breakdown of four problem areas

Every project owner wants a successful construction project—one that finishes on time, on budget, without defects in design or construction and with minimum conflict among the project parties. To minimize problems and maximize the chances of success, owners must effectively manage four construction risks. The owner who fails to do so is more likely to have the trouble, delays, problems and headaches for which construction projects are renowned.

Risk #1: Cost Overruns

Cost overruns on construction projects seem to be the rule, not the exception.

Overruns often occur even before construction commences. Typically, the owner engages the design team, establishes project parameters, sets a budget and receives a well-crafted set of plans. Commonly also, the owner thereafter receives construction bids which significantly exceed the project budget, with the result that the project has incurred cost overruns even before construction work has begun.

Cost overruns also frequently occur after construction begins. Construction projects are famous for generating multitudes of change orders while the construction is ongoing, with resulting cost overruns.

What causes construction cost overruns and what can owners do to minimize them?

Overruns commonly occur where initial cost estimates are inaccurate. Many owners rely heavily upon project designers (architects and engineers) for initial cost estimations. However, designers who may be highly qualified in technical areas may not be equally skilled in cost estimating, which is an expertise unto itself. Also, designers generally do not guarantee that their cost estimates are accurate. Under the standard form of architect's contract published by the American Institute of Architects, the architect disclaims any guarantee that actual construction costs will meet the owner's budget

or any cost estimates the designer prepared. Most standardized agreements between owners and designers contain a similar provision.

Overruns also occur when design or construction errors are discovered in the field, requiring redesign, repair and/or replacement of installed work.

Project owners can minimize the risk of cost overruns in a variety of ways.

- *Establish a Firm Budget.* While every project has a budget, some budgets are firmer than others. To reduce the risk of overruns, an owner should establish a firm budget and direct the architect and engineers to design to that budget. Also, the contracts with the designers could require them to revise the plans at no cost if the bids exceed the budget by a stated percentage, although such a provision is difficult to obtain.

- *Obtain Independent Cost Estimates*. Another way to limit overruns is to obtain independent cost estimates as the design progresses. Although this service involves an extra expense, the expense is modest and well worth the cost.

- *Use "Add and Delete" Alternatives*. Under this approach, the design team preplans certain components of the work which the owner may delete if the bids come in too high, and add if the bids are lower than expected. Preplanned "add and delete" alternatives protect the owner from the delays, disruptions and extra expense that inevitably result from redesigning the project after bids are received, in an effort to save costs.

- *Peer Review the Design*. Peer review involves an independent architect or engineer reviewing the plans in an effort to uncover errors, omissions and inconsistencies. The modest cost is justified by avoiding the delays, disruptions and extra costs which usually are involved when design errors are discovered in the field after construction is underway.

- *Review the Plans for Constructability*. "Constructability" describes the ease and efficiency with which structures can be built. The constructability of a building depends largely on the quality of the designs—if the design documents contain errors or are difficult to interpret, the project will be more difficult to build. Having a qualified contractor evaluate the plans for constructability before construction begins helps assure that the plans can be efficiently implemented in the field. Again, although this service involves an extra expense, it is a modest expense which is well worth the cost.

Risk #2: Design and Construction Defects

Any element of a project which deviates from the contract requirements or does not perform as intended is defective.

Defects in design and construction are common. Defects range from mundane or aesthetic defects, to very serious defects that affect the performance of a structure and cause severe economic impacts, to defects that cause catastrophic collapses with tragic results.

Water leakage through a building's exterior envelope is by far the most common construction defect. And, chronic water leakage causes mold growth on cellulose-based materials (such as wood and drywall), frequently leading to "sick building" claims. Why is water intrusion such a problem? The reason is that the components of the exterior building envelope (walls, windows, roofing and foundation walls) are constantly exposed to rain, wind forces and temperature changes, so where exterior envelopes are not designed or constructed properly, there is a high probability that water intrusion will result. In contrast to building envelopes, structural elements are rarely exposed to full design loads under normal use, so structural problems appear less frequently but, when they occur, the results can be horrific.

