

## **Project Name:** UHealth Harmony Cancer Center Linear Accelerator Expansion

McCarthy Building Companies, Inc. takes great pride in constructing essential projects our communities rely on, especially when supporting healthcare workers who have sacrificed so much for our communities. The opportunity to expand the UHealth Harmony Cancer Center with an additional linear accelerator was a great honor and a project we're very proud of, as it allows the hospital to treat more patients with more innovative treatments. Serving as the general contractor, McCarthy collaborated with numerous AGC Colorado partners on the expansion including: Legacy Mechanical, Gregory Electric, Martin Marietta Materials, Keller North America, Lu-Tek, Rolling Plains Construction, Front Range Roofing Systems, LONG Building Technologies, Brundage-Bone Concrete Pumping, Hillen Corporation and Lamp Rynearson & Associates.

The 4,883-square-foot expansion incorporated additional exam rooms, consultation space, and a third vault which houses the linear accelerator (LINAC), a machine that customizes high energy electrons to destroy cancer cells while sparing surrounding normal tissue. The project also included a 3,048-square-foot renovation component, which included backfilling former exam room space and admitting areas with new designs. A significant portion of the scope included mass concrete walls, which were self-performed by McCarthy. A substantial portion of that scope included the 5-foot thick, 18-foot tall accelerator bunker, which was completed in three pours with each wall and bunker lid completed in a single pour. The team conducted proof of concept mockups on the proper consistency of the concrete and chemical additives required to determine the highest quality product and execution plan. With a concrete pour of this magnitude, temperature differentials between the surface and center of the concrete had to be managed closely. When conducting the pours, the team covered the walls with insulated blankets to control the concrete's surface temperature and prevent rapid cooling. Prior to pouring, McCarthy also determined strategic locations of the construction joints – which were placed in the concrete to compensate for the expansion and contraction of the material – with the UHealth physicists to ensure adequate radiation containment within the linear accelerator bunker.

## **Solutions of Special Projects**

Familiar with working in operating healthcare facilities, McCarthy anticipated obstacles that would require collaboration on this project. Given the extensive scope, multi-phase sequence of work, and compact space constraints, these challenges occurred throughout the 15-month project duration.

Due to the project magnitude and specialized equipment required, McCarthy got involved early in the preconstruction process to develop a phased construction approach. This included engaging with the hospital's facilities and department head to develop a detailed plan through the four-phase project. As a company that takes great pride in a full-service approach, McCarthy worked with the design team, vendors and UCHealth on extensive medical equipment coordination to ensure the design documents captured all layout and logistical requirements. This included the large, central piece of the project – the linear accelerator equipment (pictured below). As intended by McCarthy on all projects, the additional attention provided not only a benefit the client, but also helped mitigate any unforeseen costs accrued late in the construction timeline.

As part of the scope, demolition was required to remove an exterior wall between the existing facility and the new building addition. The new addition was adjacent to the main entrance and parking lot – which remained active throughout construction – creating a dense workspace during demolition and throughout construction. This space constraint was accounted for in the construction timeline and site-specific safety planning. After the new building was constructed, the exterior wall referenced was demolished in addition to the thin, two spaces between the two structures and were removed through the hospital. The majority of work was completed during hospital off hours to ensure the facility remained operational without disruption, and more importantly protect the safety and exposure of current patients. In total, approximately three months of construction was completed during off hours (evening, night, and early mornings). The primary focus of these labor hours was concerted towards routing utilities through the existing hospital and required demolition mentioned above. The active site, which required convenient and safe access for all staff, patients, and visitors, was another obstacle to manage. The team made a concerted effort to separate the construction and patient areas. This required a separate entrance for the construction teams accessing the hospital, as well as different drive lanes created for the ambulances to the main entry way. The project team was frequently

complimented and plauded by the on-site staff for their hospitable and efficient construction approach and communication.

