

**Location:**

Raleigh, North Carolina

Architects:

BBH Design

Construction Manager:

Brasfield & Gorrie, LLC

Wall Cladding/Enclosure Contractor:

SECO Architectural Systems, Inc.

Caulking Contractor:

Waterproofing Specialties, Inc.

Glazing Contractor:

SPS Corporation

Tremco Distributor:

Kenseal Construction Products

Tremco Sustainable Building Solution:ExoAir® 220 Fluid-Applied Vapor-Permeable
Air Barrier MembraneExoAir® 110 Self-Adhered Air and Vapor
Membrane

Spectrem® 1 Silicone Sealant

Spectrem® 2 Silicone Sealant

WakeMed North Hospital

Challenge: Raising the Bar - Hospital Expansion Streamlines Approach to Ensure Enclosure Continuity

Hospital expansions happen all the time. Three additions and an expansion vertically all at the same time while an existing facility is doing day surgeries and operating a 24-hour emergency service creates increased challenges for the design and construction team. When you strip the skin off the building and remove windows, the exposure can be tremendous – particularly when it goes on for months at a time and through the winter months. Standard practices or the way things have been done for decades just won't suffice. Surprises just won't be acceptable. Critical care functions and patient comfort cannot be compromised.

WakeMed North Healthplex in Raleigh, North Carolina has been transformed into a full-service hospital with a 131,000-square-foot expansion and an 8,550-square-foot central energy plant being added to an existing 109,250-square-foot complex. A five-story, 61-bed acute care expansion will focus on inpatient women's specialty services, offering a full range of obstetric and gynecological services including comprehensive preventive, diagnostic and therapeutic care. These new WakeMed North Hospital services have been added to the facility's existing emergency department and outpatient surgery, rehabilitation, imaging, lab and physician services.

The joining of the old with the new represented two completely different worlds colliding. BBH Design, a sustainable architectural design firm specializing in healthcare and education, faced



SECO Architectural Systems provided a comprehensive approach to the building enclosure including a continuous Tremco air barrier system behind the metal panels, which added moisture control and waterproofing while ensuring the integrity of the wall assembly.

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the challenge of ensuring continuity throughout the building enclosure during the construction process and for decades to come. Not only was the challenge to transform this medical complex built in 2001 into a high-performance, full-service medical institution, but to pursue LEED Gold under the LEED for Healthcare (LEED-HC) program. The LEED-HC rating system is the first of the LEED rating systems to include a prerequisite for integrated project planning and design for healthcare. Research has demonstrated that green health care facilities lead to faster healing, shorter hospital stays, and fewer return visits.

HOLISTIC APPROACH TO ABOVE-GRADE WATERPROOFING SYSTEM USED TO ELIMINATE POTENTIAL FOR PROBLEMS, ENSURE ACCOUNTABILITY

In the early stages of the project, fees were negotiated and Brasfield & Gorrie was hired to manage the budget. Brasfield & Gorrie is one of the nation's largest privately-held construction firms and consistently ranks among the top healthcare contractors. As often occurs, however, it was determined a couple of years into the project that costs had to be reined in a bit and the value engineering began. "We knew that we had to be extremely careful with the skin of the building. The owner still had to get a quality waterproofing system, and we were not willing to compromise," noted Allison Crabtree, assistant project manager at Brasfield & Gorrie.

"Anytime we can get one firm to be responsible for more things, it helps ensure the building is watertight," she added. "One contractor, one manufacturer is an important factor. Our biggest concern is that even if we have one contractor using products from two manufacturers, we may have problems. With SECO Architectural Systems, we were able to get that blanket relationship with the metal panels, waterproofing and air barrier which eliminates the finger pointing in the event of a problem."

