NEWSLETTER

GEOTECHNICAL CONSULTANTS INC.

Use of Building Envelope Consulting Practices Can Minimize Rework and Increase Profitability

April 2024

"Rework" is defined simply as modifications and repairs to completed construction work. Rework due to unknown conditions may be unavoidable, but there are steps architects, owners, and contractors can take to minimize avoidable and costly tear-outs and do-overs.

Rework costs Ohio building owners and contractors millions.

The Associated General Contractors of America (AGC) reported that private nonresidential construction spending in Ohio totaled $14 billion in 2022. State and local government construction spending totaled an additional $10 billion.

- Contractors and subcontractors typically budget an extra 5-10% contingency in their contracts to cover errors and unaccounted for issues.
- Separately, the project owner creates an owner contingency fund. "Incomplete plans or owner-directed changes are the leading causes of dipping into an owner contingency fund," according to Alex Benarroche, Associate Counsel for Procore (www.procore.com/library/construction-contingency).

Contingency funds account for as much as $2.4 billion of Ohio commercial construction budgets annually. While certainly not all contingency spending is attributed to rework, rework is a significant hit to contractors' profitability and project schedules.

Contractor Profit Reduced by 28% Due to Rework

In the first longitudinal and in-depth study of rework costs in construction published in the international journal Production Planning & Control, researchers reported:

"Based on a sample of 19,605 rework events derived from 346 construction projects delivered by a contractor between 2009 and 2015, it was revealed that their mean yearly profit over the period of analysis was reduced by a staggering 28% due to rework."

Love, P. E. D., Smith, J., Ackermann, F., Irani, Z., & Teo, P. (2018). The costs of rework: insights from construction and opportunities for learning. Production Planning & Control, 29(13), 1082–1095. https://doi.org/10.1080/09537287.2018.1513177

Use Building Envelope Consulting (BEC) practices to reduce rework costs.

The top causes of rework include:

- Design errors and misinterpretation
- Quality and specification compliance issues
- Design changes requested by the owner

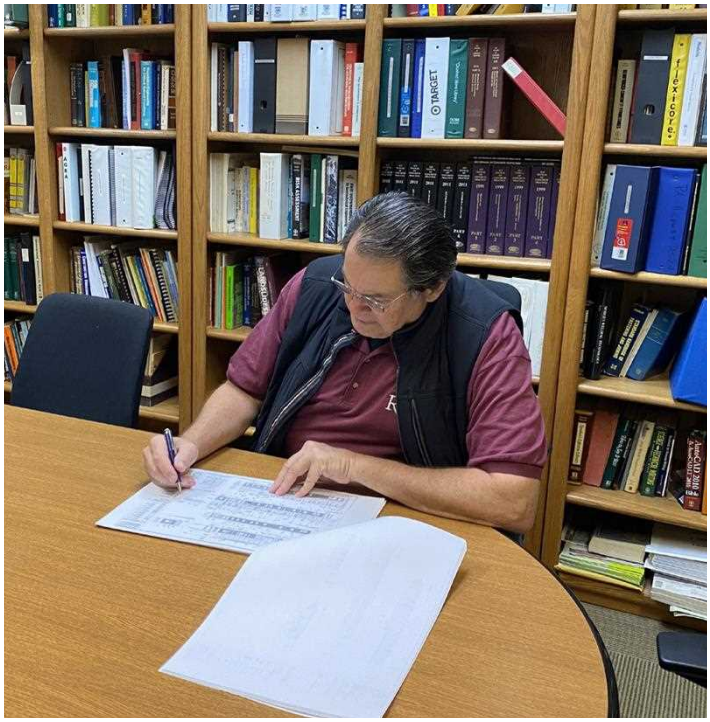
Here's how BEC practices can reduce rework costs:

1. **Design issues are caught during the pre-construction phase.**

   The least expensive time to make adjustments in the building envelope is during early design through construction document development, well before materials are being, or have been, installed.

   "Building envelope" refers to the systems and assemblies designed to separate one defined environment from another, which means limiting the movement of water, air, vapor, and thermal (heat/cool) within or through that envelope.

   During the design phase, BEC consultants conduct periodic design review sessions with architects to make sure the building envelope is continuous. This is not to control design, but to review and advise on the performance of the building envelope elements.



