

Category: 7 – Best Building Project – Specialty Contractor (Over \$10 Million)

Specialty Contractor: RK Mechanical

Project Name: C. Wayne McIlwraith Translational Medicine Institute at Colorado State University

Colorado State University's (CSU) C. Wayne McIlwraith Translational Medicine Institute (TMI) is poised to be one of the world's top translational medicine research centers. The \$79 million ground-up facility is comprised of 116,194 total square feet, with 48,550 square feet of space dedicated to animal care, expanding on the university's highly acclaimed veterinary medical center campus.

Scheduled for completion in September 2018, the cutting-edge veterinary science institute will combine research, resources, existing knowledge and techniques from multiple academic fields. It will focus on the research and treatment of animals, large and small, with the intent of later translating the important research data into technology that can also be used to treat humans.

Top facility features include:

- Teaching laboratories dedicated to animal dissection and stem cell culture research
- Integrated operating rooms for preclinical surgical research focused on endoscopy and arthroscopy training
- CT scan and MRI rooms
- Audio/visual-equipped virtual reality immersive classrooms
- 150-seat auditorium
- Fully integrated media production studio capable of sending live feeds
- Large animal performance treadmill capable of 60mph speeds
- State-of-the-art 3D printers enabling creation of prosthetics and bio tissues

The institute was named for a prominent veterinarian, University Distinguished Professor and founding director of CSU's Orthopaedic Research Center, C. Wayne McIlwraith. In his nearly 40 years on campus, McIlwraith built a remarkable equine clinical and research enterprise focused on stem-cell therapies in the hopes of healing injured and degraded joints. Several of his discoveries have already been translated into orthopaedic advancements for humans.

RK Mechanical served as the design-assist mechanical contractor for the project. The scope of work included designing, fabricating and installing all of the mechanical and plumbing systems.

It comprised of three custom rooftop air handling units; an interior air handling unit; a heat recovery unit; fume exhaust system on multiple floors; hydronic piping; domestic plumbing and medical gas piping for the lab vacuums; nitrogen; compressed air and carbon dioxide.

The project features four air handler units that circulate glycol, a form of antifreeze, heating water produced by four condensing boilers totaling a capacity of 14,100 thousands of BTUs per hour throughout the building. The heat-recovery system scavenges warm air from the building and transfers it to the glycol heating water, reducing the amount of energy required to heat up the water system. In addition, the circulating hot water system is used to heat the building through dedicated air handlers for each area.

RK Mechanical's team also installed a new chiller for the central campus chilled water plant, which feeds to the building through an 800 gallons per minute plate and frame heat exchanger. Thirteen different pumps with integral variable-frequency drives feed the chilled water system; glycol heating water system; heating water; heat recovery system and hot water circulation system.

Two other RK business units performed work on this project as well. RK Water provided water treatment services for the entire hydronic scope of the project. RK Service was awarded a 30-year service agreement with CSU to continue maintaining the mechanical and plumbing systems.

CSU set the construction bar high, expecting the final project to achieve LEED Silver status. Obtaining this certification can provide a positive environmental impact on the community and result in significant energy and cost savings for the owner.

To aide in accomplishing this goal, project crews had to comply with LEED guidelines during construction. All vendor, subcontractor and construction materials, even down to the material glue that RK Mechanical used, were selected due to their low levels of volatile organic compounds (VOC) in order to maintain the indoor air quality required for certification.

After construction is complete, a building flush out will be performed by RK Mechanical. The team will pull in 100% outside air and force it through the ventilation system to flush out any debris, such as dust, left behind during construction, as well as pollutants that may have seeped in from newly installed materials.

Northern Colorado received a lot of unexpected icy rain early on in the project which caused schedule delays as there were basically ice skating rinks on the ground causing fall hazards. Following strict safety guidelines, such as walking slowly and in designated walkways as much as possible, our crew continued working during this time to complete our scope of work.

