FOCUS ON GREEN BUILDING

Trust, but Verify… Building Enclosure Commissioning in Sustainable Design

BY DANIEL J. LEMIEUX, AIA

INTRODUCTION

SUSTAINABLE DESIGN DOES NOT NECESSARILY RESULT IN A sustainable building. As an architect practicing in the area of building enclosure failure investigation and repair design, personal experience has taught me that there is often a sizeable gap between design intent and actual performance. This is particularly true when viewed in the context of the overheated rhetoric currently surrounding "green" building and sustainable design. The benefits of solar, wind, double skins, various insulating technologies, and an endless array of materials and methods all require serious performance verification before owners of real estate can feel comfortable that their investment is truly "green" and, more critically, that their investment is economically viable in the long term.

To assure the economic viability and performance of the sustainable building (or any building for that matter), it is crucial to understand two things. First, one can only verify what one can measure. Second, it is important to understand from the beginning the business goals shaping the performance requirements of a building asset. What needs to be measured will be determined by these larger business issues, and the verification protocols must be tuned accordingly. The recent National Institute of Building Sciences (NIBS) report to Congress regarding the attributes of a "high performance" building is instructive and worth keeping in mind. It says:

> "The high-performance building concept comes at a time when the building community is being pulled in many directions and is in need of a framework for balancing competing interests. The increasing popularity of sustainable or "green" building, post-9/11 safety and security concerns, the new contractual and delivery methods available to builders, and the market mechanisms driving institutional investors to seek out energy and other efficiencies in building asset portfolios all confirm that this is the right time to begin … ".[1]

The operative word here, of course, is "*begin.*" As we stand on the precipice of what can be fairly judged a sea-change in the role of the architect in sustainability and environmentally conscious design, it is becoming increasingly vital that we, as architects, resist the temptation to "greenwash," and instead look critically at our own role in this process and the tools available to us to truly deliver on both the potential and the *promise* of high-performance buildings and sustainable design.

About the Author

Daniel J. Lemieux, AIA, *is principal and unit manager of the Washington, D.C. office of Wiss, Janney, Elstner Associates, Inc. Since joining the firm in 1996, Lemieux has handled projects in the area of building envelope failure investigation, repair design and architectural rehabilitation, including projects that have been honored both locally and nationally for design and restoration excellence. Lemieux served as co-author and contributing editor for the "Exterior Wall" chapters of the Web-based* Whole Building Design Guide, *and was a contributor to the development of* NIBS(*National Institute of Building Sciences)* Guideline 3: "Exterior Enclosure Technical Requirements for the Commissioning Process." *He is a graduate of the College of Architecture at the Georgia Institute of Technology.*

THE CHANGING ROLE OF THE ARCHITECT: PERCEPTION VS. REALITY

In a thoughtful discussion of the changing role of architects, Professor Barry Yatt of the School of Architecture at Catholic University in Washington, D.C., recently wrote: "Architects see themselves and, to a larger extent, are seen by society as "creative types." As a culture, we recognize these individuals as renaissance people—licensed professionals who think in the abstract and possess the rare combination of vision, creativity and the scientific rationale necessary to bring us informed, responsive and, in some instances, truly inspiring and thought-provoking design. This notion of the architect's place in our society is reaffirmed time and again in the popular press when business leaders and politicians are referred to as the *architects* of a given mission or success—be it the start of a successful new business or, perhaps, the outcome of a successful piece of legislation. We use the term reverentially because, as a society, we have come to recognize architects as individuals with a proven ability to solve major problems through the use of a creative, yet structured and thoughtfully applied intellectual process."[2]

Ironically, this societal view of the architect has begun to apply less and less to those who, by definition, are actually engaged in the practice of architecture. Due largely to development models that increasingly reflect near-term profitability rather than long-term durability and performance—*and the corresponding increase in liability and risk associated with this shift*—architecture has evolved into a profession that, in many respects, is better known for the services and expertise it no longer provides than for the services that were once the foundation of the profession. In-depth technical research, comprehensive and effective detailing during the design phases of a project, and a commitment to regular inspections of the work during construction to ensure proper installation and performance have increasingly fallen victim to the demands of compressed schedules and often, unrealistically low budgets. Architects recognized this shifting demand and responded by reducing their scope of services—*and shielding themselves from liability*—by outsourcing these tasks to what has become a breathtakingly large and still expanding field of design consultants. Developers, for their part, unwittingly contributed to this shift by creating a more competitive environment for design services during the conceptual stages of a project—an environment that, while perhaps more cost-effective in the near term, nonetheless contributed to the compartmentalization of design and an attempt, in many instances, to redistribute design responsibility "downstream" into the construction industry and trades—arguably lowering the bar for a profession that is increasingly unwilling or unable to invest the time and resources necessary to respond to the rapidly evolving technical challenges of a project.

