TREMCO®
Commercial Sealants & Waterproofing

Parkland Hospital

Location:
Dallas, Texas

Architects:
HDR + Corgan

Construction Manager:
BARA
Balfour Beatty Construction
Austin Commercial
H.J. Russell & Co.
Azteca Enterprises

Specialty Consultants:
Wiss, Janney, Elstner Associates
McFarquhar Group
Conley Design
ATI

Window Fabricator:
Win-Con Enterprises

Tremco Sustainable Building Solution:
Proglaze® ETA
Engineered Transition Assembly
ExoAir® 230 Fluid-Applied Vapor-Permeable UV-Resistant Air Barrier Membrane
ExoAir® TWF Thru-Wall Flashing
Proglaze® II Structural Silicone Sealant
Proglaze® SSG
Structural Silicone Glazing Sealant
Tremco Gaskets
Spectrem® 1 Silicone Sealant
Spectrem® 2 Silicone Sealant
Spectrem® 3 Silicone Sealant
Tremflex 834
TREMproof® 250GC Cold Fluid-Applied Elastomeric Waterproofing Membrane
Tremco Drainage and Protection Course

Challenge: Engineering Performance into SYSTEM Specifications

The integrity of the building enclosure plays an integral role in the ability of a hospital to truly be considered high-performing not just the day it opens its doors but for the decades to come. Any gaps not addressed or detailed in a comprehensive way open the door to the promotion of airborne infections, patient discomfort, escalating maintenance costs, increased operating costs from energy inefficiency and ultimately, a lack of sustainability. As Parkland Hospital in Dallas, Texas planned the construction of its replacement hospital, projected to be the largest public hospital building in the nation built in one phase at nearly two million square feet, its attention to detail holds promise of contributing to enhanced patient outcomes.

A joint venture between Omaha-based HDR and Dallas-based Corgan has been responsible for this massive endeavor including the hospital and site planning. Construction of the new hospital was executed by a four-way joint venture called BARA, an acronym for Balfour Beatty Construction, Austin Commercial, H.J. Russell & Co. and Azteca Enterprises.

With a project of this magnitude, the team also involved numerous specialty consultants including Wiss, Janney, Elstner Associates, McFarquhar Group, Conley Design, and ATI. The objective was to create a healthcare facility with a 50+ year lifespan to serve generations to come. This team of experts would need to act as one cohesive and collaborative group with the interaction serving as a catalyst to spur the most advanced and innovative thinking in healthcare facility planning while testing design concepts and ideas. The hospital also targeted at least LEED-HC and LEED-NC Silver as objectives for the project. The LEED-HC rating system is the first of the LEED rating systems to include a prerequisite for integrated project planning and design. Research has demonstrated that green health care facilities lead to faster healing, shorter hospital stays, and fewer return visits.

Bridging the Gap in Healthcare Construction

Parkland Hospital *...continued*

BUILDING ENVELOPE PROJECT REQUIREMENTS

Several key imperatives were defined as critical to success of the project:

Compatibility: A prerequisite of all components within the building envelope that would abut, adjoin or overlap to ensure continuity at transitions was **compatibility**. Simply specifying an air barrier membrane is not sufficient. Codes do not indicate how to achieve a **holistic, continuous system**, and the details must be thoughtfully considered by the design professionals or otherwise left up to interpretation at the jobsite. If attention isn't paid to the compatibility of the components within an air barrier system, an inappropriate sealant may be installed at a job site and in conjunction with all types of air barriers, weather barriers, and self-adhered membranes and flashings. This can be a recipe for disaster.

Spanning Capabilities: While many connections are critical, window-to-wall connections are where most problems occur. Just one small gap can lead to air and moisture infiltration, so the ability to "span the gap" or make transitions from the window frame to the wall substrate without the need for any secondary or continuous support was an absolute requirement.

Flexibility: Maintaining continuity at moving joints is particularly difficult, especially since many contemporary designs incorporate complex geometries requiring greater movement in different directions and varying magnitudes. Traditional sealants and flashings cannot always accommodate the larger gaps resulting from progressive designs incorporating multi-directional planes, multiple projections and recesses, large curtain wall expanses, and dissimilar materials which may not be capable of withstanding the dynamic movement incurred. In addition, field conditions include acceptable deviations (tolerances) resulting in any number of irregularities from the designed condition which must be accommodated. The use of "peel-and-stick" membranes at these complicated transitions would not be acceptable.

