University of Colorado Boulder Jennie Smoly Caruthers Biotechnology Building E-Wing Addition and Renovation

Adolfson & Peterson Construction

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9. Best Building Project – General Contractor ($10-$40 Million)

Why this project should win an ACE Award and why this project is unique

Building on a busy, occupied campus presents challenges for any construction project. However, at the University of Colorado Boulder – a 600-acre campus with 33,246 students – the Jennie Smoly Caruthers Biotechnology Building E-Wing Addition and Renovation project was unlike any other, requiring strict construction protocols and unique innovations to build and renovate without making noise or vibration.

The jobsite was sandwiched between the Laboratory for Atmospheric and Space Physics, Prentup Field and Potts Field, requiring construction activities to be coordinated around the schedules of CU's soccer, track and field and skiing teams in addition to the academic and research facilities. This limited scheduling construction work for weekends and off-hour work.

The addition had to be built with the building fully operational, connecting to a 330,000-sf facility containing numerous biochemical labs and vivariums which could not be moved or disturbed. These highly-sensitive labs – which included live animals, million-dollar investment research, dangerous chemicals and work by Nobel Prize-winning scientists – were required to remain fully functional and running 24-7. Being an addition, these labs and learning environments were extremely close to where construction had to occur. Exterior windows of the existing structure became interior windows, resulting in no buffer zone for work.

The project required removing an entire side of the existing 3-story structure and rebuilding a 57,500-sf new addition. Connecting and tying into the current structure required precise engineering expertise to match up each floor elevation, restructure room layouts, which bridged old and new rooms, and connect to the existing main stairway and hallway which were permanent parts of the old building. 73 vertical feet of brick was removed from the exterior

façade, leaving only 5 inches of studs and 1 layer of drywall between construction and labs conducting million-dollar research.

Excellence in Project Execution and Management/Team Approach:

Coordinating with the University, the team organized town hall meetings on campus with lab users, campus facility management and neighboring campus entities. Current project information, upcoming activities, logistics and questions were all addressed. The meetings also gave facility users a personal connection with the construction management team and an opportunity to address their concerns. During construction, weekly prepared dashboard communications were customized to the project and handed out to the project stakeholders.

The team also included both the physics and athletic departments in their meeting and communications. They prepared public communications and 4-week look ahead schedules for the CU website. For example, when the team needed to build their crane in the parking lot, a phased logistical plan was sent out to the user groups months in advanced and coordinated around their activities for least impact to parking. Even with the best planning, unexpected issues came up, such as the team providing a portable restroom for the band during a Grateful Dead concert. The band paid their gratitude in T-shirts to the construction team.

Because testing and research functionality was needed 24 hours a day inside the facility, utility shutdowns were not possible. Pre-planning was essential in preconstruction and included numerous MEP investigations. To tie electrical and mechanical into the existing utilities, the team created a detailed communication and M.O.P. or needed major outages. The work was conducted during the least disruptive time periods between 1 and 5 am, requiring special scheduling challenges for construction. Most importantly was the communication with the University and lab managers to properly prep for the outages – preparations which took 3 months to implement and had to run flawlessly.

The team had nine seismic vibration monitors (one on every floor and two in sensitive labs) to monitor any disturbances during construction. These were linked to the phones of both the construction team and the client’s facilities management team, alerting them of any potential problems. A baseline was set before construction began to create a known vibration threshold. The construction team built thermal and acoustical walls between spaces to lessen disruptions

caused by construction. Besides when initially tested, the monitors never went off, which reflects the diligence of the construction crews to not impact the client's valuable research.

Solutions of Special Projects:

The project was underfunded from the beginning with the University only having $25.6M approved and a design of a $37M addition. With the lacking funds, the team had to find a way to make the project still go. Even though the awarded contract was CM/GC, the preconstruction team acted in a design-build fashion with the architect to phase and estimate with CU's budget constraints. The team broke the labs out into a separate work package which maintained state compliance by providing academic spaces in phase I. Phase I construction was able to then start.

AP provided 18 full estimates and countless smaller pricing exercises and had full team involvement during preconstruction for a seamless transition to construction. AP also had a team member who worked as an Estimator in preconstruction and shifted to Assistant Project Manager during construction, providing the client and team a continuous thread of budget management. Subcontractors were brought on through a strategically phased buyout process in design-assist roles and alternates were crafted around what funds were available, repricing pieces to accommodate escalation after a year delay. AP targeted subcontractors that had campus experience and understood CU's standards, including subcontractors who originally built the Jennie Smoly Caruthers Biotechnology Building.

The team worked diligently with CU on funding for the entire building and was able to avoid demobilizing after the core and shell was done and continue the lab TI work in two additional phases. At the end of the project, unused contingency was leftover on the project and AP was able to return those funds to CU.

Construction Innovations/State-of-the-Art Advancement:

Construction practices put into place were proven scientifically evident, reflecting the uniqueness of this project. Research in the labs used live rats—animals whose natural cycles of defecation, feeding and sleeping were closely monitored by researchers. The labs measured cortisol levels continually before and during construction, measuring stress or any abnormalities caused by

construction activity. No indication of stress was found and thus the labs had scientific data that construction did not impede their live animal experiments.