"It should come as no surprise, then," says Professor Yatt, "that developers increasingly turned to consultants to fill this void. And architects who did, in fact, invest the time and financial resources to design responsively, increasingly found themselves facing a market that no longer expected to see them in this role."[2] While design responsibility (and fees) for architects engaged in traditional practice have suffered, the number of players and costs associated with a project team have continued to increase, with (arguably) little or no significant reduction in risk for the owner/developer, and only minimal gain in the long-term durability and performance of the buildings that continue to emerge from this process.

How do we address this concern? One popular refrain among owners, developers and contractors is to reflect wistfully upon the idea of the architect as *master builder* "… that legendary paragon of creativity and pragmatism that once guided both design and construction before the increasing complexity of building technology warranted building codes and public regulation of teh architecture profession."[2] As tempting as it may be for architects to want to resurrect that ideal, the notion that the profession will return triumphantly to recapture that mantle is one that can only be viewed through the romantic lens of history. It holds little or no promise when viewed through the multi-faceted prism that has come to define project delivery today. Perhaps, then, it is more appropriate to consider the possibility of an architect (or engineer) serving as the *steward* of the pre-design, design and construction process—a design professional who possesses a level of base-building knowledge, intellectual curiosity and technical competence necessary to understand, evaluate and effectively balance the desire to take advantage of rapidly advancing construction materials and technologies with the reality (and often competing interest) of initial project cost, life-cycle cost, short- and long-term environmental impact, energy efficiency, and the long-term durability, serviceability and performance of the modern building enclosure. These are the same principles we consider fundamental to good design practice and, by definition, sustainable design.

WHY COMMISSION THE BUILDING ENCLOSURE?

In any effort to produce a new building project or manage an existing building asset, proper design and maintenance of the building enclosure is vital. This is even more critical when trying to create or manage a sustainable building. In general, the transfer of heat and moisture between the building interior and exterior has a fundamental impact on the design and eventual operation of a building asset. The heat transfer through the building envelope, including both the facades and the roof, dominates the design requirements in virtually all buildings with floor plates smaller than 15,000 square feet and, depending on the building configuration, can have a significant effect for buildings with larger floor plates. Generally speaking, the impact of the building envelope penetrates to 15 feet from the envelope in most buildings.[3] Therefore, proper design and maintenance of the building envelope is crucial to the sustainability and eventual durability of the asset. Building envelope failures quickly obviate the best laid plans for an energy-efficient building as we shall see in the Chesapeake Bay Foundation building below.

Energy efficiency is not the only goal of a sustainable building. Other goals include indoor environmental quality and durability. Simply put: uncontrolled rainwater penetration, condensation and moisture ingress are three of the most common threats to the long-term durability, structural integrity and performance of the building enclosure. In the past, statistical data has suggested that collectively they represent up to 80 percent of all construction-related claims in the United States.[4] Today, a new pipeline of litigation has been added to that list—one that arises not simply from the deleterious effects of moisture intrusion, but rather from the noble, though perhaps short-sighted and frequently ill-informed objectives established for energy efficiency in the name of sustainable design. The continuation of this trend is troubling, and has only taken on added significance when one considers the irrational exuberance that now appears to surround sustainable design and the rush to mandate the objectives of the United States Green Building Council (USGBC) through hastily crafted and what may prove to be short-sighted and ill-conceived legislation. The changing role and perception of the architect have contributed to this trend.

In an effort to more clearly deal with the risks associated with the failure of design and maintenance of the building envelope, a whole new area of technical design, forensic analysis and redesign has arisen. The primary motivation for the recent concept and practice of Building Enclosure Commissioning (BEC) has been to address the common technical deficit of most architectural detailing practices and the increased recognition of owners and insurers of the significant losses in functionality and asset damage as a result of poor building envelope design and maintenance.

