

Exacting Precision Proves Critical in Leading-Edge Lab Renovation

U.S. News and World Report's 2018 ranking of Best Engineering Schools places the University of Colorado/Boulder in the nation's top 40. The epicenter of the globally respected program is the 660,000 square-foot Engineering Center. In 2017, Legacy Mechanical, Inc. renovated the aging facility's plumbing and mechanical systems to meet current and coming demands. The success of the complex project came down to spatial tolerances measured in millimeters, scheduling in 15-minute intervals and just-in-time materials delivery with no room for error. The process called for nothing less than ACE Award-level performance.

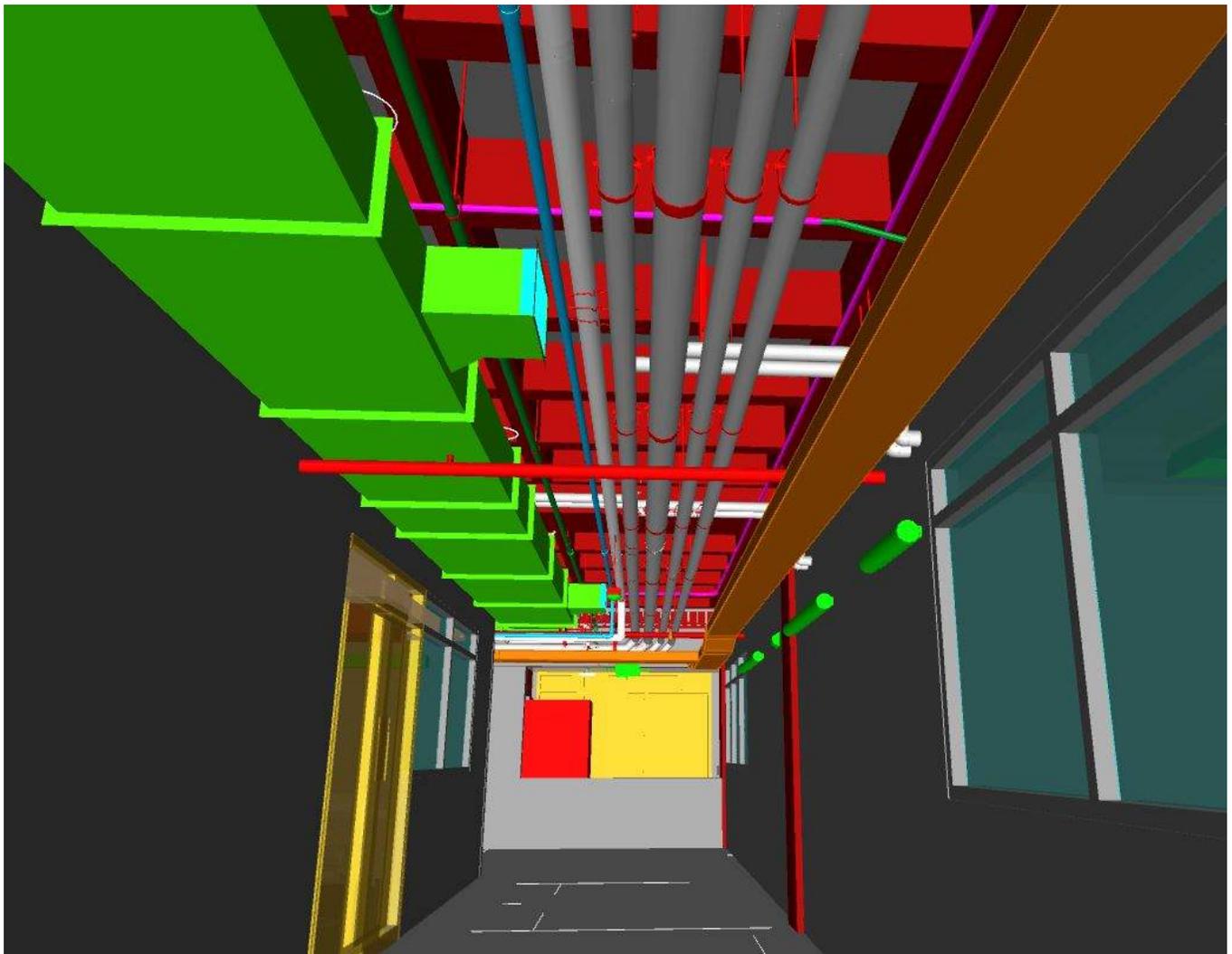
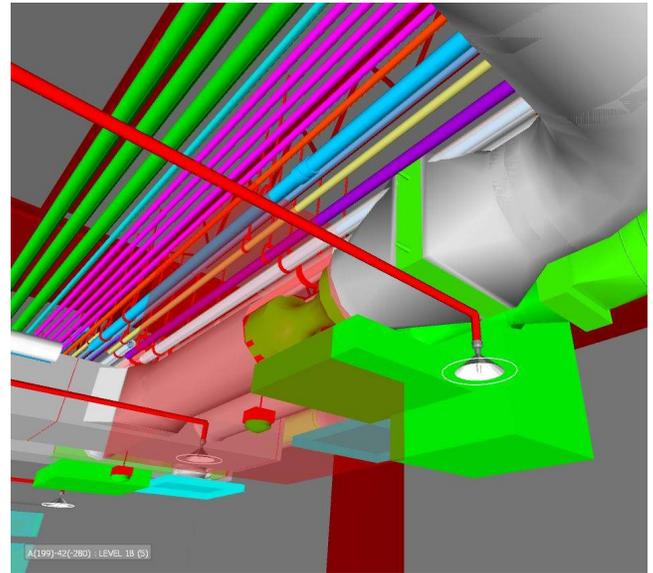
Assessing the Challenges

