

Colorado School of Mines – Spruce Hall

Category 5: Best Building Project – Specialty Contractor (\$2 - \$6 Million)

Ludvik Electric Co.

The Spruce Hall, student dormitory project, at Colorado School of Mines deserves the illumination of a miner's head lamp and the 2020 ACE award. This building has unique architecture that showcases a natural flowing creek running under and through the building. The installation challenges required the initiative of quality craftsman and supervisors who guided the project to successful completion. Although Ludvik was hampered by weather, logistics, architectural and structural obstacles, our team delivered the successful project through great collaboration, advanced Virtual Design Technologies and a miner's attitude.

The Colorado School of Mines was founded in 1874, here early settlers and miners had the opportunity for an education on natural resources such as water, natural gas, minerals, air, and oil. The university now offers undergraduate and graduate degrees in Science, Mathematics, and Engineering. Since the late 1800's, Colorado School of Mines has been a staple in the small, blue-collar town of Golden and is situated just blocks from historic downtown Main Street.

Today, with the addition of the new residence hall, Colorado School of Mines has added the eighteenth building to the campus, within the last ten years. The campus has grown substantially over the years, occupied by historical architecture, as well as buildings with modern aesthetics and cutting-edge research facilities. Upon groundbreaking, one thing was clear, the standards were set very high. The structures built on campus were designed with the expectation of lasting hundreds of years, which would be no different with Spruce Hall. Ludvik Electric immediately knew that we would be able to execute and deliver an outstanding project, on time, by following our company's mission to provide all clients with exceptional service, quality and integrity.

Spruce Hall is a one hundred twenty-five thousand square foot dormitory, housing four hundred twenty students. Included in this facility is a state-of-the art fitness room, social lounges, areas of quiet and repose, a cozy café and dining area, a game lounge, recreational space, as well as a courtyard, with panoramic views of the mountains. Extensive collaboration and coordination between the design team, engineers, owner, and subcontractors was imperative throughout the construction process. For Ludvik Electric, this project offered a great opportunity for our team to lead the way in the electrical industry by implementing innovative ideas, leadership, teamwork, and the ability to adapt and succeed.

There is a strong focal point of studies, at Colorado School of Mines, revolving around the environment and natural resources, and it is only fitting for Spruce Hall to have a creek run through it. The five-story structure has three wings laid out, in the shape resembling the letter “U”. In the south most wing of Level 1 the structure has a gap, designed to allow the natural water system to flow undisturbed. Major environmental and structural engineering requirements were necessary to allow the natural flow of the creek to remain, while simultaneously building Spruce Hall around it. Site work had its challenges, such as planning feeder raceways and branch underground to be re-routed into the building. In addition, there were excavation challenges in the courtyard and fire lane, due to high water table. With the expertise and coordination of the excavation subcontractor, Ludvik Electric oversaw all excavations and installs with thousands of feet of underground PVC raceways for power and data to meet the requirements of equipment such as generators, fiber optic connections, a motorized gate, courtyard additions, site lighting and panel feeders. While the site conditions throughout the project remained problematic, Ludvik sought out windows of opportunity, overcame problems and relayed solutions to the general contractor.

During the construction process, there were no shortage of obstacles, one of the more disruptive being the phase when the structure went vertical. The Ludvik team endured harsh weather conditions and encountered twenty plus days of weather-related delays, which made in-slab rough-in of electrical components very difficult. However, with proper planning and sequencing, Ludvik’s qualified field teams were able to complete the work in less time than allotted for each

deck pour. This was accomplished, in part, by pre-fabricating all deck rough-in materials in our prefab shop, which allowed the field team to complete rough-in and installation in one-third of the time. Ludvik scheduled prefab drivers to take advantage of opportune weather conditions with all materials consolidated into a fly box, designed to be picked by crane from the truck and transferred directly to the deck for install. While this did not keep crews entirely out of the elements, it significantly reduced logistical and installation time. Also, the quality of work was executed precisely without any in-slab broken raceways.

In the early pre-planning stages, Ludvik Electric initiated a rough-in strategy to efficiently execute an approach that met the high standards of Colorado School of Mines, as well as to meet the integral structural needs. While in-slab rough-in was acceptable for the Level 1 slab-on-grade, Floors 2-5 required a shallower depth of concrete, poured onto pan decking. Due to structural and concrete coverage requirements, traditional rough-in for power, data, and fire alarm raceways were un-achievable. This obstacle changed the game plan and the Ludvik team was tasked with finding space in a congested corridor for thousands of feet of conduit. Adapting quickly and working diligently with our in-house Building Information Modeling (BIM) specialists, the field team worked to find space in the corridors on Levels 2-5 to run thirty-three, one-inch conduits in a thirty-inch wide by nine-inch-high space. This space was already congested, lined with mechanical, plumbing, and fire protection components. Through structured team meetings, which included all the trades as well as the design team, BIM was leveraged to aid in solving this complex issue. Ludvik was able to utilize Trimble Total Station to pinpoint locations of Unistrut rack supports, junction boxes, and cable tray supports. By incorporating this technology, and collaboration between the BIM and field teams, Ludvik was able to ease the install and save time. The result was an overwhelming success.

At Spruce Hall, site logistics in relation to existing buildings presented some challenges. With other buildings being occupied by students on campus, Ludvik was tasked with relocating an existing generator for Maple Hall, slightly to the south to make way for the new Spruce Hall generator. This required excavation to uncover the feeder conduits and redirect them to their new location, which also created the need to employ generator back-up power to Maple Hall during

the downtime. Ludvik worked closely with Colorado School of Mines maintenance electricians to produce a detailed methodology and procedure to successfully execute the scope of work, both safely and efficiently. Stringent time allotments were outlined, and these were met by Ludvik, permitting the students to quickly reoccupy the building. In addition to Spruce Hall, Ludvik Electric also oversaw the electrical installation of the tunnel project to the north, which involved connecting underground steam lines throughout the campus. Given the wide scope of work across the campus Ludvik Electric's success at Colorado School of Mines was achieved through outstanding customer relations, pre-planning and execution.

The Spruce Hall project, along with the rest of industry-wide work this year, has faced unique safety concerns. Flexibility and due diligence were required of all team members in dealing with the outbreak of COVID-19. Ludvik Electric quickly adapted to the challenges and implemented procedures to keep employees safe. The project at Spruce Hall and all work at Colorado School of Mines was a testament to Ludvik Electric's strong safety culture, resulting in zero injuries, zero lost time and zero cases of COVID-19 for all Ludvik employees on site. With the pandemic on the forefront of everyone's mind, it was vital to convey the importance of everyday construction safety to the team through weekly toolbox talks and site visits from Ludvik's safety department. Ludvik Electric continues to lead by example with our values in safety, we are committed as a team to do whatever is necessary to keep our crews safe and maintain Ludvik's .55 Experience Modification Rate.

It is now Fall of 2020, class is in session, and the first freshmen who will call Spruce Hall home have arrived. The hard work and effort put forth by all the trades, including the general contractor have made this achievement possible. In a sense, Spruce Hall just made it by the bell. All the collaboration and hard work came together to deliver an exceptional product to the client and a space able to facilitate and foster the development of knowledge and higher education.