BUILDING ENCLOSURE COMMISSIONING IN SUSTAINABLE DESIGN

Often, in order to achieve a holistically designed, energy-efficient and properly functioning building, careful attention both to global design objectives and to details is required, beginning at the initial programmatic stages of a project and extending through the pre-design, design, construction and post-occupancy phases of a project. The greater the risk associated with the project—typically a function of building type, intended use, location, climate or exposure—the greater the need for confidence in the long-term durability and performance of the materials, components and systems that will support and condition that building and protect those within from the surrounding environment. Creating check lists and maintaining a written record of mechanical system design and initial verification of operability and performance are tasks associated with the traditional role of the Building Enclosure Commissioning Agent (BECx). Recognizing the *interdependency* between the performance of these systems and effective design, detailing, integration of the materials, components and systems that comprise the modern building enclosure (and having the professional background and technical expertise to appropriately influence that process) is the role of the BECx.

To assist in further defining this concept, *NIBS Guideline 3* (2006): "Exterior Enclosure Technical Requirements for the Commissioning Process" offers the following definition:

> "The Commissioning Process is a quality oriented process for achieving, verifying and documenting that the performance of facilities, systems, and assemblies meets defined objectives and criteria. The Commissioning Process assumes that owners, programmers, designers, contractors, commissioning team members, and operations and maintenance entities are fully accountable for the quality of their work. The Commissioning Team uses methods and tools to verify that the project is achieving the Owner's Project Requirements throughout the delivery of the project."

While this definition covers the broader context of traditional building commissioning, the BEC process endeavors to take it a step further by *actively engaging*, rather than *assuming*, "... that owners, programmers, designers [and] contractors ... are fully accountable for the quality of their work." In other words, "... *verify and ensure that fundamental building elements and systems are designed, installed and calibrated to operate as intended...* "[5] with a particular focus on the design and construction of the building enclosure. This is accomplished through comprehensive design peer review, detailing assistance, pre-construction and construction period performance verification testing, and post-occupancy evaluation of the completed project to ensure performance is consistent with the Owner's Performance Requirements (OPR) established during the initial programmatic stages of the project. *Trust, but verify*[6] is the premise of the BEC, and a properly educated and trained design professional is uniquely qualified to serve the BECxA and *steward* of that process.

THE BUILDING ENCLOSURE COMMISSIONING PROCESS

Optimum building performance begins at conception. That is both the premise *and the promise* of the BECx process. In order to achieve a fully integrated, high-performance building—one in which the design of the building enclosure reaches beyond the aesthetic and begins to support *and enhance* the comfort and productivity of the end user—it is critical that issues of serviceability, durability and performance receive the same weight as those associated with programming, massing, site orientation, and climate. These concepts are inextricably linked, of course, and must be fully considered during the early stages of a project, when ideas are promulgated and images begin to form. The traditional Commissioning process has long held that optimum building performance can be achieved through the proper design, balancing and operation of base-building mechanical systems. The BECx process builds upon that notion first by: a) recognizing the rapid pace at which building enclosure systems and technologies continue to evolve (and the limitations that often exist during the design process to properly evaluate and apply those technologies); and b) mandating that a design professional well-versed in building enclosure design and, more critically, *failure*, are given seats at the table and an opportunity to positively influence the direction and outcome of a project. In its purest form, the BECx process can be summarized as follows:

Pre-Design
Establishing performance objectives that will support and enhance the comfort and productivity of the end user by ensuring that the goals associated with initial design and construction costs are properly aligned with the long-term objectives of energy efficiency, serviceability, durability and performance (the hallmarks of good design practice and, arguably, the very definition of *sustainable design*);

Design
Ensuring consistency during the design process by requiring that performance objectives established at conception are properly maintained throughout the schematic design, design development and construction document phases of the project;

Pre-Construction
Verifying the design through detailed and effective submittal review, followed by the construction and subsequent performance testing of a full-scale, pre-construction mock-up and further design refinement as required to better reflect the realities that exist among the building contractors and trades without sacrifice to the performance objectives established for the project;

Construction
Validating the construction by working closely with the individual contractors and trades to periodically review and evaluate the work in progress, as well as to provide technical guidance and quantifiable field quality assurance testing at critical stages *throughout the construction process;*

Post-Occupancy
Improving performance and the future of truly sustainable design through a carefully crafted, well-conceived post-occupancy performance evaluation program that analyzes actual performance in a manner that is quantifiable and can be accurately measured against the performance objectives established at the outset of a project (the necessary evolution of good design practice will rely heavily upon this step).

