**Category: 3 – Meeting the Challenge of a Difficult Job – General Contractor**
**Contractor: W.E. O'Neil Construction**
**Project Name: Colorado School of Mines, Spruce Hall**

**Building Community**
Having college students live on campus is foundational to the student experience and culture of a university. Studies show that students who live on campus complete more credit hours, have higher grade point averages, and become more involved with the campus community.

Colorado School of Mines (CSM) developed the Spruce Hall dormitory project to help meet their goal of having all freshmen and sophomores live on campus. Spruce Hall is a five-story, 400-bed freshman dormitory with student life spaces on the ground level connected to the campus pedestrian experience. The upper floors of the building are focused on the freshmen community; neighborhoods of 30 students have a resident assistant, community bathroom, study lounge, and dedicated gathering space. The 122,000 SF Spruce Hall includes a shared wellness center, fitness center, game room, collaboration lab, café, study space and private spaces on each floor. The building is an inclusive, dynamic environment that contributes to campus while creating a home that provides students with a sense of belonging and community. This $34.6M dorm project was ready for the fall 2020 semester and earned LEED Platinum certification.

Key project challenges included:

- The site was tight
- Maintaining a seasonal gulch
- Floor height redesign
- First project at CSM using PlanGrid
- Covid and weather delays

**The Site Was Tight**
The new Spruce Hall dormitory took over an existing parking lot that was surrounded by buildings on three sides. There was also a seasonal gulch running north to south on the west side of the site that went under the south wing of the new building. Construction for this project was done on an active college campus. The pedestrian pathways between Spruce Hall and the adjacent buildings had to remain fully open for student and faculty use. The only access road for

the project site was on the east side, which was also where all the wet and dry utilities came into the building.

W.E. O'Neil had to extend the existing steam infrastructure to the northeast corner of the project where the steam / condensate piping was to tie-in. This greatly reduced access to the site, stopped access during the steam piping work, and shut off access to the university president's home. I think it is worth mentioning this work required cutting off garage access to the university president's home. (see image #1)

To overcome site constraints, the W.E. O'Neil team worked with the design team and trade partners to prefabricate walls, mechanical systems, and electrical components to maximize what little workspace they had on site.

The construction team worked closely with the drywall contractor during the submittal process to get the prefab wall system approved by the structural engineer. It took leadership and collaboration to bring together the structural engineer and drywall designer to revise connection details, floor / stud penetration details, steel column details, window / door opening dimensions, etc. to approve the prefabricated wall panel system.

The construction team developed and managed a very regimented and specific delivery plan for prefabricated metal wall panels to keep deliveries scheduled every three days. This allowed the continued erection of the structure while smaller and quicker electrical conduit, sewer and waterline utilities were being installed under the one and only access road. (see image #2)

Due to logistical restraints of getting equipment to the west side of the building where the seasonal storm water gulch cut off access, the construction team worked to offload wall panels with the tower crane between concrete placements. This allowed the drywall contractor to pre-rock the panels with exterior dens glass before lifting them into place and anchoring them to the concrete decks. (see image #3)

The mechanical trade partner prefabricated toilet carrier racks and chilled water systems racks. They loaded 20' prefabricated 4-pipe chilled water system piping into the building during erection, since they would not fit through any window or door opening in the building. The piping deliveries were specifically scheduled and delivered to allow the wall panels system to be erected in an area so racks could be loaded right behind the wall panels but before any metal decking was loaded and spread to begin prepping for the slab on metal deck for the floor above. This efficient delivery and installation system was carried through four floors without affecting the critical path schedule. This process allowed our subcontractor to work with a smaller crew and move faster than originally scheduled once floors were safe to work with concrete decks placed above. (see image #4)

The electrical contractor prefabricated all the unit electrical box and unit cable packages. With the repetitive nature of dorm building construction, W.E. O'Neil worked to formalize the overall layout of the three-dorm room types the using the BIM modeling process and mockups. Electricians were able to prefabricate their light fixtures, switches, outlets, and whip lengths to create a prefabricated box for each unit that was delivered in bulk and staged in the building during construction of the structure. Once released to install a floor, electricians were able to work through the units much faster as all materials were stored in the unit and electrical whips were precut.

**Maintaining a Seasonal Gulch**

The west side of the site had the Welch Ditch seasonal stream that was designed to carry stormwater from surrounding buildings and site areas under the south wing of the project. W.E. O'Neil had to comply with the City of Golden's stormwater program that required them to keep contaminants, trash and waste from entering the gulch as it continuously discharged water from the site to the adjacent golf course. The construction team was able to bury temp reinforced concrete pipe and fill in the section of the gulch that crossed under the building while maintaining stormwater best management practices and keeping all construction activities away from the gulch.

**Floor Height Redesign**
In an effort to reduce cost, the university and design team reduced the height of each floor by eight inches. During the BIM process it was discovered that the space between the ceiling and underside of the floor above could not accommodate the designed plumbing, HVAC, electrical, and fire sprinkler systems. W.E. O'Neil and associated subcontractors worked to relocate water systems to different floors with more space as well as change electrical circuitry to ultimately reduce the quantity of electrical conduits. The construction team ensured that all systems functioned as designed and the owner was able to realize the cost savings from the reduced height.

**First project at CSM using PlanGrid**
This was in fact their first rodeo … using PlanGrid. W.E. O'Neil worked with and trained campus facility and construction management personnel, and the design team to use PlanGrid to manage quality-control, identify non-conformance items, document the construction process. The CSM facility staff and design team performed weekly punchlist walks to document issues they saw. These walks all took place during the final four months of the project when covid restrictions and guidance limited everyone's ability to walk the building in groups. The PlanGrid process allowed people to perform building walks individually, document and photograph any issues, and notify trade partners of the required repairs without having to meet in person.

**Covid & Weather Delays**
The global COVID-19 pandemic arrived on campus in March 2020, during the last four months of construction. The construction team worked closely with CSM to implement procedures and best practices to follow the government guidance being given at the time. W.E. O'Neil set up a mobile testing lab, implemented a contact tracing management plan with QR codes, installed custom built handwashing stations, and implemented strict site cleaning protocols. Managing an active outbreak and covid exposures led to a 25% reduction in manpower in the final stage of finishing the project.

In addition to managing active construction through a pandemic, the project experienced 60% more weather days than originally planned. Despite the setbacks, W.E. O'Neil found ways to accelerate the schedule and still get students moved in for the fall 2020 semester.

**Additional Information**

This project earned LEED Platinum Certification through the USGBC. Green building practices included recycling of concrete with eco pans, as well as separate sorting and recycling of wood and metal waste. Furthermore, the development was compact, and withing walking distance to community access and transit.

A site-specific safety plan was developed and implemented for this project. There were no major injuries or lost time for this project.

"The most valuable thing W.E. O'Neil did for us on this project was in how well they kept the momentum going despite the challenges that arose. They demonstrated their commitment by how well they dealt with COVID-19 and the weather delays." – Kara Rowland, Project Architect, Anderson Mason Dale

"The most valuable thing W.E. O'Neil did for us was in getting us to have occupancy of the building during the pandemic despite all the challenges. They were experienced, knowledgeable, good problem solvers, organized and customer-service oriented." Mike Bowker, Director, Office of Design & Construction, Colorado School of Mines

Image #1


Image #2

Image #3

Image #4