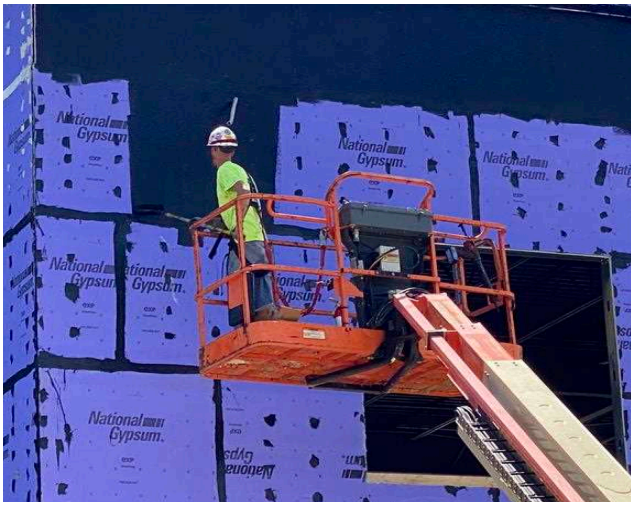
   "BEC is a mission critical practice for everyone in the architecture profession to adopt," says Jack Chapin, Jr., AIA, NCARB, and GCI building envelope manager. "Having the BEC consultant review detailing, schematic design, design development, construction documents, bidding addenda, shop drawings, and materials selection, and then do a final review before drawings go out for bid, can help minimize rework and design issues during construction."

2. **Quality control issues are discovered during installation before work is covered up.**

   Re-work is much less costly when issues are caught and corrected early in the construction process before interior finishes are applied.

Construction observations of the building envelope (in addition to inspections required by code) lead to better conformance to details and specifications. Examples include:

- Air and moisture barrier substrate testing
- Water spray testing of windows and storefronts
- Caulking installation and pull testing of sealants
- Adhesion testing of the bond between substrate and a coating or between different coating layers
- Moisture testing of wood, masonry and concrete
- Observation of roofing, its component parts and penetrations
- Observation of walls and wall penetrations such as windows, vents, louvers, and doors
- Residential duct tightness testing



3. BEC observations help reduce warranty work.

Joints between differing materials typically comprise less than 1% of the building envelope but contribute to 90% of the root causes of air and water leakage.

- Up to 90% of building envelope problems are associated with water.
- Air leakage into and out of buildings causes HVAC systems to use more energy to maintain buildings' desired temperature.

Because BEC design review and testing focuses on water intrusion and high-risk joints and materials, employing BEC services throughout design and construction can reduce quality control issues and improve the long-term integrity of the building envelope, resulting in fewer construction warranty issues.

Minimizing rework reduces climate impact and material waste, plus saves labor costs.

The carbon footprint of building materials begins with how materials are produced, transported, and installed, and carries all the way through building operation.

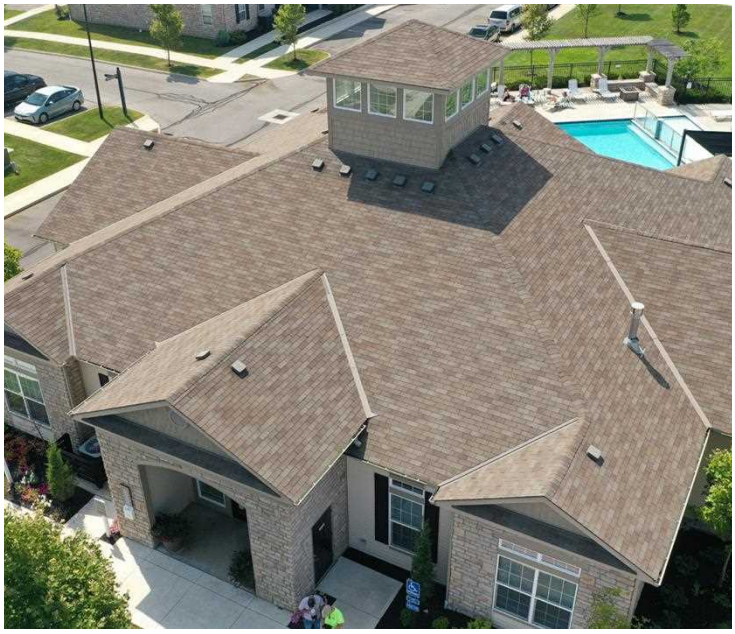
- Any material wasted due to rework adds the full climate impact of production, transportation, and disposal, but with zero benefit.
- Rework can scramble schedules of the entire project team and further stretch the capacity of an already over-extended workforce.

