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Cost-saving Strategies for Highly-functional Buildings

Good Spending Decisions Yield More Building for Less Money

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Regardless of budget parameters--tight and rigid or open-ended and flexible--getting the best value possible in a new science building is almost always a concern. But cutting costs doesn't have to mean cutting corners. Instead, institutions, corporations, and medical facilities can construct highly-functional buildings for less by taking a creative approach to the processes and decisions that go into their building projects.

Several key factors to get more science building for less money include good cost decisions, opportunities for economies, integrated design process, construction delivery process, concepts that facilitate less costly solutions, and components and materials. While these money-saving decisions sometimes seem more costly upfront, they pay off in the long run because they allow the new buildings to stand the test of time, according to Russ Chernoff, a partner with Chernoff Thompson Architects (CTA) in Vancouver, B.C.

The ideas within these six categories do more than just sound nice. Their implementation has allowed several institutions in British Columbia to yield more and spend less.

Good Cost Decisions

The first step toward taking this long term approach is making what Chernoff refers to as good cost decisions. In other words, weigh the upfront costs against the cost to maintain, update, and improve the building in the future.

“We need to view buildings for the long-term and think in terms of how much it would cost if we had to renovate them many times over the life of the building,” explains Chernoff. “If you buy it cheap, it may cost more overtime.”

Next, consider the disruption caused by ongoing building changes, such as renovating a lab for a new faculty member, which has the potential to interfere with the activities of other building occupants.

Finally, making a good cost decision means considering overall operating expenses. While Chernoff says such expenses should be analyzed on a piece-by-piece basis, it is generally more efficient to combine certain building systems, such as exhaust fans, into one, two, or three centralized locations, rather than one for each individual lab or floor.

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Biographies

Russell Chernoff is a partner at Chernoff Thompson Architects. Prior to serving as a founding partner of CTA in 1981, he worked at The Hulbert Group Architects, Bruno Freschi Architects, and Arthur Erickson Architects.

Naomi Gross is an associate at Chernoff Thompson Architects. Prior to joining CTA in 1996, she worked at Scott Morris Architects, Barcelona Government Architectural Department, and Lambur Scott Architects.

This report is based upon a presentation Chernoff and Gross gave at the Tradeline *Science Buildings Canada 2006* conference held in July.

For more information

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Recycle/Reuse

Adding all three areas together should provide a sense of the overall value impact, says Chernoff.

"If you spend an extra dollar today you are getting real value out of it, whereas if you put in cheap equipment you might have to replace it in 10 years and struggle with poor performance," he cautions.

Opportunities for Economies

Finding opportunities for economies simply means pinpointing the obvious, and not so obvious, dollar-saving possibilities.

"There are various areas where people can look," Chernoff points out.

One such area is density, or the efficient use of land. This means constructing a taller building with a compact footprint, keeping floorplate efficiency in mind. Another option is reducing floor-to-floor heights, which ultimately reduces the amount of material needed to construct the building, such as windows and concrete.

Chernoff also advises taking great care in making decisions about basic features like data outlets in various rooms, an opportunity for economy referred to as the building's facility/build program. When a building plan is approved, he says, it always includes a program that describes all the spaces in the building and what it will and will not include. The architects involved generally design around these requirements, but Chernoff says a significant amount of money is saved when the designer questions these requirements and makes suggestions for improvements.

"We discover things we can tweak to enhance and save," he says. "We are looking at ways to create a better building."

Integrated Design Process

When all key players are involved in planning from the get go, everyone wins, states Naomi Gross, an associate with CTA. Using an integrated design process includes anyone with a vested interest in the outcome of the project, including the design team, the client, the contractor, and the building's future users.

The process starts even before the plans are drawn, and continues until the project is complete. Frequent meetings allow team members to share ideas, express concerns, discuss goals, and confirm plans. Not only does this save time, it also saves money because potential problems are resolved early.

"Everyone works together to come up with a common understanding," she says.

Construction Delivery Process

Historically, construction on new buildings begins once each and every piece of the project is documented. By changing the construction delivery process to phase

The University of Victoria Medical Sciences Building is equipped with benches that were originally intended for another institution, which rejected them because of the color. The result is a savings of $20,000 (CAD). (*Photo courtesy of Chernoff Thompson Architects.*)

Cable Trays

Simon Frasier University saved $30,000 (CAD) by using cable trays for controls wiring in its new Technology and Science Complex 2. (*Photo courtesy of Chernoff Thompson Architects.*)

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Notes:

construction documents, institutions can pocket a lot of extra money. For example, it allows the opportunity to beat inflation because institutions can purchase concrete now, at current prices, rather than at the cost when construction starts.

"This is a more challenging approach, and you need to find a contractor willing to take the risk and start building before a final design decision has been made," says Chernoff, explaining that this method requires involvement from the builder far earlier than usual.

