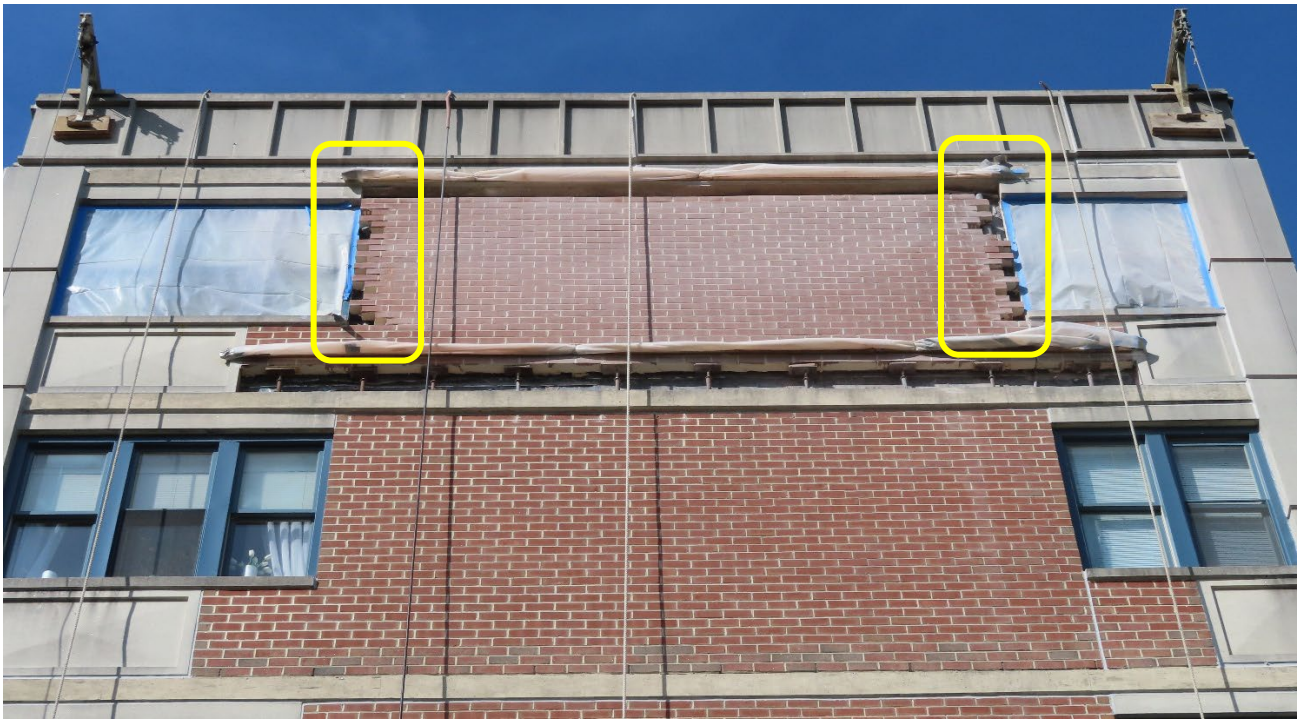
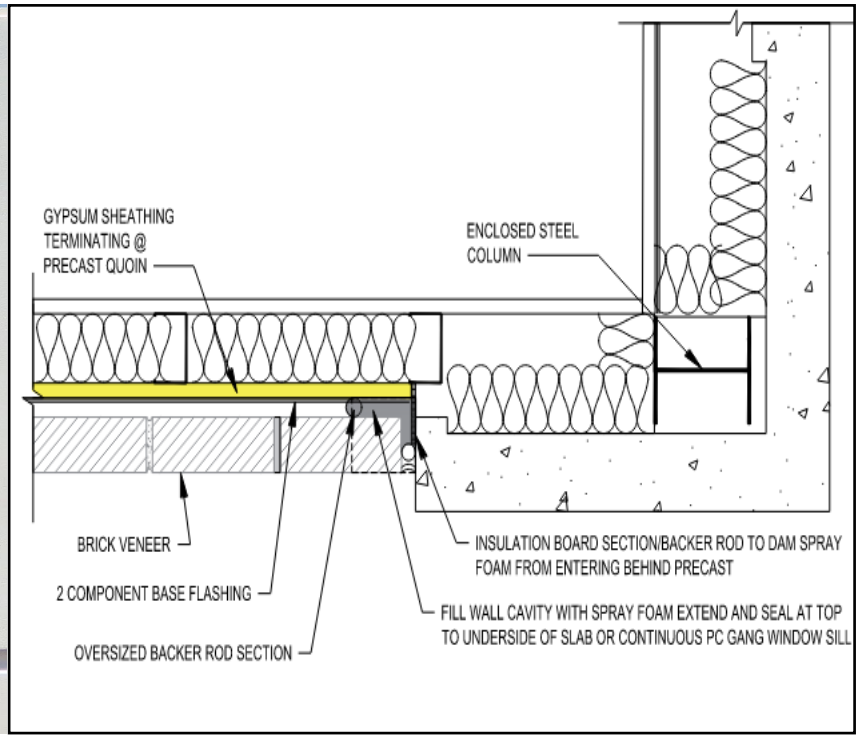
South River Condominium

