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## **Sealing the envelope: Integrity of building envelope key to success on historic renovations and additions**

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At the Milton Public Library, in Milton, Mass., G & R Construction of Quincy recently replaced two multiple-level structures that tied into the original three-story library building built in 1904 with a new four-level addition. A major concern was the integrity of the building envelope and the integration of the new modern structure with a historic building while meeting seismic, waterproofing and aesthetic specifications.

"G & R brought a rare set of skills to the expansion of the historic Milton Public Library," said Angela Ward Hyatt AIA, principal, Schwartz/Silver Architects of Boston, "the ability to build complicated ground-up, multi-level construction coupled with the special old-world care and craft necessary for restoring a century-old historic building."

Recently strengthened seismic design parameters require such additions to be built as virtually separate structures, with an expansion joint isolating the two building components.

"G&R was particularly concerned about the three-story expansion joint between the old building and the new construction, from foundation to roof, a particularly vulnerable part of any expansion project. They looked beyond what we had been able to detail for this joint to make sure the envelope was completely secure and the interior connection seamless. And, witnessing first-hand the way they treat their subs with professionalism and respect, it was no surprise that they were able to bring in top-notch artisans that had the special qualifications we requested."

### Renovation is fraught with challenges

Historically significant buildings in New England, particularly libraries, town halls, private secondary schools and college campuses, represent the traditions and reputations of towns and institutions, demanding respect from architects and builders. Few realize that the U.S. National Park Service guidelines for renovations and additions to buildings on the National Register of Historic Places requires new structures to be modern and distinctive from the historic structure. Thus, the restoration and renovation of historic structures is fraught with challenges, involving every discipline of design, engineering and construction.

In Hanover, Mass. for example, G&R teamed with J Stewart Roberts Associates Architects to rebuild the 93-year-old "Carnegie-esque" John Curtis Library, using the original brick and slate structure as the anchoring element for a new and modern facility with two wings flanking a central atrium.

Working closely with Ann Beha Architects of Boston, G&R Construction built a contemporary 40,000 s/f addition to the Needham Public Library's existing 8,000 s/f Georgian Revival style building, originally constructed in 1915. Additions to the library built in 1961 and 1981 were demolished, making way for the new marble, slate and brick-clad structure.

Expansion joints are critical

Most of the problems associated with newly constructed additions that tie into historic structures are caused by the improper design and construction of critical expansion joints, that jeopardize the integrity of the building envelope that separates environmentally conditioned space from rain, wind and temperature variation. Correcting water infiltration and premature cracking once a building is occupied is an expensive proposition, so it's wise to invest upfront in a detailed design that evaluates the condition of the existing building envelope and specifies redundant expansion joint products to properly "seal the envelope".

"Building envelope failures and aggravating and expensive problems that occur most often when the architectural details do not plan for a backup to the exterior expansion joint," said Stephen Wessling, president, Wessling Architects, an architectural firm specialized in building envelope restoration and waterproofing design for historic structures, based in Quincy. "Expansion joints are often overlooked as critical components of the building envelope. They provide for natural settlement of the structure, differential movement, shrinkage and seismic movement, preventing one structure from transferring loads to the other. They also play a major role in preventing water infiltration, insect infestation and worse still, rodents from taking up residence inside the structure."

#### No room for compromise

Wessling says that many building envelope failures can be traced to designers relying on inexperienced contractors to make critical decisions regarding expansion joints. "There can be no compromise on expansion joints," warns Wessling. "Thoughtful planning now can prevent major problems later."

To build a legacy as one of the premier - and competitive - renovation and restoration general contractors in eastern Mass, G&R works closely with each project design team and applies its experience to ensure the integrity of the building envelope.

Ed Dann, business development director, G&R Construction, Quincy, Mass.