Chernoff adds that using the integrated design process is an essential component to using an early construction delivery model.

"It has to be carefully managed, and it needs a strong team approach," he says.

Concepts That Facilitate Less Costly Solutions

"Thinking outside the box and making the most of the resources available is another way to halt escalating costs," says Chernoff.

Start by striving for efficient planning. For example, don't maximize the floor plate size "just because." This may actually lead to less efficiency. Use modular interior elements whenever possible so future changes and re-arrangements are more easily realized. Make buildings multi-disciplinary, and incorporate shared space such as lobbies and meeting areas that can transform into reception venues.

The University of Victoria (UV) created such a space in its new science facility.

"We took the lobby and put the student lounge in the same space. This creates a bigger space that is easier to work with," says Chernoff, explaining that this concept creates efficiency and flexibility because one space can "borrow" from another.

Also consider placing users that require similar equipment in the same section of the building. This allows them to share, and the cost of a second set of identical equipment is eliminated. There is always the concept of slashing prices in one area to make room for enhancement in another.

"Selecting an equally reliable but less expensive roof can free up funds for additional floor space or other enhancements," says Chernoff.

Embrace the idea of "less is more" by avoiding the installation of unneeded services and using a central service spine rather than individual services routing throughout the building. In the University of Victoria's new Medical Sciences Building, for example, air conditioning was installed only on the south side of the building which responds to the higher heat load. The north side is equipped with fans.

"This is a very happy balance," says Chernoff, adding that British Columbia's mild climate allows this type of feature.

A central service spine also allows easy access to gas, air, and power.

The use of "plug and play" also falls into the "less is more" arena allowing for an instantaneous facility update—drain cap-offs (instead of actual sinks) are installed in areas of a building that don't need sinks now but might in the future. When and if a sink is needed, it can simply be "plugged in."

Lastly, look for opportunities for sharing and re-use. These opportunities are as simple as installing a shared service/passenger elevator, like the Discovery Parks Trust at the University of British Columbia did in its Technology Enterprise Facility, or by re-using water from aquatic research to flush toilets, as the University of Victoria does.

Components and Materials

The final area with the potential for significant savings is making cost-effective decisions regarding components and materials. While it is often true that "you get what you pay for," in some situations the higher-priced materials are not necessarily the best choice for a given project, says Gross. In fact, some less expensive items are actually just as durable as their costlier counterparts. This can be the case in many facets of a building project, from the exterior to the piping to the countertop surfaces.

Brick and concrete, for example, are very resilient and surprisingly affordable, while the cost of steel is at an all-time high. Similarly, institutions can achieve significant savings on flooring by choosing vinyl composition tile (VCT) over sheet vinyl.

"Many people think sheet vinyl is the only way to go," says Gross. "But for many labs, VCT is appropriate because maintenance is easy and it is half the cost."

The University of Victoria saved $15,000 (CAD) in electrical installation costs for it new science facility by using a 1,500-volt substation as opposed to the more typical 2,000. UV saved another $20,000 on this facility by using spray-on insulation around the building's envelope.

The University saved the same amount on its Medical Sciences Building by purchasing and installing lab benches originally intended for another facility (they were the wrong color, so the original buyer rejected them). This, says Gross, is not only a materials savings, it also encourages sustainability.

Simon Fraser University saved $30,000 on the Technology and Science Complex 2 by eliminating the conduit and using a cable tray instead for the controls wiring, and an additional $70,000 by opting for a low-extractable (LXT) pure-water piping system rather than polyvinylidene fluoride (PVDF) piping. As an added bonus the less-expensive LXT so far appears less leak-prone, says Gross.

Another creative suggestion offered by Chernoff and

Gross involves reducing the number of data outlets in lecture halls. Instead, they advise urging participants to charge their laptops prior to arriving to the lecture, or to sit in the front row where the outlets are located. This saved $196,000 at UV.

Final Overview

“A good cost decision considers first cost, long-term impact, operating impact, and value for the money vs. least cost,” says Chernoff.

Seeking opportunities for economies means considering density, planning, floor-to-floor heights, air quantity, servicing concepts, services distribution, mechanical equipment, building materials and products, and project delivery.

“There are so many different ways we can approach building design to find more economical solutions,” says Chernoff.

“Using an integrated design process provides early and full involvement by all key players, workshops to set goals and priorities, and pre-design reports to assist in developing the correct cost-effective solutions,” recommends Gross.

A phased construction/delivery process includes early builder involvement and allows for earlier occupation of the facility. Ultimately, this approach can result in a cost savings of one to one-and-a-half percent per month in the current construction climate.

Concepts that facilitate less costly solutions include efficient planning, a “less is more” approach, seizing opportunities to share and re-use materials, and minimizing the impact of change over time.

By Dawn Weinberger

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