Durability: The air and weather barrier on the building enclosure must therefore be able to survive the construction process and anything with sharp edges such as tools, masonry, metal panels, particularly at unsupported transitional areas. Peel-and-stick membranes which typically consist of a 4-mil carrier sheet over +/-35 mils of adhesive would contribute to system integrity in supported conditions, but would present the potential for problems in the myriad of unsupported conditions throughout the project.

Design Support: Building envelope integrity should be a design consideration in the earliest stages of any project. Assigning responsibility for components to a single source where feasible helps maintain control, eliminate risk, and facilitate the process. It also helps ensure the appropriate solution (and application sequence) is specified and eliminates any gaps that may be left to guesswork or interpretation down the line. The air and moisture management supplier should be included in the shop drawing reviews, development of workable solutions adaptable to field conditions, review of project specifications, evaluation of connection points and compatibilities, as well as on-site support including testing protocols.

ENSURING PERFORMANCE IS DESIGNED IN

"When designing for healthcare, the options are limited when it comes to supporting a sterile environment," noted Chris Johnson, director of technical design services at Corgan. "It is mandatory to design the most robust facility possible to manage air and moisture vapor infiltration. This project was a huge collaborative process. For two years, the owner, architect and the construction manager co-located to promote a closer collaborative environment in terms of the development of the project and ensure the products and systems utilized were what we all thought were the best."

"Before putting material on the building, we had to have actual performance verification. The mockup was massive and included glazing, composite panels, studs, sheathing, the air barrier system," he added. This allowed the constructability to be verified as well as the performance while providing the contractors with the opportunity to get comfortable with the products and systems used and the detailing requirements. It also permits the architect and the manufacturer to review, critique and troubleshoot the installer's work if the AAMA 501.1 water test should fail.

With the industry's most comprehensive offering of products from the foundation to the roof, **Tremco Commercial Sealants & Waterproofing** was able to meet all the building envelope project requirements while providing uncommon collaboration and support that would make it an active participant on the team and designate its air barrier system, including engineered transition assemblies, as the basis-of-design for Corgan's air barrier system specification. Critical to the design of Parkland Hospital, Tremco's singular approach to the project also included glazing system solutions, below-grade, and coating solutions.

Tremco's vast offering of products and systems — including air barrier systems, glazing systems and transition assemblies, traffic coatings, waterproofing and sealants — are formulated and tested to ensure

Uncompromised Performance Within the Glazing System

Long a market leader in the design, development and manufacture of glazing products for commercial construction, Tremco is the only supplier in the industry offering a complete line of glazing sealants and compatible gaskets, tapes, spacers and blocks.

To ensure performance, glazing systems also need to be designed as a complete and unified assembly. The custom unitized four-sided structurally glazed wall system at Parkland Hospital incorporated the same single-source approach to ensure success. The window fabricator, Win-Con Enterprises, used Tremco's two-component Proglaze® II Structural Silicone Sealant because of its high performance properties in conjunction with the appropriate glazing gaskets and spacers developed by Tremco's design engineers. Spectrem® 2 Silicone Sealant was then applied in the field as a weatherseal.

In addition to Tremco's extensive experience in design to accommodate the movement of various materials and other performance requirements, field support and on-site inspections for proper integration and detailing were key requirements on the project. Shop drawings today require manufacturers' representatives to provide job-specific details and to respond quickly when assistance is needed on-site. Tremco's field sales representatives are experienced company employees with ongoing training to assist customers in every major market around the country.

All structural glazing projects require a complete review of project details and adhesion or compatibility, but projects like these take on another whole dimension. Structural glazing details for the job along with elevations and wind-load information are evaluated so that calculations may be done for sealant contact depth and approved bead size. Samples of all substrates the sealants will be applied to for assurance of adhesion, weatherability and durability, as well as aesthetic implications over the long term are tested and evaluated. Effectiveness depends on how well the structural loading and thermal movement can be held by the sealant between the glass and metal surfaces.

superior performance and compatibility. Understanding that the quality of the entire building envelope will determine a building's functionality and lifespan, Tremco has committed significant resources to developing superior technology and integrated systems that provide true solutions to the most troublesome gaps in building protection.

Tremco's Proglaze ETA Engineered Transition Assembly was able to span the gap needed to accommodate the combined thicknesses of the continuous board insulation and limestone veneer to assure continuous, compatible performance between adjoining assemblies.

Tremco is the only company able to provide a comprehensive air barrier system, including fluid- and sheet-applied membranes, thru-wall flashings, primers, termination mastics, high performance silicone and urethane sealants and transition assemblies. Tremco's Proglaze® ETA is a patented transition assembly composed of pre-engineered, finished aluminum and silicone materials that are mechanically attached to the window and/or wall's structural framing to insure a durable connection and seal.

