**CU Anschutz Unit Substation Replacement – University of Colorado Denver ($1,310,583)**
Category 2: Meeting the Challenge of a Difficult Job- Specialty Contractor
Intermountain Electric, Inc.

The construction of the CU Anschutz Fitzsimons Building began in 1938 and opened its doors in 1941, just four days before the attack on pearl harbor. Over the course of construction, as the threat of war increases, the building's original plan for a five-story building doubled. At completion, the building became the largest structure in Colorado as well as the largest hospital ever built by the army at 290,000 sqft and 608 beds. The building is a piece of Colorado history, originally servicing those coming home from war, training Army medics, and even treating former President Eisenhower in 1955. The building remained as an operational hospital until after the turn of the century. Now a part of the University of Colorado Denver Anschutz Medical Campus, the Fitzsimons Building is used for research and academic offices. The original building is surrounded by a full campus of newly constructed medical buildings.

To ensure longevity and preservation of this historic building, it is essential to establish a schedule of maintenance. When IME was contracted to replace the current substations outside of the Fitzsimons building, they had been covered by tarps to prevent water from entering and surface rust from spreading. The substation is essential to maintaining a constant energy source to the building that a great deal of people depend on for daily use. This substation replacement project will assist in keeping the historic building operational for many years to come.

**Challenging Replacement**

The project involved the replacement of three unit-substations required to power the Fitzsimons Building 500. To replace each substation, the existing foundations needed to be demolished, followed by the relocation of their conduit systems and replacement of the original foundations. These replacements would typically require power to be shut down to the building for almost a week per substation. IME recognized that the length of time without power would cause major disruptions to ongoing research and academic life. Therefore, IME's focus in planning for this project was to minimize disruptions and shutdown time for those working within the building.

There was an unprecedented level of coordination between General Contractor Howell Construction, Anschutz leadership & various departments, the IME operation-design team and multiple vendors. Ensuring that the Anschutz personnel had the power they needed, when they needed it, was no small task. Because of the building's age and existing unknown infrastructure, the decision was made that traditional demolition and replacement was out of the question. With IME's talent for innovative thinking, a project plan was created that reduced the amount of time the building would need to be shut down from over 2 weeks to just one long weekend.

**Solutions of a Special Project**

IME's solution to the problem of shutdown time was to design a steel frame skid that could support the 40' long unit-substation and allow for interconnection of pipe and wire for power and controls. IME coordinated site visits, safety, BIM, equipment manufacturers, design, steel fabricators, facility engineering, crane loading & pick plan and many other processes to bring the innovative skid together. IME utilized its Operations and Building Information Modeling (BIM) departments to create the customized design using a combination of 3D scanning and digital surveying equipment. Personnel made multiple site visits to gather information on the location of existing equipment and conduit.

After the modeling tasks were complete, IME worked with a design team from the steel fabricator to develop a complete engineered design. This included a base with ample room for the interconnection of conduit and wiring. Once the steel frame was built, the IME team worked with the fabricator to assemble all equipment on the skid, along with all conduit, wiring, terminations, BAS control, buss connections, torque, and all required testing. This work was all performed inside a controlled warehouse protected from the weather, which allowed our team to schedule and execute each task with precision.

Due to the age of the Building 500, remaining records of past construction work were inaccurate and incomplete. This lack of information could have led to unpredictable issues and extended the shut down time. To prevent those delays, IME's BIM department and General Superintendent worked together to ensure there would not be any interference with unknown underground obstructions and that all the conduit would fit properly. To further ensure that everything would run smoothly in the brief shutdown, the General Superintendent and Foreman

went back to the site before the replacement to double check everything. These extra measures taken beforehand guaranteed less risk for error in the brief replacement window.

Surrounding buildings, trees and other obstacles, made the precision handling of these massive, 41-foot-long 34,000-pound, prefabricated unit substations critical. The IME team planned our project execution with these limitations in mind. Each crane pick was planned out step by step to prevent hazards.

IME methodically and meticulously planned to ensure a successful completion of the substation replacements in a single weekend. Plans were created to chart every action taken by IME and subcontracted crews, ensuring on-site safety and successful replacements. After the Safe Project Plan, MOP (Method of Procedure) and crane pick plan were submitted and approved, three different cutovers were completed. Our team was proud to successfully complete this substation replacement—keeping the root of the CU Anschutz operating for years to come.

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

IME has formed a corporate Innovation Team of professionals committed to assisting all departments with innovative ideas. The team assists through the continual development of Apps, BIM best practices, training videos and other tools to promote safety, efficiency and forward thinking on how to solve complex situations for our teams and clients. This Innovation Team played a key role in the strategy behind the solutions to the difficulties presented by this project.

BIM was an integral asset throughout the project in mitigating the issues with existing conditions. IME utilized BIM techniques to create an initial design for building the skids as effectively as possible. Our BIM Fabrication Manager used Trimble Total Station and Infrared scanning to assist in planning how skids would connect to the in-place underground wiring.

**Safety – The Capacity Model**

As a part of a Quanta Services, IME uses a well-rounded approach to safety that we call the Capacity Model. The Capacity Model creates a work environment that focuses on preventing an incident while also building the capacity for failure by always planning and executing our work as if failure is going to happen today. This approach is focused on prevention, capacity for failure and learning. We think of capacity as a balance between prevention and controls, and we

must have the capacity to fail safely. At IME, our goal will always be to bring our workers home safe every day to their families; we are proud that on this project we were successful in doing so.

IME greatly reduced safety risks on this project by performing all the prefabrication work inside the Easter Owens' warehouse. Completing most of the work indoors during the winter months prevented the crew from spending long hours outside with exposure to the cold and greatly limited the potential for error in the field. With less chance of error in the field, the crew could be more attentive to closely following the MOP and safety protocols.

While setting the new skids in place, IME put in place the necessary controlled access zones to keep the public and our crews safe and clear from the path of the suspended loads. Because this work was being performed on an active campus, IME worked with Howell Construction and CU Anschutz to implement the appropriate traffic control plans.

**Success and Team Approach**

IME partnered with two subcontracted groups to execute the substation replacements: Easter Owens Electric Co and Duffy Crane and Hauling Inc. Easter Owens is well known in the Denver area for their work in constructing specialty items. They assisted IME in this project by constructing the three substation line-ups on skids and engineering them to be easily picked up by a crane. Duffy worked with both IME and Easter Owens to ensure that they could pick up the skids safely and move them into place while working within confined spaces. The coordination between parties was paramount in the success of this job.

IME's team for this challenging work was handpicked by the General Superintendent. The team was made up of crew members who were committed to knowing every step of the job, working long hours and through the weekend. The crew's preparation and communication were essential to completing the substation replacement in such a short span of time. At the Anschutz Campus, the IME team along with our subcontracted partners and Howell worked together to develop an innovative design, built in capacity for a safe working environment, and provided our client with a successful project.

**Photos:**



CAUTION