Let the Pressure-Equalized EIFS Panels on Seaside High-Rise Solves Chronic Leaks

Capri Condominiums in Ocean City, Md., typifies a growing trend of total renovations, interior and exterior, coming about due to a large class of the earliest condos, developed in the mid-1970s.

As an oceanfront development, the Capri joins a subset of condos with more challenges than just old age. Along with the high winds and driving rains of the regions nor’easters, in recent years hurricanes have been hitting our East Coast and exposing major problems with weather tightness in exterior walls. Chlorides from the ocean air also attack and corrode these buildings, Solutions to these problems are becoming more urgent as these building age.

Renovations to the Capri high-rise came in response to problems very common to condos and persisting since 1974 when the building was first constructed.

Numerous contractors had been hired, and the owners’ association was stuck in an endless cycle of continual exterior maintenance of the building, spending more money and getting shorter service life from attempted solutions. The exterior wall was corroded, deteriorated and leaking severely, with extensive water damage to the interior.

The typical condominium tower presents many different places for wind-driven water to enter the wall: windows, balcony slab and doors, air transfer grilles, exhaust vents, along with cracks aggravated by aging. The Capri owners’ association was spending $45,000 per year to coat and caulk the 21-story building. In 1995, they determined to find a radical, low-maintenance solution that would last substantially longer than previous solutions.

By Tom Robertson

Pressure-Equalized Rain Shield Design

Architect David L. May Jr., AIA, convinced the condo association to try his solution to eliminate water infiltration on
the seaside high-rise: the Pressure Equalized Rain Shield Design, consisting of prefab EIFS panels developed specifically for high-rise retrofit.

The PERSD system as applied on the Capri is the result of a collaboration between the architect and Mastech Construction and Interiors, Inc. of McKees Rocks, Pa.

A noted expert on water infiltration solutions and wind-resistive design, May, then founding partner of CMSS Architects, advises homeowners and condominium associations in hurricane preparedness, and in the evaluation, investigation, repair and remodeling of their buildings.

The PERSD system is based on the pressure-equalized technology developed in Canada for new construction, the only solution to successfully combat severe problems there with ice expansion in walls. Capri is the first high-rise in the eastern United States to retrofit with a pressure equalized exterior, May says.

The $2.5 million exterior renovation was completed in July 1997. Since then, the building has successfully resisted all weather, including two near-hurricane-level nor’easters last year, with 12 to 15 hours of high winds and heavy rains, and plenty of opportunity to push water into the cladding. Around town, buildings sprang new leaks. At the Capri, Carol Wolitsky, general manager of Capri Condominiums Council of Unit Owners, Inc., got not a single complaint.

Fighting the Wind

The difference between the Pressure Equalized Rain Shield Design and the typical single width wall, explains May, is analogous to the difference between wrapping yourself tightly with a raincoat and shielding yourself in a rainstorm with an umbrella. Inside the raincoat, you will get wet from any openings to the weather. With the umbrella, though, you are protected even though you are exposed underneath.

Cavity walls for new construction have been around for a long time, May says. To reduce costs in the 1970s, though, developers started eliminating the cavity in walls, leading to major leaks problems with leaks.

The rain screen design re-creates the cavity between inner and outer walls, sheltering the inner wall from driven rain. The pressure-equalized panel, going one step further, makes the concept exceptionally effective on a high rise. Explains May, “It doesn’t matter how fast the wind blows; in fact the harder it blows, the better the system works.”

The outer wall has an “air port,” an air vent through which air enters to equalize the pressure in the air chamber between the two walls. Equalizing the pressure differential neutralizes the exte-
rior force to drive water past the outer rain shield into the building.

Living with Leaks

The key to realistic solutions to water infiltration on high-rise condominium construction or renovation on the sea front and in damp climates is anticipating and providing for leaks in all exterior wall surfaces. On the oceanfront, wind speeds can reach 100 mph funnelling between high-rises. The amount of horizontally driven rain cascading down over the lower wall surfaces may actually exceed the amount that falls on the roof.

The PERSD system anticipates leaks and providing drainage redundancy against any infiltration, as May explains, “like a belt and suspenders.” Drainage EIFS isn’t required because the panels themselves are totally sealed at their edges. The rain shield formed by the EIFS panel then creates a void, not affected by wind and elements, where water can fall straight down.

The system integrates a rubber flashing membrane, which seals each individually pressurized air chamber at the attachment, and provides back-up water protection. Any water that could possibly enter the air chamber seeps to the rubber and is directed immediately out through bottom weep holes.