CU has its own authorities of jurisdiction so the team didn't need to go to the state or city for permitting and inspections. The team understood the importance of ensuring these individuals were satisfied with the work performed, each having their own requirements – often which were not standard requests. For instance, a dance floor was put into the mechanical chase, where usually flooring isn't installed, at the request of the building's maintenance management for ease of accessibility. These personnel were deeply involved in the project since they were responsible for maintaining the equipment and structure once construction was over. Once BIM coordination was complete, the AP team invited the CU Facility Management Team to participate in the final BIM fly-throughs of each floor in order to make any final modifications for access concerns by the individuals that would be servicing the equipment.

Even though the team had information for materials ordered on the original structure, the look and colors of the materials had since changed. Six different brick mockups were created to obtain a grout that matched the existing structure due to the fading from sun and wind (image 1).

In addition to the unused contingency AP was able to return to CU, the project finished $500,000 under budget.

Environmental/Safety:

The project finished without any lost-time incidents on an occupied campus and facility.

Above safety training and standards common to the industry and AP, this project took an increased approach to harassment prevention because of the large amount of people on campus. All personnel onsite were trained and instructed on what was considered appropriate interaction with students, staff and community members.

AP implemented a badging system to easily identify all workers and put security measurements in place to enter the site. Field management communicated with subcontractor crews about how the project is a high-profile project to the University and the safety concerns on the busy campus. Background checks were required for all workers involved in the project. Because of the

significant pedestrian traffic on campus, it was imperative for the team to coordinate signage and wayfinding with the University to properly redirect students and staff.

On-time delivery coordination was imperative for the limited laydown site, so the team rented a parking lot a quarter mile down the road and trucked materials and personnel back and forth. This area allowed for parking and storage when just-in-time deliveries weren't feasible. To maximize efficiency, daily huddles were conducted with the Foreman before work began each day to coordinate the offsite staging and deliveries.

Excellence in Client Service and/or Contribution to Community:

The project was committed to sustainable design principles and is pending LEED Gold Certification. The addition is fitted out with sustainable heating, cooling, water treatment, and material selections to reduce the structure's carbon footprint. The addition was designed to have an efficient footprint that is intelligently sited and features windows and shading devices that maximize the interior natural light while minimizing solar glare.

The addition was painstakingly designed to not look like an addition, while meticulously being reinvented to improve on everything that the 360,000-sf original structure left to be desired. To anyone walking by, the precise location where the finished addition attaches to the existing structure at the new side entrance is inconspicuous. Success of the project is reflected by the seamless transition from old to new.

"I have been involved with a fair number of construction projects on campus over the years, and it is one thing to build a stand-alone building, and quite another to build a building with people connected directly to the construction site. Our many researchers perform sensitive and sophisticated experiments and were very concerned that noise, vibration, power/utilities issues, and the like, would pose significant problems. We wanted the space, but at what sacrifice? Well, the AP team was amazing. They were great at communicating the construction schedule, they accommodated all our requests (ok, some demands!), were hugely flexible, and did all that in a professional and courteous way. They all went that extra mile to make sure we got what we needed, and, remarkably, were always so pleasant about it! Truly impressive!" – Lee Silbert, Director of Operations at Biofrontiers Institute, University of Colorado Boulder


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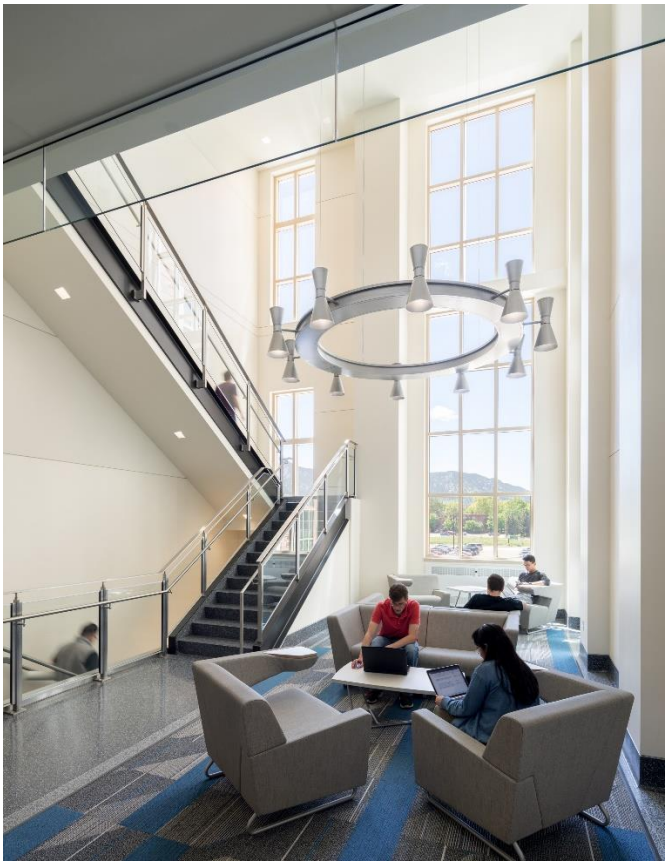


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