While today's Legacy was founded in 2004, its principals have been collaborating since the mid-1990s on some of Colorado's most recognized projects. *Denver International Airport. Union Station. Multiple buildings on both the University of Colorado and Colorado State University Campuses.* Expertise developed across those two decades was key as the Legacy team tackled this remarkable renovation. Three key factors included:

- **The age of the original building.** The initial facility was built in 1965. While updates had occurred in some areas, design has changed significantly over the nearly 60 years since.
- **The need for the facility to remain occupied throughout.** Multiple phases, sub-phases and temporary services would be required to keep laboratories outside the construction area functioning.
- **The demand for greater energy efficiency.** A heat recovery system, demand based ventilation and detailed commissioning ensured an efficient lab building from concept to completion.

Calibrating the Solution

Most new laboratories are designed to have a deck-to-deck height of 16 feet to accommodate the complex mechanical/electrical/plumbing (MEP) necessary for optimal laboratory functioning. The maximum height here was only 12 feet. Legacy relied heavily on its building information modeling (BIM) to make it happen. Ultimately, everything was integrated...but frequently with clearances of less than ¼-inch between systems.





Replacing the major mechanical equipment on the roof carried its own level of complexity. Existing fans, air-handling units, pumps, heat exchangers and heat recovery units were outdated and needed replaced. All components had to be flown up during off-hours as they were being transported over an occupied area of the building. The impact of the crane pick was minimized by scheduling all over one weekend. More than 40 crane picks were required to lift and locate the equipment inside the penthouses. Each crew's schedule was detailed down to 15 minutes increments to keep the crane moving.

Because the lay-down area for deliveries was limited, at best, and nonexistent, in many instances, a true just-in-time delivery construction method was essential. This not only compressed the tight construction

schedule further, it meant crew-scheduling became doubly critical. At the peak of the project, the mechanical and plumbing scope required 12 crews on-site. Just enough materials were kept on site for those 70 men to use in three-day increments.

Gauging the Success

Scott Krum, President recaps, “We laughed among ourselves about this being a true test of the time/space continuum. When you’re working with quarter-inch tolerances and down-to-the minute deliverables, you know you have a great crew. They are truly ACEs. We know their performance is a major part of Legacy’s being selected repeatedly for some of the most demanding projects on Colorado campuses.”