Types of Construction Defects

There are many types of construction defects.

- *Deviations from Plans and Specifications*. Every construction project has a set of plans and specifications which

instruct the contractor what to build and the quality of materials that must be used. Any deviation from those plans and specifications is a construction defect, even if what is built "works."

One common example is the use of inferior strength concrete. Recent years have seen highly-publicized scandals where substandard concrete was provided to major public projects and test records were falsified to hide the substitution. In those cases, even though the concrete "worked" in the sense that it had not failed, the substandard concrete was a construction defect because it did not meet the strength requirements of the project specifications.

Another example is improper placement of reinforcing steel in concrete structures—even though the structure has not failed or even deteriorated, the failure to comply with the reinforcement requirements is a construction defect.

- *Failure to Follow Manufacturers' or Industry Guidelines*. Project specifications commonly incorporate manufacturers' instructions or industry standards by reference. The failure to follow those instructions is a construction defect, even if the construction "works." Examples include roofing installation which, by reference to the manufacturer's guidelines, may require a certain nailing pattern, shingle exposure and flashing placement. Where these requirements are not followed, the construction is defective even though the roof is performing properly.

- *Functional Defects* refer to any elements of the project that do not work properly. Examples include building leaks and excessive settlement of the structure, causing the floor to become out of level or the walls to crack.

- *Failure to Meet Performance Criteria*. Project specifications commonly include performance criteria dictating results that must be achieved rather than the specific methods or materials to be used. Examples include specifications for: (a) industrial plants, which may require that the plant produce a certain quantity of end-product using only a certain amount of energy with limited waste or by-product; (b) windows, which typically must meet performance standards for resistance to wind-driven rain; (c) heating, ventilating and air conditioning systems, which typically must meet performance requirements for ventilation (usually expressed in terms of the amount of outside air which must be brought into the structure, and the cubic feet per minute of ventilation air which the system must provide); and (d) energy efficiency, where the building may be required to heat or cool to certain temperatures without exceeding specified operating costs. If a building fails to meet specified performance criteria, the design and/or construction is defective.

- *Building Code Violations*. Building codes are complex and frequently incorporate manufacturers' specifications by reference, making them even more complicated. Any violation of a building code is a construction defect even if what is built "works."

- *Diminished Useful Life* is another type of construction defect. An example would be a roof expected to last 20 years, which prematurely deteriorates.

- *Sudden Failures* are catastrophic events such as a collapsed bridge, tunnel or building. These are the clearest cases of defects, with effects ranging from costly repairs to personal injury and death.

What Causes Design and Construction Defects?

Design and construction defects occur for varied reasons.

- *Flawed Design.* The design for a construction project must take into account a number of different forces called "loads"—there are dead loads, live loads, wind loads, snow loads and seismic loads. In addition, the design must account for movement. For example, concrete tends to shrink after it is installed. A proper design predicts these movements and takes them into account in the design process, such as by utilizing expansion joints. Where the design fails to properly account for these forces, the design is defective and is likely to result in cracking, settling and other problems.

- *Poor Detailing and Drafting*. Design plans may include inconsistent information, inaccurate details and erroneous instructions. These flaws may lead to construction defects.

- *Defective Materials.* The use of unsuitable materials is likely to result in defects. Two well-known examples are fire retardant treated (FRT) plywood and exterior insulation and finishing system (EIFS) cladding. FRT plywood was a roof sheathing chemically treated to resist fire. Not until this material was installed in thousands of home attics was it discovered that, under heat and humidity (typical attic conditions), the FRT plywood deteriorated and collapsed. EIFS is an exterior cladding system that also was installed on thousands of homes. Over time, the EIFS system trapped water within the exterior walls, causing decay of the wall system and mold growth.

- *Poor Workmanship*. To avoid defects, construction must be performed with precision. Frequently, contractors are careless even when not under stress. Where contractors are working under time pressure or overtime, the resulting construction is more likely to suffer from poor workmanship, leading to construction defects.