Facilities with a continuous building envelope that properly separates defined environments and limits the movement of water, air, vapor, and thermal within or through that envelope, are more likely to perform as designed and not incur increased building operating costs or excessive climate impact.

BEC helps minimize rework on renovation and tenant buildouts.

Building alterations, renovations, and tenant buildouts often disrupt the integrity of the building envelope.

BEC assessment services at key points during renovation that focus on high-risk joints and materials, including the building roof and its component parts and penetrations; building façade; walls and wall penetrations such as windows, vents, louvers, and doors; and the floor, can help reduce the need for costly rework.



BEC services provide insight for asset management and acquisition.

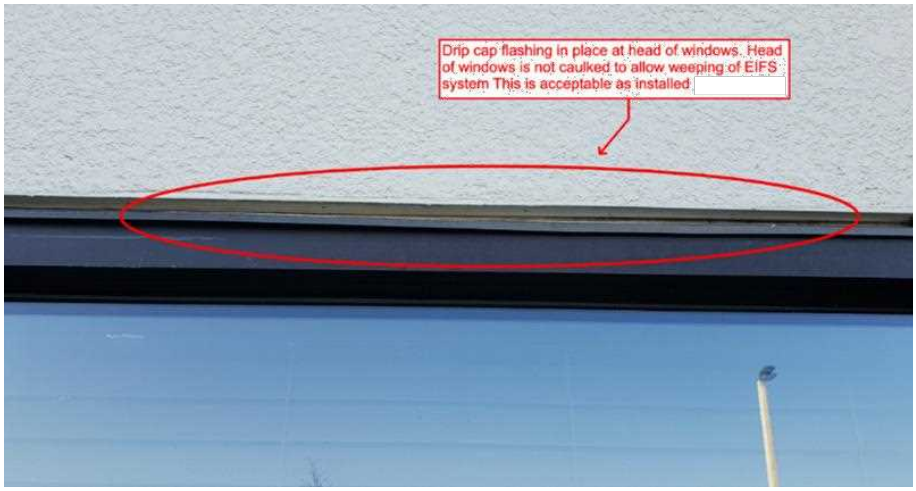
BEC services can also be engaged for examination of the building envelope elements of existing buildings to look for evidence of water intrusion, air leakage, and insulation irregularities. The summary of findings provides owners with a report of necessary repairs and deferred maintenance to help determine appropriate budgets and repairs.

When armed with building envelope test results, building owners and investors can improve their negotiations during due diligence and negotiate investment, renovation, property management, and acquisition price decisions from a more informed position.

GCI provides independent BEC review, testing, and observation.

GCI offers BEC and property condition assessment services during design, construction, building renovation and upgrades, property acquisition, ongoing building operation, and when forensic investigations are needed. GCI provides independent review, testing, and observation to:

- Verify that building envelope elements are installed according to specifications
- Confirm that the building performs as intended
- Review building envelope after alterations or repairs to verify integrity
- Minimize building operating and maintenance costs
- Perform forensic investigations to determine sources of water intrusion, heat loss and other operating failures



Contact GCI at **614.895.1400** to learn more about Building Envelope Consulting services for your next design, construction or building renovation project.

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GCI Announces New Leadership

Bob Hiles

Curtis Miller

Bruce Savage

GCI's Executive Committee is pleased to share that the CEO/President transition announced several months ago took effect on April 1. Bob Hiles is now GCI's CEO and Curtis Miller, P.E. serves as president.

Bob and Curtis succeed Bruce Savage. Bruce continues serving as a senior environmental consultant and as a member of GCI's Executive Committee and Board of Directors.

Bruce led GCI for five years and helped guide the company's continuous growth, expansion of service offerings, and professional advancement of employees while keeping a sharp focus on client retention and best-practices business management. His caring and thoughtful leadership was especially appreciated throughout the pandemic response.

As CEO, Bob Hiles will champion strategic planning initiatives, develop new business and geographic expansion opportunities, oversee client engagement efforts, support staff development, mentor developing leaders, and continue to lead GCI's Field Services Department.

Along with his new executive duties, Curtis Miller will lead strategic production and administration initiatives and continue overseeing drilling, laboratory services, and GCI's AMRL accredited facility.

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