Optimum building performance begins at conception. It is a concept worth repeating, if only to underscore the critical need to re-establish *first-principles* thinking to the design and construction of our built environment. As the following case study will attest, the BECx process offers an opportunity for design and construction teams to re-embrace that principle, and to establish *quantifiable metrics for performance testing and validation* that demand accountability at every stage of the design and construction process.

A "PLATINUM" CASE STUDY

Introduction

Designed and constructed almost entirely of rapidly renewable and/or recycled building materials and systems, the Phillip Merrill Environmental Center[7] has been recognized both regionally and nationally in the U.S. as the first project to achieve the Platinum rating under the USGBC LEED® rating program first introduced in 2003. As a symbolic representation of the owner and its mission (a not-for-profit, environmental advocacy group), the overall design aesthetic, placement on the site and creative use of passive heating and cooling, rainwater recovery, stormwater management and similar innovations have been widely recognized as unique and successful by design professionals and the sustainable design community. However, the location and exposure of this building, the architect's choice of materials, and the manner in which those materials have been incorporated into the building enclosure created a series of challenges for the owner with regard to the long-term maintenance and care of this structure.

BASE BUILDING DESIGN AND INNOVATION

The Phillip Merrill Environmental Center is located near a coastal environment on the eastern shore of the U. S., in what can be defined as a mixed-humid climate.[8] The building is exposed to large volumes of wind-driven rain and to high humidity during the summer months. The project contains numerous innovative applications in an attempt to obtain the rating. Following is a summary of some of the unique technologies and design functions included in this property:

- Water usage in the building is less than ten percent than that of a similar conventional office building. This is accomplished by several means including the use of waterless urinals and composting toilets. An extensive rainwater collection system filters and recycles rainwater for fire suppression, hand-washing, mop sinks, desiccant unit make-up, laundry, and gear-washing equipment. This redirection of rainwater eases the volume of storm water flow out of the building and into the surrounding watersheds and ecosystems and reduces the need to draw from groundwater wells or from municipal water systems. Hot water is provided by a solar hot water heater, which reduces energy consumption.
- In the area of energy conservation, the building utilizes passive solar heating by capitalizing upon its large expanses of glass on the south and east elevations. Operable louvers and shades are positioned at these elevations to help minimize summertime heat gain, enhancing cooling and reducing electric bills, while still allowing winter sun to enter and passively heat the building.[9] Structurally insulated panels (SIPs) were selected for this structure instead of conventional framing to reduce the use of wood and increase the insulation value of the structure. Photovoltaic or solar panels are used to convert solar energy to electricity, and a complete energy management system monitors and optimizes the building's energy usage. A ground source heat pump is used in conjunction with a desiccant dehumidification unit to eliminate the need for a mechanical system for air conditioning, and the heat pump also assists with heating the building in the winter. Interior sensors on the interior measure the light supplied from the windows and, when sunlight is abundant, the amount of electric lighting is minimized.
- Material selection focused on supplying recycled, salvaged and rapidly renewable materials to construct the building. The absence of interior walls and finishes also greatly reduced the need for additional materials found in more conventional structures. A great majority (80 percent) of the materials were found within a 300-mile radius of the site. Materials incorporated included cork flooring and bamboo for stairs and flooring.
- Windows provide natural day lighting and views of the surrounding natural habitat. Indoor air quality for occupants and visitors was addressed via passive natural ventilation and mechanical ventilation, combined with zero-volatile organic compound (VOC) paints and adhesives, natural materials, and direct venting and non re-circulating air in rooms where chemicals might be used. Operable windows have an indicator light at the base to indicate when environmental conditions are right for windows to be opened.

Material Selection and Design of the Above-Grade Building Enclosure

The building enclosure on this project consists primarily of exposed, engineered-wood "parallam" columns, beams and trusses; galvanized steel roofing and siding; pultruded fiberglass window systems and SIPs. The SIPs consist primarily of a center core of rigid insulation board sandwiched between an inner layer of oriented strand board (OSB) and an outer layer of either exterior grade plywood or OSB protected by a second layer of exterior grade plywood. Exposed wood elements were treated after installation with semi-transparent, breathable water repellent. Frame joinery between the SIP panels and the adjacent parallam structural elements, metal siding and window frames was to be back-sealed and protected by exposed wood batten strips.

