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New Construction Trends And Their Impact On Contracts

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With rapid advances in technology and an increased emphasis on efficiency and resiliency for complex construction and engineering projects come exciting new design and construction trends. We highlight here a few of the top trends in 2018, along with negotiation and contracting tips to address the unique legal and commercial issues emerging from these trends.

Considering these ideas at the outset of a project can help owners and design and construction professionals take full advantage of these advances.

Performance-Based Design

Recent Trend

The design methodology for complex structures provided in building codes generally includes aspects of the following two design approaches: (1) prescriptive design, in which building codes provide explicit standards the design must satisfy (e.g., height limits or minimum material strengths), and (2) performance-based design, in which the design engineer is free to innovate but must show the design meets the intent of the prescriptive design requirements.

While certain aspects of modern building codes in the U.S. are performance-based (e.g., fire-resistance ratings), most code requirements governing structural design are prescriptive, to simplify the design. This preference for prescriptive design requirements can unnecessarily restrict the design options for certain structures, including those with innovative geometry and those located in areas of extreme loading, such as high seismic risk.

To address these restrictions and allow for increased flexibility in design, U.S. jurisdictions are increasingly embracing the performance-based aspects of the building codes (e.g., the International Building Code and ASCE 7), subject to approval by the authority having jurisdiction. A peer review panel is typically convened to assist with design review and approval, which often includes the use of sophisticated modeling techniques and testing methods.

Unique risks associated with increased use of performance-based design standards include inconsistencies among designs, increased costs due to reviewer requirements and possible design inadequacies that may not be caught for years after construction.

Negotiation and Contracting Tips

The parties to an agreement that involves performance-based design should discuss and agree to the use of performance-based design prior to entering into the agreement, to ensure that all parties understand their obligations and any related risks. In addition, these negotiations should address how all costs associated with performance-based design, including costs related to the testing and verification of the design professional's design, will be shared by the parties.

The contract should clearly set forth the design professional's responsibility to generate a design that satisfies applicable performance-based requirements, and the obligation to remedy any defects in the design impacting satisfaction of the requirements.

The contractor's agreement should specify the contractor's responsibility to perform work that satisfies applicable performance-based requirements, and to identify and report to the owner any deficiencies in the design professional's design it identifies while performing the work.

The retention of the peer review panel presents additional contractual issues that should be considered by the team, including the standard of care and liability for the peer reviewers (and concurrent insurance needs).

Computer-Aided Engineering

Recent Trend

The increasing capabilities of computational tools enable structural engineers to perform most aspects of structural design using computer software. As computer software becomes more sophisticated, the resulting design becomes more complex.

These sophisticated analyses are particularly important for performance-based design (see discussion above), which relies on computer software to realistically predict building behavior to generate design plans complying with applicable performance standards. Additionally, the use of building information modeling, or BIM, is increasingly common in in the construction industry. BIM is a useful tool for organizing construction documents, requiring architects, engineers and contractors to collaborate by keeping project documents in a centralized (and unified) electronic format.

Increased reliance on computer software brings many benefits, but also increased risk. Though software is validated before release, there are no guarantees that new software will be free of bugs and other errors, and it is possible that reliance on new, untested software will result in defective design plans. A competent structural analyst will typically validate new software on simple problems and will perform hand calculations to check the computer-generated analysis throughout the design process.

Hand checks to validate the sophisticated analysis produced by cutting-edge software programs, however, are increasingly difficult to do. And even where hand checks are feasible, schedules and deadlines often inhibit an analyst from checking all aspects of a computer-generated model to confirm accuracy. Also, contractual agreements with structural engineers typically do not specify analysis software, and the software company is not party to the contractual agreement.

BIM software also raises questions as to the copyright, ownership and liability of contributed designs to a project. The owner of the project owns the BIM model at the end of the project, but the designers may want to retain copyright on basic design elements. Additionally, the liability of individual consultants can be more challenging to decipher than with more traditional methods.

Negotiation and Contracting Tips

The parties to an agreement that involves computer-aided engineering should discuss in detail its use prior to entering into the agreement, to ensure the parties understand how it will be used and their respective obligations and risks related to its use. This should include the expectations for hand checks.

The design professional's agreement should clearly set forth the design professional's obligation to ensure that all parts of a project designed with the use of computer-aided engineering satisfy all applicable design requirements. In addition, the agreement should clearly describe the design professional's responsibility for, and obligation to remedy, any defects in the design, including any defects resulting from problems in the computer software used by the design professional.

The design professional should fully understand the risks it is assuming when using computer-aided engineering software, and should determine what recourse (if any) it has to the software provider if the software is defective. It is also important to understand what risks insurance will cover in this regard.

With respect to BIM, it is also important to carefully document in contracts issues like intellectual property ownership, liability for errors and omissions and responsibilities for confidentiality of various components. These provisions may need to be negotiated to delineate responsibility and rights with respect to subsets of inputs and portions of the overall BIM model.