In addition, if there’s a leak on the 18th floor, it is isolated to that particular panel. Notes Mastech’s George Hric, “It’s an insurance policy against mystery leaks.”

Freedom from Caulking Cycle

The PERSD system presents a radical change away from reliance on the integrity of caulking, the basis of the conventional response to water infiltration.

The renovation team told the owner that caulking the new exterior was unnecessary, May says. Allstates Construction of Ocean
View, Del., who was responsible for coating existing precast concrete panels and for caulking, offered the owners’ association a $38,000 credit not to caulk. The management opted to caulk the building nevertheless. Explains manager Wolitsky, “We knew it would be simpler to caulk than to explain to 222 unit owners why it wasn’t necessary.” There was a storm, though, before any caulking was done, after panel installation. The uncaulked panel system passed a severe test without a leak, thanks to pressure equalization.

Because materials that are mixed and trowelled into place on site are more susceptible to the environment during construction, as well as more difficult to inspect and repair, prefabrication of panels provides a significant advantage for high-rise condominium renovation, particularly on waterfront properties.

Each panel for the Capri renovation was assembled in a jig in Mastech’s panel shop. The panels, which are 8 feet, 9 inches wide by 20 and 27 feet long, are sheathed on 5/8-inch Dens Glass Gold®. All attachments of studs and tracks were welded, and all welds are cold galvanized.

Because of the climate conditions, and because some panels are adjacent to balconies on rental properties, a more wind- and abuse-resistant system was required. May specified Parex I-C Silver, a flexible PM EIFS, for twice the impact- and weather-resistance of PB EIFS. I-C Silver, reports Hric, is “the Cadillac of systems. It’s all I would use for a case like this. We don’t cut corners for a long-term renovation of residential property and homes.”

Applying the EIFS to panels in a controlled environment results in excellent consistency of finish, Hric says. Scheduling for production of panels was easily accelerated and went according to plan. Building site debris and need for on-site storage on a tight condominium site with limited parking were also eliminated.

For the PERSD system, the panels couldn’t be anything but EIFS, according to May, who’s specified EIF systems since 1978. “Of all possible materials,” he states, “it’s a good combination of low weight and low cost.” Lightweight was imperative for the erection and hoisting, as well as for the combined weight capacity of the building.

Hoisting Challenges

While other bidders didn’t think of applying panels because of the hoisting challenge, the project was made possible by resourceful thinking on
May had originally specified a top-down erection to avoid damaging installed panels. Conventionally, a crane is used to pick up the panel and swing it in place. The problem for this project was the danger and difficulty of hoisting a very large panel 200 feet in the air on the ocean-front with wind funnelling between high rises. Mastech came in with new equipment, which opened new possibilities for erecting the panels.

HEK® aerial climbing platforms were used to install the panels, allowing greater safety and ease. Mastech rigged a portable hoist with 250-foot pendant control off the roof to lift the 1,100-pound panels. The hoist is totally operable from the platform at all times. The men on the platforms stabilized the panel between the platform and the building face, and the panels were lifted up the face of the building, with I-beams distributing the weight.

Mastech devised a safety switch similar to a crane anti-two block apparatus so that the load would stop whenever it reached the balcony floor deck. In the original plan called for mounting the attachment clips to the building before the installation of panels. The revised plan called for mounting the clips to each panel and then to the building as the panels were erected.

The existing floor deck was 8-inch precast concrete hollow core planks, rather than solid concrete planks. Each plank has a 5-inch diameter hole running through it. To anchor the panels, the core ends were filled with high strength, non-shrinkable mortar, and drilled. The edges of the plank were then also drilled and filled with mortar. T-angles were bolted directly to the concrete plank through the original half-inch asbestos cement panels. Pins go through slots in the t-angles that are perpendicular to the building, and accept the next panel. Once fastened, the slots in the t-angles allowed adjustment of the panel to level it. Locking screws then set the panel.

May credits Mastech as an integral part of the project’s success. Along with Mastech’s revised anchorage, the architect was pleased with their “extraordinary workmanship” in welding the light-gauge metal, and their understanding of the importance of galvanizing against salt corrosion. While innovative projects can be unpredictable, things went smoothly and scheduling went according to plan, notes May.

All construction was between Labor Day and Memorial Day, in two phases. Capri’s interior renovation, which will complete the full restoration, is slated for this year.

Wolitsky reports satisfaction with the results of the exterior project: “A dramatic improvement in both leak prevention and the appearance of the building.” As for maintenance, with the exception of recoating within the next 10 years, there’s not a thing the association needs to do, May adds.

Two other application of the PERSD system are planned in the near future.

About the Author
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