Forensic Investigation, Design Repairs & Quality Assurance During Repairs



OVERVIEW OF TYPICAL WALL ELEVATION DISPLAYING VERTICAL TOOTHING OF BRICK

CONVENTIONAL VERTICAL BRICK TOOTHING



INNOVATIVE METHOD ELIMINATES BRICK REMOVAL FOR VERTICAL REPAIRS

ALTERNATE REMEDIAL DESIGN REDUCED PROJECT COST BY 30%.

The South River Condominium is a six story multi-family residential structure situated approximately 3 miles west of Annapolis, MD. The project was completed in 1989 and consists of a steel frame with conventional reinforced concrete floor slabs over a single level, below grade parking garage with 32 spaces. The exterior walls are primarily steel studs with gypsum sheathing drainage cavity construction behind the brick veneer. Accent spandrel panels under windows, full height quoins at exterior corners and oversized lintels are precast concrete supported by structural steel to the frame. The precast areas are designed as barrier wall construction and vulnerable without the continuation of the sheathing and WRB.

Challenge:

- The masonry through wall flashing had most end dams omitted and the vertical terminations of the drainage cavities were not isolated from the barrier wall construction. As a result, water traveling downward in the masonry drainage cavity was free to divert past the ends of the flashing at lintels, sills, and top of the slab into the back of the precast where sheathing is omitted allowing direct water infiltration into the unit interiors.
- Between 2008 and when D&A was retained in 2022 the South River Condominium has been subjected to numerous repairs without correcting the source of water infiltration. Some locations had been repaired numerous times over the years by different masonry restoration firms and were still leaking. The consultants and contractors incorrectly assumed the issues were common masonry through wall flashing deficiencies and implemented standard remedial designs without substantiating the actual as-built conditions and therefore **did not recognize that the primary issue was the omitted isolation of the drainage cavity from the precast construction.** Also, by not performing a moisture survey to confirm the specific source locations and patterns **the analysis did not recognize that the deficiencies were systemic** and limiting the remedial scope to scattered locations as inappropriate.

Value Added:

- D&A's technical capabilities, including high end in-house testing equipment, provides accurate forensic analysis and substantiation of deficiencies not identified by prior forensic architects or engineers. Using capacitance testing, a non-destructive method of detecting water up to several inches inside the walls or floors, D&A mapped out patterns of infiltration which identified distinct sources. The consistency throughout units was also consistent with the sources being systemic and not random poor workmanship.
- A detailed borescopic analysis performed at various conditions to substantiate the concealed as-built conditions and specific deficiencies resulting in the infiltration. This was then expanded to substantiate the concealed conditions at a cross-sample of units. This was accomplished with access from balconies and through windows to drill a ¼" hole in mortar joints. This avoided the disruption and high cost of typical masonry probes, which require installing a swing stage in order to remove several square foot sections of brickwork for each test location.
- Conventional Remedial Design Mockup: The entire façade of a top floor unit with water infiltration at multiple conditions was selected for mockup and water testing to determine constructability, effectiveness, and projected costs. The standard/conventional method required removing large amounts of adjacent brick in a toothed pattern to install a vertical separation between the two wall assemblies and jamb of all windows and balcony doors. This vertical separation consisted of backer rod with a 4" wide foam sealant dam extending to the infiltration source or termination of the sheathing (Ex. window/door jamb and precast). This method was more difficult than anticipated as existing mortar droppings often clogged the drainage cavity preventing ease of access for the backer rod to be positioned which led to the removal of additional brickwork. See top and bottom left photos. This work effort, cost, and disruption to residents was disproportionately high compared to the other work and the patches objectively visible.
- Innovative Remedial Mock-Up: D&A developed a innovative repair design that installed a vertical barrier sealing the wall drainage cavity at changes in assemblies and sheathing terminations with a combination of materials that in tandem performed as an enhanced inflatable backer rod in a protective sleeve, extending the full floor height. Once in place a 4" wide foam sealant dam was installed. This eliminated the need to remove any vertical toothing of brick and the associated blemishes and disruption to the residence. Comparing the actual costs of both mockups confirmed that this innovative method was a viable solution and would **reduce total project costs by 30%.**
- Remedial Design Performance: With D&A in-house testing capabilities both mock-up repair methods were each water tested with spray racks substantiating that both remedial designs eliminated all sources of water infiltration.