### **Excellence in Project Execution & Management/Team Approach**

As alluded to previously, one of the biggest accomplishments from a project execution and management approach was the early coordination of medical equipment. The meticulous examination of the design drawings by the project team and in-house experts provided a high level of cost and schedule certainty.

The project totaled 31,343 labor hours by McCarthy and its subcontractors with zero recordable or lost time incidents. Needless to say, the safety efficiency was stellar for a project that encountered severe weather in Colorado, navigated a pandemic, and was completed within narrow space constraints on an active site. To maintain the highest standards, a 5S program was implemented to promote jobsite cleanliness and productivity. This approach encouraged order in the workplace, using visual controls to eliminate waste. The 5S words are: Sort, Set in Order, Shine/Sweep, Standardize and Self-Discipline/Sustain.

Another efficient execution of construction was the mass concrete self-performed by McCarthy crews, and featured a relatively new, innovative advancement detailed in the next section. The team relied on the firms' years of concrete experience to develop a work sequence that produced an accurate and reliable schedule for all subcontractors, increased efficiency, and reinforced quality and safety standards. This accounted for approximately 20% of the project scope.

### **Construction Innovations/State-of-the-Art Advancement**

The linear accelerator bunkers consisted of 18-foot tall, 5-foot-thick concrete walls – therefore constituting mass concrete – and were poured with GIATEC SmartRock concrete sensors within the walls. The Bluetooth-accessible sensors help monitor the concrete poured, communicating to the McCarthy team internal and external temperatures and humidity of the concrete. With the varying temperatures in Colorado between summer and winter, this technology helps survey the stability of the concrete for up to three years after installment. This relatively new form of technology was an additional implementation by the project team as a form of value engineering for the hospital.

## **Environmental/Safety**

Safety is an integral piece of every McCarthy project. Our "All in" safety program means every employee in the field and office remains focused on keeping everyone safe at all times, including our clients, workers, trade partners, employees and visitors. From weekly safety meetings to daily stretching, McCarthy frequently instills the importance of safety on the job site. The project totaled 31,343 labor hours by McCarthy and its subcontractors with *zero* recordable or lost time incidents. Despite inclement weather throughout the winter and the tight constraints on the project site, McCarthy and its partners were able to avoid any potential issues involving safety. As part of McCarthy's involvement with the AGC and OSHA's safety partnership, the linear accelerator project was randomly inspected, helping the Colorado team achieve CHASE Blue, the highest safety award in recognition of keeping sites safe for all who are on site. With the hospital and oncology suites remaining active throughout construction, public safety was at the forefront from start to finish. The project team placed an emphasis on noise mitigation during specific hours and creatively developed workflows that accounted for the patients' experience, care, and comfort first and foremost.

## **Excellence in Client Service and/or Contribution to Community**

McCarthy prides itself on contributing to its local communities and making an impact away from the job site. This is especially true when it comes to active job sites, as project teams in the past have contributed to hospitals with donations of food, arts and crafts, or other community-focused projects. With sensitivity around the pandemic, this hands-on tradition unfortunately was not a possibility on this project. However, McCarthy found ways to indirectly impact UCHHealth through focused fundraisers and other ways we could serve the hospital through our work. During construction, the project required a building-wide power shutdown for tie-ins. One unique element of the hospital is that each medical suite features different owners, therefore involving many entities for a full shutdown. McCarthy did just that, learning about each individual space, what made them unique from a power standpoint, communicating an appropriate timeline for the shutdown, and making the inconvenience as smooth as possible. The hospital staff and suite owners were very appreciative of the constant communication and efficiency of the team during shutdown.



*1: The main entrance to UCHealth Harmony Cancer Center with the new building addition on the right side of the photo.*



*2: One of the few nursing stations within the new building addition at UCHealth Harmony Cancer Center.*





*3: The linear particle accelerator was the main focus of the UHealth Harmony Cancer Center expansion and renovation.*



*4: In tandem with the UHealth team and architects, McCarthy assisted with room and space renovations for incoming patients.*