How to Minimize Design and Construction Defects

- *Eliminate Plan Errors*. To minimize defects, owners should take measures to assure that the project plans are as complete and error-free as possible. These include some of the same measures that minimize the risk of cost overruns, such as having the plans peer reviewed by independent designers and evaluated for constructability by a qualified contractor.

- *Review Construction Activities*. Owners also should regularly review construction activities using a variety of methods. Owners commonly delegate project oversight to the designers or construction manager, but this approach may leave the owner uninformed about issues and conflicts that are brewing in the field. Prudent owners should seek to identify and resolve field issues as soon as possible, so that potential problems do not ripen into defects that disrupt the project and are costly to remedy. Methods which the owner can use to monitor the project include (a) periodic review of project meeting minutes, and (b) periodic audits intended to detect contractor overbilling, inappropriate cost-shifting, abusive change order practices and other abnormalities.

Risk #3: Differing Site Conditions

Differing site conditions are conditions of the site, soil or subsurface which the owner did not disclose and which the contractor could not reasonably have discovered or anticipated itself. Unforeseen site conditions can seriously impede a construction project by interrupting the progress of critical construction activities, cascading through the project and causing severe disruptions and delays.

To minimize this risk, owners can take these steps:

- *Thorough Geo-Technical Studies*. Although geo-technical studies (evaluating underground conditions) are not foolproof, thorough site evaluations are essential to avoid unforeseen site conditions.

- *Specific Disclaimer*. In the construction contract, the owner can disclaim responsibility for unforeseen site conditions, thus placing this risk on the contractor. To be enforceable, the disclaimer should describe all site information known to the owner, identify any available geo-technical studies and specifically provide that the contractor assumes the risk of unknown conditions.

Risk #4: Delays

Projects can be delayed by many causes, including: (a) incomplete, inaccurate or poorly coordinated designs, (b) unforeseen site conditions, and (c) force majeure (e.g., hurricanes, tornadoes, terrorism, etc.).

Changes in the work are another major source of project delays. Changes occur on every construction project and can take place for a multitude of reasons, such as poor advance planning by the owner, unforeseen conditions, design revisions, design errors or defective work. Where a project has a great number of changes, the project is much more likely

to suffer delays.

Owners are severely injured by delays. For the owner building a plant to produce a product, construction delays mean a loss of product revenues. For the developer building a project to rent or sell, delay deprives the owner of rentals and the time value of money. For the company expanding its office campus, delay prevents the owner from using the facility. Also, where a construction project is significantly delayed, the owner is much more likely to become the target of delay claims from contractors seeking time extensions and delay damages. Contractor delay claims are common, difficult, complex and usually involve significant expense.

How can project owners minimize the risk of construction delays? While all delay risks cannot be controlled, owners can take these steps:

- *Assure All Permits Are in Place*. Before construction commences, the owner should make sure that the completed plans are approved by the necessary government officials and all required land use permits are in place. Projects are delayed where contractors cannot begin work, or their work is interrupted, because the owner has failed to obtain all necessary approvals and permits.

- *Review the Design Plans for Errors and Constructability*. Construction proceeds most smoothly where the plans have minimal errors and have been thoroughly vetted for constructability. Peer review of design plans and constructability evaluations help achieve the best possible set of plans and minimize the risk of project delays.

- *Close Project Supervision*. By regularly reviewing construction activities using a variety of methods, an owner improves the chances of uncovering conflicts, reducing unexpected change orders, detecting potential design errors, revealing poor construction practices and avoiding project delays.

- *Risk Sharing* can be accomplished with a contract provision dividing responsibility for delays between the owner and contractor. For example, such a provision might state that, whatever the cause, the contractor is responsible for the first 90 days of delay and the owner is responsible for the rest.

- *No Damages for Delay Clause*. Under this important contract clause, where the contractor is delayed by any cause, its only remedy is to obtain an extension of time to complete the work and it may not recover delay damages from the owner.

Construction presents a myriad of risks that can disrupt or derail a project. The owner who effectively manages these risks is likely to have a successful construction project.

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