Design for Resilience

Recent Trend

We as a society are dependent on civil infrastructure, including buildings, bridges, water and sewer transport systems and the electrical grid, for shelter, safety and access to food, water and energy. The continued performance of these systems is therefore crucial before, during and after natural and man-made disasters.

To develop a metric to assess the resilience of buildings — and to encourage prioritizing resilience in design — the U.S. Green Building Council, or USGBC, released, in November 2017, the RELi rating system. RELi is a certification system that sets standards to help architects, engineers, city planners and developers design buildings and communities that are better able to withstand and recover from disasters and emergencies, including earthquakes, hurricanes, extreme storms, heat waves and droughts.

RELi is based on a credit system, similar to the USGBC's LEED program, and many of LEED's credits for sustainability are incorporated into RELi. RELi, however, specifies additional steps, and provides for a holistic system of credits for hazard adaptability and resilience — focused on environmental, social and economic factors — to ensure that people have access to food, water, energy and the ability to communicate following a disaster.

This is an exciting development, but it is also a new system, and industry participants are still learning the risk and rewards involved in pursuing a RELi rating.

Negotiation and Contracting Tips

When the owner of a project decides to pursue a RELi rating, it is important to discuss the desired elements (based on the resiliency risks that the individual project faces) as a team, and agree on the allocation of responsibility and the schedule. All agreements related to the project should clearly state the RELi rating requirement, including the schedule expectation for obtaining the rating and the parties' respective responsibilities related to the rating.

The design professional's agreement should set forth the design professional's obligation to design a project that will satisfy all RELi requirements, and describe the design professional's responsibility to address any defects in the design that may prevent the RELi rating. The contractor's agreement should likewise specify the contractor's construction obligations related to obtaining a RELi rating, including an obligation to report any defects identified in the design negatively impacting the rating. The owner, of course, will also need to take responsibility for certain aspects of the administration of achieving the RELi rating.

Modularized Construction

Recent Trend

The use of modularized construction — the process of prefabricating modules (or smaller unit components of a larger structure) at a facility off-site and then delivering them to the intended site for final erection and installation — is increasingly common in the construction of oil and gas facilities, nuclear facilities, shipbuilding and mining facilities and multifamily, commercial and healthcare buildings.

Compared to the traditional "stick-built" approach to construction — where individual parts are shipped to the construction site and then assembled into a larger structure — modular construction provides a number of potential advantages, including lower labor costs, increased productivity, lower safety and quality assurance costs and the facilitation of streamlined schedules (e.g., fabrication in shop may allow for the optimization of work streams, and may reduce risk of delay due to weather-related events).

With its efficiencies, modular construction also brings certain challenges, including the cost of transporting oversized modules, the cost of engineering required to ensure safe transport of the assembled modules and the cost of increased off-site engineering supervision to oversee the manufacturer's assembly and factory acceptance testing.

Negotiation and Contract Tips

While a contractor will be in the best position to judge whether modular construction will be favorable for a project, it is important for the owner to understand the cost-benefit analysis and to determine if this method will achieve cost savings. Parties should undertake this analysis in the preconstruction and budgeting phase.

The contractor's agreement should clearly set forth the contractor's obligation to ensure that modules constructed by third parties satisfy all requirements of the project documents. The contractor's responsibility to remedy any defects in the modules, including when the defects are caused by a third-party manufacturer, should also be specified. The parties should also consider whether there should be any special warranty terms relating to the modules.

The contractor's agreement should also specify the contractor's responsibilities related to the transport of the modules to the project site, including the obligation to cover all related costs and liability for any damage caused during the transport. As always, it is also important to address transfer of title and risk of loss for the modules.

Drones and Robotic Inspection Devices

Recent Trends

Contractors are increasingly using unmanned aerial vehicles, or UAVs, for planning, site preparation, prefoundation work, surveying and monitoring progress on construction sites. Contractors also use UAVs to aid in the inspection of projects during and after construction.

The use of UAVs increases safety over traditional surveying and inspection methods because UAVs can access difficult locations and provide aerial views of construction sites, helping to identify potential hazards. They can also provide efficiencies in more quickly surveying large sites. Many large projects already use drone technology, and a number of small and midsize construction businesses expect to be incorporating drones into their operations by 2020.

Given the newness of this technology and the changing regulatory landscape, having an understanding of the technology, its limitations and applicable regulations is key to its effective application.

Negotiation and Contract Tips

Legal regulation of use of this technology is evolving rapidly, so it is critical to address expectations for the use of UAVs at the outset of a project, and to ensure compliance with applicable legal regulations at all levels.

The project documents should address all risks related to UAV use, including the contractor's obligation to comply with all applicable regulations governing UAVs, including any new regulations that may be imposed after execution of the contractor's agreement. The contractor's agreement should also address the contractor's responsibility for any damage caused in connection with UAV use, and the responsibility to obtain appropriate insurance coverages to address risk.

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