Financial Perspective – November 2015

Regulations and Technology Are Pushing Costs Higher

As contractors build backlog and concerns grow about a tight labor supply, there is increasing conversation about the impact on construction costs in the next few years. However, costs have been rising for several years now, in spite of intense competition, because of regulations and advances in technology that raise first cost.

Increasing costs are the result of a number of incremental bumps across several parts of the project scope. Most of these incremental changes come from changes in regulations or codes that govern safety, environmental impact or energy efficiency. The growing acceptance of green building is at the root of a number of the changes, as suggested standards have become codified, and the upside of those regulations has been that upfront cost increases result in significant operating cost savings over the life of the building. Other changes have meant to ensure human safety or environmental protection but created unintended cost consequences.

Regulations and codes affecting the building’s HVAC system have probably had the biggest impact on project costs. As the International Building Code (IBC) has been updated to include higher standards for energy efficiency, mechanical systems are being driven by increasingly more efficient equipment. Improvements in equipment efficiency has come from innovation by manufacturers, which carries a research and development cost. Manufacturers who can gain a bit on the energy efficiency of their competitors can charge a little more until the field catches up.

The IBC includes energy standards – based on AHRAE 90.2 – and an International Energy Code. Whenever these codes are updated to reflect improved standards, owners are required or incented to use better, more expensive equipment. An example of this kind of standard upgrade is the implementation of the Montreal Protocol on Substances That Deplete the Ozone Layer. Originally agreed to in 1987, the Montreal Protocol created a timeline for reducing and eliminating the use of hydrochlorofluorocarbons, including R-22 refrigerant. The key dates in the accord were 2013 and 2015. This part of the agreement is impacting air-conditioning equipment manufacturing now.

"We’re in the final stage of implementing the Montreal Protocol. Manufacturers are no longer allowed to make R-22," explains Jamie White, partner at LLI Engineering. "You can buy surplus R-22 on the market but you can’t make it. As of January 2016, you won’t be able to make replacement parts or condensers either."

The implementation of the Montreal Protocol won’t eliminate older equipment from the built environment but the diminishing inventory of refrigerant and replacement parts will limit the options for building owners trying to get the longest life from outdated equipment. And the inability to replace components will mean replacement
of HVAC equipment rather than repairs. That will begin to impact renovation costs almost immediately.

Equipment isn’t the only area that is being affected by the increased efficiency standards. An important component of a building’s mechanical system is the control package. As digital controls have become more sophisticated, it’s possible to lower energy usage and operating costs by controlling the portions of the building being conditioned and limiting the use of heating or cooling to times when buildings are occupied. Controls can make Chevrolet HVAC equipment perform like a Cadillac. In the case of a highly engineered system the automated controls will drive actions that will save millions of dollars. Such complicated controls come with a complicated price.

“We see increases in the controls package,” remarks Dave Casciani, vice president of estimating for McKamish Inc. “Controls used to be maybe five percent of the total for our bid. Now it’s 15 or 20 percent of our total sometimes.”

Casciani explains that controls tend to be a higher share of the HVAC bid when the building is more complex – as in the case of the Tower at PNC Plaza – or when the project is a smaller renovation in a mechanically-intense environment, like a clinical remodeling in one of the hospitals. When a specialty subcontract goes up by ten or 15 points in a subcontracting package that is already a big part of the project – like the HVAC portion – that increase can add significantly to the overall cost. For example, on a mechanical package that’s $1 million – which is not a terribly large project – the increased scope of the controls work can add about three percent to the overall cost.

Changes to another large piece of the project – the electrical construction – have also resulted from energy saving technology and regulation. Sensors and communications components of the HVAC controls can be part of the electrical contractor’s scope of work. Advances in lighting technology have made a huge impact on the operating costs and energy usage in buildings. Light-emitting diode (LED) technology was a preferential choice just a few years ago. Advances in LED lighting have made its use widespread. The positive impact on the performance of the building has made the choice to use LED much easier but the cost is still an upcharge.

Todd Mikec, president of Lighthouse Electric, has seen costs increase, but feels the climate is being driven more by innovation and choice than by regulation.

“Some of it is owner-driven. There are certain building codes that relate to energy efficiency that are driving costs up but those costs come back around on the back side in operating cost savings for the owner,” Mikec points out. “Many of the fixture and equipment prices are coming down too. Now all of a sudden you have ten people selling LED fixtures or occupancy sensors and the competition is bringing prices down.”

There is also new fire safety regulation related to the electrical system. The National Fire Protection Association has had success integrating arc flash and breaker studies into the National Electrical Code. An arc flash is light and heat produced when an electrical arc heats up sufficiently to make some part of the electrical circuit fail.
Controlled electric arcs can be useful (think arc lamps or arc welders) but arc flash blasts can be dangerous. A blast resulting from a 480v system failure would have the equivalent of nearly a pound of TNT.

White explains that better understanding of the hazards of arc flashes has led to additional consulting. “In past breakers were designed to protect the wire downstream. Now we realize that electricity goes through multiple breakers and what happens is affected by how those devices interact,” he says.

In conjunction with a construction project, the arc study is part of the electrical contractor’s scope of work. The studies aren’t cheap and often lead to repairs or changes to the systems. LLI Engineering has conducted six-figure studies for 600 Grant Street and for Verizon, the latter of which resulted in $1 million in repairs. Repairing electrical systems in those buildings made conditions safer for thousands of occupants.

Improvements in the operations of key systems to reduce the energy usage or environmental impact of the building have paybacks. Energy-efficient buildings are more desirable to tenants and there is evidence that high-performing buildings occupy quicker and command higher rents. The property owner also gets a building that costs less to operate, often paying back the additional investment in a few years. These facts have been part of the green building sales pitch – along with a sense of civic responsibility – for decades. When performance-enhancing factors become regulations, owners have to change their thinking, much as owners did when fire sprinklers were mandated or accessibility standards went into effect.

For better or worse, costs caused by regulation get passed on to occupants and the occupants are generally better off for the changes brought by the regulations.

Adding fire sprinklers to high-rise offices added significantly to the cost of the construction but no one would dream of occupying an office without sprinklers today. The cost of sprinklers is just another component of the pro forma that works over time. Energy efficient HVAC equipment will pencil out over time as well. There will be a way to cost-justify any regulated improvements over time.

Perhaps the upside of the escalation of first costs due to the mandates of constructing better buildings will be a change in focus for building owners from first cost to life-cycle cost. That kind of perspective would make products more desirable that are more durable or improve a building’s performance. Increased demand for innovative products tends to create more innovation. That’s something that the construction industry could use more of.