Some construction complications outside of our control, including the need for the facility to be opened as soon as possible for incoming students, meant an accelerated schedule was needed. This required RK Mechanical's team to work a large amount of overtime, averaging 50-60 hour-long work weeks, to ensure that our portion of work would be completed on time.

While manpower shortages are a problem across the country, our team was innovative in overcoming this. RK Mechanical triumphed by creating a mix of field leadership that utilized overlapping trade management. For instance, our plumbing crews were supervised by knowledgeable sheet metal leads with expertise in the specific processes and systems required. This meant that the team needed fewer crew members on-site to complete the work effectively.

Due to the extensive fabrication requirements, RK Mechanical purchased much of the mechanical equipment from local vendors in bulk. The buyouts allowed our team to ensure high-quality standardized materials that could be delivered on-site in a timely manner for less. By utilizing partners, we were also able to produce materials around the clock, keeping the project on schedule. In addition, the size of our shop, along with our in-house prefabrication capabilities and our detailed CAD coordination, allowed us to work quickly and efficiently.

RK Mechanical utilized Holobuilder cloud-based software on-site. The construction technology uses 360-degree photos to create virtual environments combined with floor plans. The team used Holobuilder to indicate problem areas, monitor project progress and collaborate in real-time. It not only reduced confusion and possible miscommunications, but also provided a faster and easier way to manage progress. Further, the virtual walk-throughs saved time for other project stakeholders who could login and view various states of the project at any time during construction.

The original building design did not allow for future replacement of the over-sized boiler, so RK Mechanical suggested that a roof-top hatch be installed in order to remove and replace equipment in the mechanical room at the end of its life. The team's innovation and dedication to project success saved the CSU facility management team time and headaches.

Implementation and rigorous use of value analysis and engineering strategies by the RK Mechanical team helped to keep the project within budget. Our team's level of experience in selecting equipment, systems options and constructability all played a major role in the value engineering effort on this project.

Specific efforts included:

- Concentration on access and long-term user maintainability. During the design phase, equipment and maintenance access was modeled in to ensure maintainability for the life of the building. In addition, domestic water heating equipment was changed to ensure that the equipment could be removed at end of life.
- Review of control systems and requirements for component construction, followed by recommended cost-effective alternatives that would not compromise the integrity of the design.

RK Mechanical proactively collaborated with the project owner in the early phases of construction as our team identified concerns about the long-term maintainability for CSU's facility managers. During the BIM process and coordination, all access panels for filters, maintenance and end-of-life equipment replacement was coordinated and identified with no-fly zones. All maintenance access was tagged as soon as valves and equipment were hung in the air so that they could be identified. RK Service monitored the process closely to ensure future maintenance would be possible.

RK is extremely proud to be an ISO 9001:2015, ASME and AISC certified contractor, as well as OSHA VPP Star Worksite and OSHA VPP Star Mobile Workforce accredited. Safety is our top priority and we have a zero injury goal on every project. Our team did not fail a single quality inspection of the entire project. In addition, to date, there have been no OSHA lost-time nor restricted day cases on this project.

By ensuring clarity of goals and expectations early on, the project team established rapport and an open dialog with on-site personnel. Quality Assurance and Quality Control (QA/QC) leaders were assigned to each trade and oversaw the project, helping to ensure that the project moved forward according to the schedule and mitigated risks to avoid set-backs. RK's licensed Safety Managers and Safety Superintendents were responsible for creating site-specific training plans, conducting safety inspections, eliminating hazards on site and ensuring compliance.

Our team continuously collaborated with the other subcontractors on site. This allowed RK Mechanical to identify and utilize areas other trades weren't currently working in to complete our portion of work, successfully cohabitating and driving trade stacking.

The City of Fort Collins has commended us for our unprecedented quality compared to what they have seen in the last ten years across the city. Due to our team's continued dedication, leadership and innovation, RK Mechanical is now a long-term partner with Colorado State University.