The metal wall panels were integral to the design of the expansion project. SECO Architectural Systems, Inc. is the Southeast's largest wall panel contractor, engineering, furnishing and installing virtually any kind of wall panel system. Particularly with the new energy codes established in recent years in North Carolina, so many customers had been asking for the air barriers behind the metal panels that adding moisture control and waterproofing services seemed a natural extension. "This allowed us to provide an attention to detail that is head and shoulders above what is available in the industry today," explained Tom Wilson, division manager, moisture control at SECO. "We know these details inside and out, so there are no surprises."

This also allowed SECO to be involved very early on at the design development level. "It was important to be collaborative and

set expectations early. We needed subcontractors who really understood the job so they were involved pre-bid, planning how to remove the skin. Tie-ins to the existing building posed a challenge. We knew we were going to be tying into two different systems at least with a third," said Crabtree.

Even though mockups were built on-site, noted Ryan Wilborne, Architect at BBH Design, there is no test that can predict the tie-in complications when attempting to get continuity between new fluid-applied air barrier membrane technologies and existing



The single-source approach helped to ensure the continuous control layers mandatory for a high-performance building. The air barrier was rolled on, the rough openings were wrapped, and the fenestrations were sealed by people skilled at the use of those products and without compatibility challenges.

building wrap technology that has dried over the years and become brittle. This situation required collaboration with all parties involved to make sure that all challenges were thoroughly flushed out. Everything had to be planned and sequenced so that there was absolute clarity – everyone knowing what they are supposed to be doing.

SECO's single-source approach included above-grade air and moisture control and waterproofing products from Tremco Commercial Sealants & Waterproofing. Tremco was the only company able to provide a comprehensive air barrier system. Some manufacturers do not even warranty the use of their own sealants with sheet membranes. With Tremco, that would not be a problem. Tremco has fluid- and sheet-applied membranes, thru-wall flashing, primers, termination mastics, high performance silicone and urethane sealants and transition assemblies that have

Uncompromised Control and Streamlined Approach Ensure Peace of Mind

The materials and technology used in hospitals and wellness centers must be considered on a deeper level since they serve a population that is highly susceptible to infections and sensitive to noise, temperature, humidity, and air leakage. The single-source approach helped to ensure the continuous control layers mandatory for a high-performance building. “We did not have to deal with multiple installers and multiple product manufacturers,” noted Wilborne. “The air barrier was rolled on, the rough openings were wrapped and the fenestrations were sealed. We had peace of mind that everything was done quickly by people skilled at the use of those products and without compatibility challenges. The building was watertight and UV stable for an extended period of time prior to cladding installation.”

In order to create a high-performance facility that would help to mitigate airborne infection and maintain patient comfort while increasing energy

efficiency and reducing maintenance requirements, continuity and compatibility of components was essential. “Trial and error” increases risk. If detailing and connectivity solutions have not been put to the test to ensure performance during high winds, wind-driven rain, seismic or dynamic movement and more, it may only be a matter of time before air and moisture vapor begin to infiltrate the facility and lead to drafty conditions, the potential for mold and mildew, an increase in heating and cooling costs and much more. “We’re not willing to take risks, particularly with a \$53 million hospital extension,” stated Crabtree. “It is important to us to maintain our client relationships. Many of our current projects are with repeat clients like WakeMed.”

“We push mockups as a firm because it helps to test the details and sequencing and ensures challenges are flushed out thoroughly,” commented Wilborne. “The mockup at WakeMed North went through

multiple AAMA water tests. We strive for clarity with our building enclosures. There cannot be any gaps in our control layers and we want confirmation our details will perform as intended.”

That continuity depends on eliminating the potential for any gaps in design, detailing, installation, product and system compatibility. That continuity of the building enclosure provides the promise of a new high-performance institution dedicated to protecting the health and well-being of all those who enter its doors. With the addition of a full complement of women’s services, a grand opening on Mother’s Day 2015 was only fitting.

been formulated and tested to ensure compatibility . . . and long-term performance. Air barriers are only effective when designed



Tremco’s ExoAir® 220 Fluid-Applied Vapor-Permeable Air Barrier Membrane has been applied to the wall of the extension and ExoAir® 110 Self-Adhered Air and Vapor Membrane at the door opening. The brick tie bases have been installed, and SECO has started installing the mineral wool insulation.

as a holistic, continuous system. Simply specifying an air barrier membrane is not sufficient. Codes do not indicate how to achieve an air barrier system, and the details are left up to interpretation

at the jobsite. If attention isn’t paid to the compatibility of the components within an air barrier system, a single sealant may be installed in all joint openings and in conjunction with all types of air barriers, moisture barriers and self-adhered membranes and flashings. This can be a recipe for disaster.

