

CSU Chemistry Research

The Chemistry Research Building [Photo 1] at Colorado State University was an incredibly fast project with sensitive scientific laboratories [Photo 2] requiring very detailed coordination and some significant last minute changes.

This was a unique project in many regards, and required creative thinking. Originally, we mapped out an 18 month schedule, which was reasonable for a project of this type, size, and scope. However, the University needed completion in a mere 15 months. To do this, we requested our subcontractors provide enough manpower to rough-in MEP and finishes on two floors at a time. Some subs had difficulty meeting this task, and we worked weekends most of the project to ensure an on-time delivery. Another key element to hitting our scheduled completion date was achieving our completion dates on our concrete pours. Because of the rigid vibration requirements of the sensitive research lab equipment, the entire structure is constructed of cast-in-place concrete—14” slabs conventionally reinforced with rebar. This translated to enormous slab pours of 500+ yards. Timing these pours correctly and sticking to those timelines was crucial. We also worked closed with the MEP team on sleeving to ensure everything was in place so there would be no delays due to misplacement and rework. Perhaps the biggest challenge came three months before the end of the project. With the MEP, overhead work, and casework already finished, the owner decided to add four more fume hoods. This entailed demoing the ceiling grid and lab piping in order to install the additional MEP serves for the new fume hoods. This brought the fume hood total up to 103 in just 24,000 SF [Photo 3]. Despite the last minute modification, this \$215,000 change order was completed within the original schedule.

This project was a hard bid, which is not a typical delivery method for Haselden, particularly for a project this size. Historically, hard bids tend to be more adversarial between the architect, contractor, and owner, however on this project, all the team members knew each other going into it, and the process proved highly collaborative. Many Lean Construction techniques—such as pull planning, POD (plan of day) meetings, and weekly work plans—were utilized, which also helped keep this fast-track project on schedule. Another team effort was planning an approach

for working with the state building inspector. The state inspector that works with CSU has a reputation for being extremely thorough. Having worked with him on previous projects, the team understood this ahead of time and devised a strategy to make the process go more smoothly and more efficiently. Our senior project engineer dedicated a substantial portion of her time to inspection coordination and resolution. She pre-walked the project with subcontractors prior to inspection, walked with the inspector, transcribed the inspector's handwritten notes into an Excel deficiency log and distributed the log to the entire team, back-walked the deficiency items to ensure they were corrected before the next inspection, and back-walked with the inspector. The project culminated in over 900 inspection comments; at the end of the project the state building inspector noted it was a very smooth project with little to no deficiencies at close-out.

Several innovative techniques were used to bring the Chemistry Research Building to fruition. The site work we performed included creating a new concrete cover for an existing irrigation box culvert. The drawings and details initially at our disposal did not show the complexity of the situation, so until we arrived on site, we did not understand the complications of this particular operation. Because the scope would have required working in a confined space [Photo 4] – presenting serious safety hazards – we enlisted our Safety Department, as well as CSU personnel, and the project's structural engineer to devise a solution. The team developed a design to precast a new lid in three pieces, which was mapped by Haselden's Survey Department [Photo 5]. The pieces were then craned into place. Had this lid been cast in place, someone would have been required to go inside the box culvert to remove the concrete formwork after the lid was placed which would have necessitated a confined space permit. By coming up with this precast solution, the team avoided this safety hazard. We also utilized BIM to model the entire building, allowing the CSU facilities personnel to see take virtual tours [Photo 6]. To achieve LEED® Gold, the team installed one of only three Konvekta High-Efficiency Heat Recovery Systems in Colorado.

Dealing with a project this dense—one of the most dense Haselden has ever constructed—presented a unique set of safety challenges, simply because of the sheer number of people in a comparably small footprint with an extensive amount of MEP. To combat this, we performed daily safety audits for portions of the project to ensure we stayed on track from a safety

standpoint. Haselden logged 27,907 hours with no lost time. From an environmental standpoint, Arthur's Ditch was a major consideration. Built in 1869, it is one of the oldest irrigation ditches in the area. Arthur's Ditch ran along the north and east sides of the site and, in some areas, ran parallel within 7 feet of the new building. We built reinforced bridge crossings on caissons to access and construct the project, and developed a plan to work around the ditch so we would not impact it. Because we were so close to the Microbiology Building, we built an enclosure around that structure's air intake to minimize the impact of construction on the building and its occupants.

Haselden worked with Colorado State University to show students and faculty the inside track on constructing a project like the Chemistry Research Building. We worked with the Construction Management Department to allow tours of the site, and our project managers and superintendents taught Construction 100 classes as guest lecturers. We worked with the University's Sustainability Club, giving site tours and showing how we manage LEED credits and how sustainability works in the world of construction. We also gave a presentation and comparative analysis on different projects on the campus. To help entice prospective graduate students, we opened for tours on Saturdays, allowing them to see the amazing new building where they could do their research and graduate studies.



Photo 1 – Haselden Construction – Colorado State University Chemistry Research Building



Photo 2 – Haselden Construction – Colorado State University Chemistry Research Building



Photo 3 – Haselden Construction – Colorado State University Chemistry Research Building



Photo 4 – Haselden Construction – Colorado State University Chemistry Research Building



Photo 5 – Haselden Construction – Colorado State University Chemistry Research Building



Photo 6 – Haselden Construction – Colorado State University Chemistry Research Building

