CSU Biology

The LEED® Gold Biology Building [Photo 1] at Colorado State University is a prime example of the success possible on a design-build project. Although there were multiple challenges during this project, the cohesiveness of this team and their innovative thinking and solutions overcame those challenges. In fact, they were so successful, they were able to add almost $8M in owner requested changes.

This project presented its fair share of difficult situations, which the team met with resourceful solutions. Beginning with excavation, the water table was higher than expected. This meant excavating an additional two feet and importing two feet of structural fill for the basement. This added to an already tight schedule. Originally, Haselden/Hord|Coplan|Macht team mapped out the schedule at 26 months. To deliver the building in a timeframe that met CSU's expectations, we whittled that down to 21 months, and only added three weeks to the schedule, despite the addition of substantial change orders at the behest of the owner. This still allowed the school to open on-time for the fall semester. These change orders were perhaps the most significant challenge our team faced: our goal was to accomplish as many of the "wish list" items as possible while still remaining within CSU's budget and time schedule. Considering one of the main items on their list was adding square footage, this was a tall order. Other change orders the owner requested—and the team was able to provide—were building out shelled space, adding fish tanks in the lobby, adding museum-quality exhibits [Photo 2], redoing East Drive in concrete, redoing all the sidewalks on East Drive, milling and overlaying Pitkin Street, adding the pergola to the patio, upgrading the first floor corridors to terrazzo flooring, upgrading the planned MEP, adding glass marker boards, and purchasing an entire A/V package that wasn't originally in the contract. Because this project was constructed under the design-build delivery method, the general contractor, architect, and subconsultants worked together from the beginning to tackle this long list. The highly collaborative process—more akin to a joint venture—included bringing on many of the subcontractors early as trade management partners to assist with the design. This allowed everyone involved in both the design and the construction to be on-board from the start, ensuring constructability which saved both time and costly rework. So much so that we were able to provide CSU with all of their requested add-alternate items. The team's

open and communicative relationship with CSU was also paramount to level of success achieved.

This project was the first design-build endeavor on CSU's campus, so it was a bit of an experiment for the University. Using a design-build delivery method resulted in an extraordinarily low number of RFIs—1/225 SF. The team attributed this to the collaborative effort on the front end, which ensured craft details were constructible. The design-build methodology also meant contending with bridging documents, but the team saw this as an opportunity to work together to create improvements. The bridging documents the University provided us with prescribed a cast-in-place concrete structure in the lab areas with a steel frame wrapping the perimeter of the concrete structure. The theory was that the concrete core would meet the vibration requirements for the lab, however, building as the bridging documents outlined would have been excessively costly. Our team investigated the issue and found that the vibration requirements for the lab could still be met by utilizing a brace-framed steel structure. This saved money from both a materials and labor standpoint, as well as approximately two months on the schedule. CSU University Manager of Design & Construction Mike Rush sent "a note of great appreciation for your hard work, innovation and extended efforts on the Biology building. Please let the entire team know that I see the project as highly successful, demonstrating the true value of the DBLS [design-build lump sum] delivery model with a comfortable, soft landing and top shelf quality."

Construction innovation started well before any earth was moved on this project. Haselden's in-house Virtual Design and Construction modeled the building, allowing not only for the design-build team to perform clash detection, but also for the CSU facilities staff and end-users to virtually tour the building [Photo 3], ensuring the design would work for them before construction even started. The tight lot line presented another opportunity for innovation, requiring us to look at an alternative method for building the full-height basement foundation. Because of the site's proximity to street access and adjacent buildings, the team chose to use a beam and lag shoring system [Photo 4] instead of traditional lay-back excavation. This led to the decision to employ shotcrete as the concrete application system [Photo 5]. Again, this was a new method on CSU's campus, but given their strong relationship with the team, they were willing to

give it a “shot.” The shotcrete technique involves wet concrete propelled through a hose at a high velocity onto walls reinforced by rebar. Due to the force with which it leaves the nozzle, the shotcrete is placed and compacted simultaneously. The walls are finished via screeding and troweling after the concrete is applied. The team’s forward-thinking ideas extended to the top of the building. CSU’s original want included a fifth floor, however our team found a creative way to add that usable floor space by expanding the footprint. Nonetheless, the team chose to super-size the structure to accommodate a fifth floor in the future. To make this transition seamless should the University choose to go this route, the MEP is also sized for the addition, and the roof is poured concrete, meaning it could easily be transformed into a floor.

