Hospital expansion increases energy efficiency, IAQ with air and moisture management system

In 2006, more than 22,000 infants, children and adolescents were admitted to the Children's Hospital of Wisconsin and more than 284,000 were seen in the hospital's specialty clinics.

Additional space was desperately needed. Plans got underway for a 12-story, 425,000-square-foot expansion tower, increasing the number of beds from 236 to 294 with capacity for an additional 72 in the future. The tower also would feature two expanded 24-bed pediatric intensive care units and a larger, more comprehensive Herma Heart Center.

Preventing uncontrolled infiltration of air and moisture was a key requirement to ensure protection of the fragile immune systems of patients. Warm air finding its way through a breach in the building envelope carries 30 to 40 times the amount of water from vapor diffusion than might be carried through an entire wall over several months. The water produced from condensation from a void is often more than the drainage capacity of the wall and cladding material, potentially leading to the development of mold and other negative impacts on air quality, premature deterioration of building envelope components, interference with the proper operation of mechanical ventilation systems and increased energy consumption.

The higher humidity in hospitals and cold winters in Wisconsin create an environment prone to frost and condensation so providing continuity throughout the building envelope was critical. The final design incorporated a curtainwall system with six-story spans along the projections and recessions in the wall and a continuous vapor barrier. One of the primary concerns was maintaining continuity between the dissimilar materials of the curtainwall system and the adjoining wall system, a critical area where dynamic movement would be expected and where multiple installers would typically be involved in the construction process.

Many commonly used transition materials are limited by specific inherent characteristics, such as the ability to span unsupported gaps, long-term compatibility with adjoining materials

and the ability to withstand the greater movement and deflection encountered with varying geometries. The architectural firm Shepley Bulfinch Richardson & Abbott and The Boldt Company incorporated a solution that was tested beyond traditional standards in the industry and proven to be effective.

The Proglaze® ETA Engineered Transition Assembly from Tremco Commercial Sealants & Waterproofing is a pre-engineered air barrier transition assembly mechanically fastened to the window and curtainwall structural framing to bridge continuously between the window-curtainwall opening and the adjacent ExoAir™ 110 Self-Adhered Air & Vapor Barrier Membrane. Its design allows it to span and seal across irregular window geometries, while absorbing dynamic movement and wind-loading stresses without pulling apart. The single-source nature of the solution also allows it to be easily specified, quality control was simplified and accountability was ensured. In addition, the first five floors of the structure could be erected, sealed off and waterproofed, allowing interior buildouts to begin sooner.

To ensure Proglaze ETA would meet the design intent, a full-scale mockup of the curtainwall and adjacent wall system was constructed and put through 17 different tests at an independent lab to withstand water penetration, thermal changes, load deflection and air leakage. More than 40 independent field tests were conducted during the construction process to confirm results of the mockup testing and ensure installation was consistent with the benchmark established during testing.

The overall protection of the well-being of patients is the ultimate reward, while yielding estimated energy savings of 15-20 percent and a structure that could last 50 to 100 years.

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