Since the 1970s energy crisis, the demand for energy efficiency has created a Pandora’s box of cause and effect relationships between increasingly complex building systems. As high performance insulation, HVAC, fenestration, and other systems have been introduced, energy saving requirements have further collided with modern economics where “faster, better, cheaper” is the unassailable business culture mantra. As building technologies continue to evolve under these intense pressures, design teams are called upon to merge profitability with multifaceted building necessities in tidy, “green-washed” construction packages.

Modern building technologies impact all phases of construction. Now more than ever, the designer must be technically correct in predicting the interaction of building system components during pre-design and design phases. Architects and engineers must also understand the technical requirements, product end use, limitations, and the detail required for the specified systems in order to convey the correct intent to the construction team. Finally, construction techniques and methods must be understood and specified in order to achieve desired outcomes during construction administration and post-construction phases.

The rapidly proliferating complexity of buildings often necessitates the expansion of design teams. For example, medium to large construction projects may involve multiple architectural firms, structural engineers, special process or application consultants, HVAC engineers, electrical and plumbing consultants, cost consultants, landscape architects, LEED® consultants, and others. Roof consultants, however, are not commonly involved. While many design teams have realized the usefulness of roof consultants on green roofing, waterproofing, or other specialized applications, roof consultants can provide valuable assistance on every project.

Roof consultants can assist architects and engineers by limiting liability, maintaining profitability, reducing team work-load, providing specialized design and problem-solving capabilities, and increasing diversification of project types.

The single most important roof consultant characteristic is his or her unique perspective in the complex building life cycle.

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services, to design-development, to post construction, to demolition. By necessity, architects and engineers are often forced to concentrate primarily on the first of these life-cycle phases. But roof consultants analyze the effectiveness and performance of roofing systems across all life-cycle phases. Daily experience in maintaining, repairing, and replacing the spectrum of roofing systems available enables a roof consultant to provide unbiased recommendations regarding system performance and return on investment information. Perhaps more importantly, the roofing consultant’s training and experience can serve to provide quality control during roofing design and construction phases to help protect the client and limit architect/engineer (A/E) liability.

In limiting liability, building code implications must also be considered. According to Richard Canon, PE, FRCI, RRC, building codes clearly delineate roofing systems as cladding. Cladding is a structural component of the building system and therefore must be designed by a licensed structural engineer or registered architect. It can be argued that this delineation of roofing responsibility to the engineer (or architect) creates more long-term liability for the design professional. If the engineer specifies a roofing system with a specified warranty period, any deficiency or problem during that period could be construed as a design deficiency. By ensuring that the system will actually perform, a roof consultant can provide a measure of protection and confidence to the architect and engineer.

For common reference, the International Building Code (IBC) is used as a basis. IBC refers to ASCE-7 which defines roofing as an “engineered component relative to: gravity loads, fire, drainage, energy, and wind uplift resistance.”

While many engineers can calculate and design the requirements necessary to satisfy code, knowledge of code requirements may not be sufficient to avoid selection of components that lack compatibility or desired performance. A roof consultant has the
unique experience and training required to determine systems and components that are both compatible and capable of delivering performance consistent with and appropriate for existing (or future) conditions, ease of maintenance, life expectancy, and qualification for warranty.

A roof that meets code will not necessarily perform. IBC references many separate entities that control or provide direction in separate areas of concern, such as plumbing code for drainage, UL and FM Global for fire resistance, ASCE-7 and FM Global for wind uplift, ASCE-7 for gravity loads, and ASHRAE for energy requirements. As long as a system, or the components of a system, meet the requirements of these individual entities (FM Global, UL, etc.) and satisfy their concerns, the system earns their approval. However, while the IBC list of entities appears comprehensive, each has a narrow area of emphasis. A single controlling entity concerned with high performance, long-term, sustainable roofing has yet to be developed. Roofing consultants are uniquely qualified, by nature of their experience and training, to understand these complex system relationships. While not qualified to perform the structural analysis required for a roofing system, a roof consultant is qualified, from a comprehensive viewpoint, to predict roofing system performance.

Maintain Profitability and Reduce Workload

Most architects and engineers lack passion in designing roofing systems, especially low-slope systems that often serve no aesthetic purpose. Add a measure of complexity to a non-aesthetic system, and profitability, focus, and accuracy can become difficult to achieve. Outsourcing this aspect of the process to a roofing consultant can help to avoid unanticipated costs.

Delegating roofing design and related efforts to a roof consultant has other benefits as well. A roof consultant can take on many aspects of roofing-related design, thus reducing internal workload. If roofing-specific requirements have not been considered, a roof consultant will ask the right questions and provide appropriate recommendation. A roof consultant can also provide specifications and details developed through consistent, monitored use.

Additionally, a roof consultant can be valuable during bidding and construction phases. Roof consultants can make bid recommendations and help select qualified contractors. Delegating approval of tedious roofing-related submittals during construction can further reduce A/E workload.

Provide Specialized Design and Problem-solving Capabilities

Air barriers, green roofing, and Energy Star® systems are relatively new to the industry. Their specification and use often require specialized design and can also introduce new problems, interactions, and consequences to building systems. The addition of a roof consultant to a design team can help to avoid such problems via pre-construction assessments and evaluations, peer review, construction observations, and post-construction problem solving. Discussion of the roof consultant’s spe-

Photo 4. The roofing on this contemporary home has four different roof structures, each with different roofing and cladding systems. A roof consultant’s involvement may have increased efficiency for the design team during design and construction administration phases.
specialized knowledge and problem-solving capabilities follows.

The number of buildings with improper air barriers indicates a lack of understanding of air barrier code. Perhaps more misunderstood are requirements to bridge all envelope systems for a complete air barrier system. Air barrier systems must be compatible and maintainable over the life expectancy of a building. Consider the following common detail: can an EPDM membrane be taped to a polyethylene air barrier? Absolutely. Will the adhesion between air barrier and EPDM last for the life expectancy of the building? Not likely. While wall systems are not as simple as a “roof turned vertical,” roof consultants are routinely involved in building envelope systems, particularly the interaction between roofing and wall systems.

The United States Green Building Council’s (USGBC’s) LEED® construction program offers many new opportunities and imposes many new requirements for projects seeking LEED® certification. It is often assumed that a green roof or Energy Star®-rated roofing system is required on a project. However, if a lower certification level is desired, this may not be the case. A roof consultant can provide unbiased recommendations regarding system performance, lifecycle cost analysis, and warranty information for the architect to present to the owner to facilitate the decision-making process.

Educating the owner can also be a difficult task for an architect or engineer. With a roof consultant on the design team, an architect can more confidently pursue intelligent, alternative roofing systems with an owner. A roof consultant can provide system performance, lifecycle cost analysis, and warranty information for the architect to present to the owner to facilitate the decision-making process.

Conclusion

Complex building relationships need not lead to the proverbial Pandora’s box. These interactions, especially when related to the building envelope, are critical to building performance. Roof consultants utilize a unique perspective of the building lifecycle to provide assistance on every phase of a project, from pre-design to construction administration. While the design professional is best suited to determine who participates on the design team, a roofing consultant can prove to be a worthwhile investment. Call a roof consultant to find out how he or she can help with a specific project.

Photo 5. The ratchet straps on the barrel ends holding down the roofing are not clearly visible. Although an extreme case, the materials that are visible are FM- and UL-approved. Specification of approved materials is not necessarily a good assurance of performance.

Footnote
