



Children's Hospital of Wisconsin, *West Tower Expansion*

Location: Milwaukee, Wisconsin

Architect: Shepley Bulfinch Richardson & Abbott

Construction Manager: Oscar J. Boldt Construction

Fabricator: Fulton Windows

Installer: Trainor Glass

Tremco Product System: Proglaze® ETA Engineered Transition Assembly, ExoAir™ 110 Self-Adhered Air & Vapor Barrier Membrane

Challenge: Children's Hospital of Wisconsin is one of the nation's leading hospitals for children. In 2006, more than 22,000 infants, children and adolescents were admitted 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 for patient rooms, increasing the 236-bed hospital to 294 beds with room for 72 more beds in the future. It will also include a larger pediatric intensive care unit and an expanded Herma Heart Center.

A main concern for Children's Hospital was the design and installation of an exterior façade that would not allow moisture or condensation to form within the building. Any breakdown in the assemblage could allow warm air to enter the building and condense in the wall cavity, leading to deterioration of building envelope components, increased energy consumption, a negative impact on the indoor air quality. If the problem proved systemic, the result could be catastrophic. The owner wanted the potential for rework to be taken out of the picture and a guarantee that this building would last 50 to 100 years under even the most extreme conditions.

Shepley Bulfinch Richardson & Abbott has a reputation for the design and construction of high-performance, sustainable building envelope technology and Oscar J. Boldt Construction's Enclosure Quality Management (EQM) Program provided the owner a top-of-the-line system for commissioning of the building envelope. The bedtower design incorporated curtain wall with six-story spans along with projections and recessions in the wall and a continuous vapor barrier, which is becoming essentially an imperative for hospitals. The areas where the dissimilar materials of the curtain wall and various adjacent wall assemblies connect are areas of dynamic movement and areas where multiple installers normally become involved. Maintaining control at these intersections to avoid moisture infiltration and the potential for mold growth was paramount.

Their requirements going forward were for:

- a continuous building envelope solution that would allow flexibility where the curtain wall intersected with the precast and that would withstand the differences in air pressure on both sides of the wall
- a single-source solution was preferred to ensure assignment of responsibility and avoid any finger-pointing in the event of problems
- a solution that would virtually eliminate the guesswork and increased potential for risk
- a solution that would afford increased design flexibility, allowing greater movement and deflection beyond what sealants can provide with varying geometries
- a durable, long-lasting solution



Children's Hospital of Wisconsin, *West Tower Expansion* ...continued

Solution: The new patent-pending Proglaze® ETA Engineered Transition Assembly which was in development provided the solution to meet these requirements. Though it can be installed in the shop or the field, it would have been too difficult in this instance to install the complete product in the curtain wall manufacturer's shop due to the long spans and potential issues with protecting the silicone membrane during shipping.

The building's design included a variety of geometries, which created difficult intersections of the window systems and adjacent wall assemblies. With a job of this scope, providing an adequate, durable, consistent connection with a sealant would have been virtually impossible. The Proglaze ETA system eliminated the opportunity for applicator variations. The system's Extruded Aluminum Adaptor was installed in the curtain wall manufacturer's shop. The adaptor is supplied with Tremco 440 Tape pre-applied on the backside, so the protective release paper was removed and this butyl tape was used to adhere the adaptor to the mullions before mechanical fasteners were installed, also serving as a thermal break. In the field, Tremco's Spectrem® 1 Silicone Sealant was applied into the pre-engineered race in the Extruded Aluminum Adaptor and an additional bead was applied onto the adjacent mullion of the window frame to ensure a strong bond between the Silicone Rubber Extrusion and the window system. Once the lock-in dart of the Silicone Rubber Extrusion was inserted and pressed into the adaptor's race, the extrusion was then placed over the adjacent bead of sealant on the mullion and rolled with a seam roller to ensure a tight, continuous seal with this three-point mechanical bond.

At the lap joint between the Silicone Rubber Extrusion and the Silicone Rubber Corners, a sealant connection of one inch was required to provide a secure bond and long-term seal. Again, a seam roller was used to ensure firm, continuous contact throughout the length of the seal. The ribs on the silicone extrusion create the proper amount of space to allow for the correct amount of sealant to be applied in order to maintain the incredibly strong bond between the Silicone Rubber Extrusion and the adjacent materials. The extrusion's translucent nature allowed visual inspection to confirm sealant was installed where it needed to be, no areas were missed, and sufficient sealant had been applied.

Tremco's ExoAir™ 110 Self-Adhered Air & Vapor Barrier Membrane was used on the adjacent metal panel backup wall and Tremco's Silicone Rubber Extrusion was the primary air and vapor

seal between the ExoAir and the curtain wall system. To ensure its compatibility and long-term air and moisture protection when used in conjunction with the ExoAir Air & Vapor Barrier Membrane, Proglaze ETA was tested at Architectural Testing Incorporated.

Proglaze ETA also allowed greater control and efficiency during the construction process with enclosure being achieved more quickly. The first five floors of the structure could be erected, sealed off and waterproofed, allowing for the interior buildouts to begin sooner. With all the components for transitions provided from one supplier, installation of the connections and quality control was simplified. Coordinating concurrent work by a variety of subcontractors was minimized.

To ensure the performance and the quality of the field installation, Children's Hospital built and tested a full-scale mockup of the curtain wall and adjacent exterior wall systems. A total of 17 different tests were performed at Architectural Testing laboratories in York, PA to determine how well the transition assembly would be able to withstand water penetration, thermal changes, load deflection and to measure air infiltration. To ensure the lessons learned from the mockup were followed during the actual construction on-site, over 40 independent field tests were performed, all with excellent success. These site tests included:

- ASTM E1105-00 Standard Test Method for Field Determination of Water Penetration of Installed Exterior windows, Skylights, Doors and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference.
- AAMA 501.2-03 Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems"
- AAMA 503-03 Voluntary Specification for Field Testing of Storefronts, Curtain Walls and Sloped Glazing Systems

With the cost of building and outfitting the bedtower at more than \$165 million and a critical need to provide the expanded facility for the community, success of the project was mandatory. Proglaze ETA eliminated many factors that contribute to potential problems on jobs such as: overreliance on sealants alone to provide waterproofing integrity, varied construction sequences, multiple subcontractors, improper or inconsistent detailing and incompatibility of components. With this new approach to sustainable building envelope design, the project team has confidence that a significant step has been taken toward providing a higher standard in healthcare environments.

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