“The sheet-applied air barrier membranes are polyethylene-faced and can pose a challenge for adhesion with silicone sealants. We have come across manufacturers in the industry who say there won’t be problems with their sealant adhesion – that is until you talk with their technical engineers, and the story changes,” noted Wilborne. “We have experienced adhesion issues even after obtaining letters of compatibility, particularly when it comes to the transition strips adhering to other products.”

Continuity is also critical. If a breach occurs in the building envelope, the amount of water carried through that opening from vapor diffusion may be 30 to 40 times greater than what 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 rusting and degradation of structural supports and other water-sensitive materials. Costly removal of exterior cladding may eventually be required to find and correct the leak.

In addition to loss of adhesion or degradation of the air barrier membrane from incompatible materials, breaches may occur from screw heads that have not been sealed effectively or transitions or penetrations from subsequent trades that have not been sealed. The single-source approach presented by SECO on the WakeMed North Hospital was embraced by the owner as well as the design and construction team to ensure performance and

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accountability. It allowed more extensive upfront planning so that the detailing provided could go beyond standard practice in the industry, issues could be addressed before the project even began, and trades could be provided with project-specific training actually working with the materials to be used.

On WakeMed North Hospital, Tremco's ExoAir® 220 Fluid-Applied Vapor-Permeable Air Barrier Membrane, ExoAir® 110 Self-Adhered Air and Vapor Membrane and Spectrem®1 and 2 Silicone Sealants comprised the above-grade system. ExoAir 220 is a vapor-permeable system that will seal the walls from air infiltration and exfiltration while allowing vapor molecules to pass through, so they do not get trapped within the wall. Though a vapor-permeable air barrier system may be used in many cases in the hope of ensuring success of the job, a poorly constructed system will not compensate for moisture transported through a breach. Wall components may not be able to dry out quickly enough to prevent damage from moisture accumulating within the wall.

The fluid-applied air barrier also provided tremendous flexibility, noted Crabtree. There wasn't a lot of draping of tents. "If the existing skin of the facility needed to be repaired, it could be done fast enough so if it rained next day, we were good to go," she



By providing the metal panels, waterproofing and air barrier, SECO Architectural Systems was able to ensure an attention to detail that would eliminate any surprises and any finger pointing in the event of a problem.



Spectrem 1 Silicone Sealant made it easy for installers to provide a secure seal for dynamically moving joints at aluminum curtain walls and window perimeters, metal panels, and the polyethylene-faced self-adhering air barrier membrane.

added. "The fluid-applied membrane dried quickly and was ready for the next weather event." Another consideration with WakeMed was the UV stability of the air barrier utilized since it would be exposed for six months or longer.

Spectrem 1 and Spectrem 2 Silicone Sealants were utilized at the fenestrations, louvers and metal panels. Three different colors were used, depending on the application. Spectrem 1 is ideal for sealing the most demanding dynamically moving joints including material having a high coefficient of linear expansion such as aluminum curtainwalls, precast concrete panels, metal panels and window perimeters. It also has excellent adhesion to most polyethylene-backed self-adhering air barrier membranes. The glazing contractor had "absolutely no hesitation" at using the Tremco silicone as they used it frequently and considered it "one of the best." "The curtainwall sits far out on the skin system, making the transitions really important. The Spectrem silicone sealants passed all the water tests of the mockup and made it easy for the metal panel and glass installers," remarked Crabtree.

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