Building in the middle of a college campus can be demanding from a safety perspective. The project is located on Pitkin Street, which is a major artery into the campus. However, there were no safety issues or break-ins at any point during construction. In fact, this project was used as a testing site to collect data we used to write new silica safety standard for Haselden. We tested both Haselden and subcontractor team members, providing them with the results procured. Following the testing, the subcontractors all took measures to become compliant to the new OSHA silica standard. Haselden has since produced silica safety training videos in both English and Spanish that are available on YouTube, free for any company to use to train its employees. This project also received Haselden’s coveted HESA (Haselden Environmental Stewardship Award), which is given to only one project each year. Haselden logged 67,490 hours on this project with no lost time.

The Biology Building has become a cornerstone of CSU’s new Science Quad. As a stop on the campus tour, it also serves as a museum of sorts: the amazing exhibits [Photo 6] throughout the first floor were crafted by award-winning museum exhibit designers and composed to be enjoyed and studied in time increments ranging from 30 seconds (for example, a child touring with his or her parent or sibling) to 30 minutes (a graduate student).

A more personal contribution this project made to the owner was serendipitous. Throughout the project our team shared documents via Bluebeam. The CSU team was so impressed with the

efficacy of our file structure, they adopted our policy as their own. They now use Bluebeam and our file structure for all of their campus projects.

Tracey Abel, CSU construction project manager, noted, “Haselden Construction’s vision statement is probably one of the simplest, ‘to be a Great Builder,’ and is followed up by their purpose statement of fulling their customers' need completely. It is meaningful because I have experienced it on a weekly basis. They truly do strive to meet their vision and purpose every day.”

Photo 1 – Haselden Construction – Colorado State University Biology Building

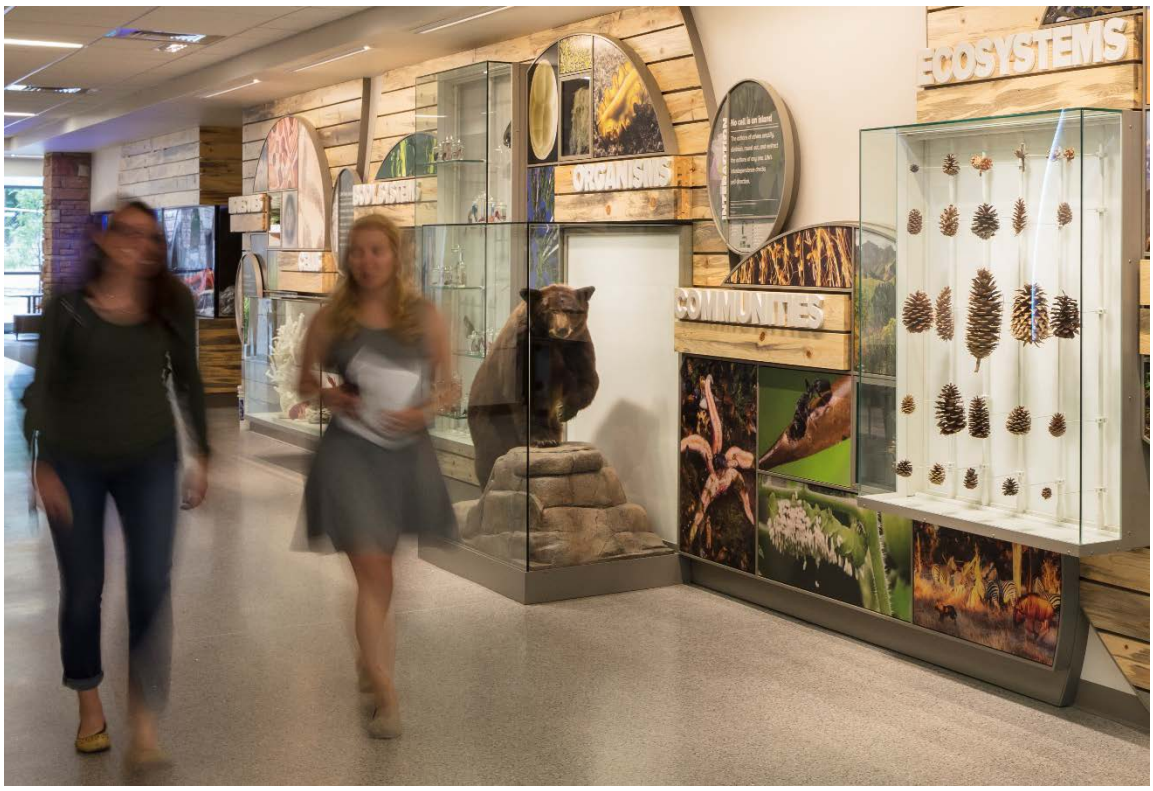

Photo 2 – Haselden Construction – Colorado State University Biology Building

Photo 3 – Haselden Construction – Colorado State University Biology Building

Photo 4 – Haselden Construction – Colorado State University Biology Building

Photo 5 – Haselden Construction – Colorado State University Biology Building

Photo 6 – Haselden Construction – Colorado State University Biology Building