Investigation and Repair

Although our investigation revealed a variety of both design and construction defects that resulted in direct, uncontrolled rainwater penetration through the exterior walls and roof of this property, we were particularly struck by the impact that material selection alone appeared to have on the overall performance of the building enclosure. In the context of sustainable design, this was especially noteworthy in that the advantages relative to the LEED rating system that may have been associated with the use of SIPs, parallam wood structural elements, wood batten strips and similar energy-efficient and renewable resources also appeared to have further complicated the already difficult task of properly installing and integrating these materials into a fully functional building enclosure. This was particularly evident at facade interface conditions, where the surface characteristics inherent in the parallam products and the manner in which they are assembled proved extremely difficult to effectively seal and properly integrate with the surrounding SIPs, galvanized steel siding, metal copings and related construction. Given the relatively rapid development of in-service warping, twisting and checking of these products evident during our investigation, we concluded that the somewhat unique use of wood products on this project, while effective in conveying the design intent of the architect and vision of the owner, nonetheless created a building enclosure that, in our judgment, was extremely vulnerable to moisture-related deterioration and, as such, would very likely be difficult and costly to effectively maintain, requiring frequent and carefully monitored routine maintenance and periodic replacement of wood facade elements by the owner.

Based on our survey of actual rainwater penetration that occurred on the project since substantial completion, as well as our own field water penetration testing at representative sections of the building facades, the following conditions were determined to be the primary sources of rainwater penetration on this building:

- Interfaces between facade elements (joints between SIPs and parallam columns and beams);
- Window locations at pultruded fiberglass gang-mullions;
- Roof terminations and interface conditions at rooftop dormers;
- Interfaces between roof and exterior wall and roof assemblies;
- Roof penetrations.

When considering the range of potential repair options available for this project, we recommended that careful consideration be given both to the long-term durability and performance of the materials themselves in this climate, as well as to the manner in which those materials would be detailed at each of the facade interface conditions to produce a fully integrated, weather-tight building enclosure. In addition, because the building would remain occupied and in use throughout the repair process, we recommended that the repairs be carried out in a manner that would allow for full implementation from the exterior, with minimal interruption to the daily use and occupancy of the building. Striking an effective balance among each of these considerations, particularly in the context of sustainable design and the prerequisites associated with the LEED rating system proved difficult, ultimately resulting in a final recommendation that the architect consider adopting a “rainscreen” approach to guide the repair process.

Following this recommendation, the architect developed a series of facade details that would, in essence, enable the primary drainage plane for the exterior wall system to reside inboard of the exposed wood spandrel panels and batten strips. In this configuration, it was determined that the impact of continued in-service deterioration of the wood facade elements on the weather-tight integrity of the building enclosure would be significantly reduced or eliminated, thereby enabling the facade to function and appear as originally intended by the architect while also providing a layer of protection for the U.V.-sensitive products and materials to be used at the primary drainage plane. The repairs were designed and successfully implemented in the year following our investigation, and to the best of our knowledge, have restored the weather-tight integrity and intended performance of the above-grade building enclosure without sacrifice to the original LEED Platinum rating awarded the property.

Hindsight, of course, is 20/20. However, several of the concepts ultimately adopted to guide the repair of this property (in particular, the "rainscreen" concept) might have arisen earlier in the design process under a more formal BEC program and, therefore, perhaps been incorporated into the design prior to the development of the construction documents for this project. Regardless, one fact is clear: the commitment of both the architect and general contractor to the significance of this property as a symbol of sustainable design and construction excellence has since resulted in the cooperative development and successful implementation of a repair program that has addressed uncontrolled rainwater penetration at this property without significant sacrifice to the fundamental principles of USGBC that formed the basis of this project and initial rating.