"We like to specify Proglaze ETA as part of the air barrier system, whether self-adhered sheet or fluid-applied, in Section 072713 or 072726, respectively," stated Johnson. "Our logic is two-fold. First and foremost, we have confidence in the single-sourced, system approach as indicated in our building envelope requirements. The best way to specify a 'system' is to put the entire system within a single specification. Consequently ALL components of the system are subject to the same performance criteria required for the entire system.

"Secondly, the OTHER transitional components of the air barrier system are specified within this section, so it makes sense from a consistency perspective. Self-adhered sheets (up and over copings) and spray foam (for thermal envelope continuity in cracks) still have their place within the system, so we feel the Proglaze ETA should be treated no differently. However, we do specifically say in the 'Accessory' article of the specifications that Proglaze ETA is to be used 'at the door and window openings'. Before the introduction of Proglaze ETA, there were no good solutions to deal with field irregularities and conditions like offsets in plane between window and jamb."

In addition to Tremco's tested, proven products and assemblies, Tremco was able to provide active design support. On the Parkland Hospital project, the curtain wall had been extended far outboard of the studs and sheathing due to the combined thicknesses of the continuous board insulation and limestone veneer. The insulation was two inches thick, plus an inch-and-a-half air space, then three more inches for the limestone. The challenge was how to span the gap and assure continuous, compatible performance between these adjoining assemblies.

In order to provide continuity of the air and weather barrier in a structurally sound and durable manner, the Tremco team required a minor shortening of the head and sill lentil to accommodate the corners, shimming and anchoring adjustment and final selection of the Proglaze ETA components, which included 3D molded corners.

"I don't know how we would have done it without Proglaze ETA," noted Johnson. "The Proglaze ETA provided adaptability for the not-so-square

Parkland Hospital *...continued*

field conditions, and the system provides at least three different ways to attach to the glazing system. It is truly an engineered solution that Tremco was able to tailor to the conditions unique to the project."

Tremco's involvement continued at every stage with every party on the team. Three-dimensional animations detailing the components at each step helped the team to visualize the solution being proposed but also served as part of the QA/QC process for the construction team. This provided a visual inspection tool and guide for the construction manager and subcontractors on proper sealing of the Proglaze ETA, membrane continuity, proper lapping and detailing as well as sequencing.

Comparing exposure timeframes of the windows with the architect also determined that the air barrier could be exposed for extended periods, leading to the selection of the ExoAir® 230 Fluid-Applied Vapor-Permeable, UV-Resistant Air Barrier Membrane which is formulated to include UV resistance. Where seasonal temperatures experience drastic changes from very cold, winter months to very hot, summer months and where seasonal moisture variation is high, a vapor-permeable system will seal the walls from air infiltration and exfiltration while allowing water vapor molecules to pass through so they do not get trapped within the wall. One of the first areas of product application was left exposed over eight months before the follow-on trades were able to cover it.

Providing continuity throughout the building envelope layers of protection is imperative for control of air and moisture infiltration.

The selection of ExoAir 230 also helped the construction manager to dry in the building faster and more efficiently. This allowed the finishes on the interior to be on their own path, streamlining the sequencing and coordination of trades.

Final field quality control and testing included adhesion testing (ASTM D4541) on the actual membrane itself to ensure adherence to the substrate was consistent with the manufacturer's requirement. System pressurization (ASTM E1186) was also done to look for leaks at the details and transitions.

CONTINUITY OF THE BUILDING ENVELOPE REQUIRES A HOLISTIC APPROACH TO CONSTRUCTION

Bridging the gap from effective design to proper operational functioning requires old practices to be challenged. "Energy codes are increasing the design and construction requirements. We must design the most robust facilities possible," noted Johnson. "Healthcare gets it. We are looking at systems instead of products. New initiatives have permeated the architectural community and we are thinking more holistically. Today, the basis-of-design in our air barrier specifications includes an engineered only transition as an accessory. Now, we are working to ensure that everyone draws this type of transition in their details."

The traditional definition of the team today is being extended as in the case of Parkland Hospital to include building product manufacturers capable of providing more advanced, sustainable construction practices, documented performance of new technologies, critical solutions designed to respond to increasing demands of the application, and field support to help ensure success. Additionally, when it comes time to develop shop drawings, the manufacturer is an active participant in developing workable solutions that are adaptable to field conditions.

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