CONCLUSION AND POSTLOGUE

Since the original publication of the case study in 2004, a new pipeline of litigation has already begun to form—one that arises not simply from the deleterious effects of moisture intrusion, but rather from the noble, though perhaps shortsighted and frequently ill-informed objectives established for energy use, serviceability and overall building performance in the name of sustainable design. While it is difficult to predict the impact of these developments on project delivery and the practice of architecture as it has currently evolved, one prediction is worthy of note:

> "Architects are not typically certified in specialties; however, LEED® Certification (as it is now defined under AIA B214 [the standard contract document recommended for use in the delivery of additional LEED certification services by the architect]) changes that general rule. The LEED®-certified Architect will, therefore, likely be held to a higher standard."[10]

In the context of building enclosure design, failure of the building enclosure continues to originate largely from errors and omissions arising from a frequently truncated and short-circuited design process—one that reflects the compartmentalization of design and, in many instances, the attempt to reallocate design responsibility "downstream" to the subcontractors and trades responsible for the work. In defense of this practice, one architect opined:

> "It is not the standard of care to provide exhaustively detailed and annotated documents. If architects were expected to provide the level of detail, our fees would need to increase dramatically or we would be out of business quickly…".[11]

Unfortunately, this is a relatively common refrain—and a very telling comment relative to the current state of the design profession. However, the language in current building code—and available case law for which the author has become familiar—implicitly rejects this logic:

> "Construction documents for all buildings shall describe the exterior wall enclosure in sufficient detail to determine compliance with this code. The construction documents shall provide details of the exterior wall enclosure as required, including flashing, intersections with dissimilar materials, corners, end details, control joints, intersections at roof, eaves or parapets, means of drainage, water-resistive membrane, and details around openings. The construction documents shall include manufacturer's installation instructions that provide supporting documentation that the proposed penetration and opening details described in the construction documents maintain the weather resistance of the exterior wall enclosure. The supporting documentation shall fully describe the exterior wall system which was tested, where applicable, as well as the test procedure used."[12]

Each of these developments is a reminder of the need for architects to step forward and serve as stewards of the pre-design, design and construction process, and of the promise that Building Enclosure Commissioning holds to ensure that design and performance objectives established at the outset of a project—particularly in the context of sustainable design—are reliably maintained during construction, and properly validated as part of the overall commissioning and post-occupancy evaluation process. ■

ENDNOTES

1. Assessment to the U.S. Congress and U.S. Department of Energy on High Performance Buildings In Response to Section 914 of the Energy Policy Act of 2005 (Public Law 109-058), National Institute of Building Sciences, 2008.
2. From an unpublished article: "Toward a Meaningful Architecture: Educating a New Profession of 'Stewards'," Yatt, Barry D., Professor of Architecture, Catholic University of America, Washington, D.C.
3. Hurd, Thomas Robert, "Evaluation of the Relative Importance of Building Envelopes and Internal Loads on Annual Energy Consumption," unpublished M. Arch thesis completed at Iowa State University of Science and Technology, Ames, Iowa, 1979; available in

the Iowa State University Parks Library General Collection and Special Collections.

4. Bomberg, M.T. and Brown, W.C. (1993), "Building Envelope and Environmental Control: Part 1-Heat, Air and Moisture Interactions," *Construction Canada* 35(1), 15-18.

5. United States Green Building Council (USGBC), Leadership in Energy and Environmental Design (LEED®).

6. This phrase has been used by many and an attribution is difficult though it was used to great effect by President Ronald Reagan during the negotiation of the Intermediate-Range Nuclear Forces Treaty with the former Soviet Union.

7. "The Importance of Building Envelope Commissioning in Sustainable Design," Lemieux, D.J. and Paul E. Totten, ASHRAE/ORNL Buildings IX Conference, Clearwater, Fla., 2004.

8. Lstiburek, J., *Builders Guide to Mixed Humid Climates*, Building Science Corporation, Energy and Environmental Building Association (EEBA), Inc., Revised 2005.

9. See the example, Magwood, C. and Park, M., *Straw Bale Building* (New Society Publishers 2000).

10. Butters, F.F. (2008), "Greening the Standard of Care: Liability Challenges for the Practicing Design Professional in a 'Green' World," presentation at "Managing Risk in Sustainable Building: Policy, Performance and Pitfalls," a conference held on Feb. 7-8, 2008, at the University Club, Chicago, Ill.; sponsored by DePaul Real Estate Center and Alberti Group.

11. State Board of Registration v. Rogers, 239 Miss. 35, 120 So. 2d 772, 775 (1960).

12. 2003 International Building Code (IBC), Section 106, Article 106.1.3: "Exterior Wall Envelope."