

DEN Emergency Fuel Shut Off Replacement

Category 2 - Meeting the Challenge of a Difficult Job - Specialty Contractor

Intermountain Electric, Inc

Environmental, health, safety and scheduling challenges couldn't stop the IME team on the Emergency Fuel Shut Off (EFSO) Replacement Project at Denver International Airport (DEN). After 24 months, they completed the work knowing it would be one of the defining projects of their careers.

Since opening, DEN worked with the legacy EFSO system, making repairs or modifications when needed. Due to a long list of troubles with the aging system, their Fuel System Management Team (FSMT) was forced to manually adjust or correct issues that would arise. Sometimes, these troubles caused failures, resulting in a disruption to the jet fuel system and significant impact to the airlines. This process wasn't scalable for a growing international hub. A new EFSO system was critical to the infrastructure and the future of the airport.

IME knew the project had its challenges – Much of the work would be done in underground vaults, which were confined spaces and classified as Class 1 Division 1 Hazardous Locations due to the storage of jet fuel and explosive gasses. In addition, replacing the EFSO at an operational airport meant scheduling and communication had to be on point. What the team didn't predict was the environmental toll and working conditions of the EFSO vaults/rooms and a global pandemic that would change the way construction work got done.

IME's preconstruction team developed a plan to minimize actual work time in the confined vaults. They took 3D images, which gave sight to the old system, conduit and wiring without physically being in the vault. It also allowed the prefabrication team to get the specs necessary to build before construction started. Without stepping into a potentially dangerous work environment, IME developed a strategy for the project. These images were also shared with the entire project team, providing everything needed for pre-task planning. In total, the team used 29 3D images.

With heightened safety concerns, IME worked with the Denver Fire Department and created confined space policies, which included monitoring atmosphere safety, harnesses and ventilation procedures.

Now that the strategy was ready to go, construction began. With 9 new PCL control panels, a 15-mile fiberoptic loop, over 600,000ft of XHHW, 10,000ft of twisted shielded cable, 39 thermal mass flow sensors and 170 new EFSO pushbutton stations to install in just 24 months, the crew of 8 had their work cut out for them.

The project scope called for reusing the spare conduit already placed under the concrete at DEN. But finding the right raceway took work. The spare conduits were placed when the airport was built, nearly 30 years ago. Years of being buried beneath the ground caused build up and blockages that needed cleaned. When a conduit was found and approved by DEN for use, it took 4 nights to pressure wash and prepare. Night work was required as many of these conduits were placed just outside a concourse and routed through active gates and taxiways, which would have made work during the day unsafe and interrupted.

Pulling wire presented another challenge for the team. With 9 different wire run locations, dozens of conductors in each run, wire lengths of up to 3000ft through multiple underground vaults and junction pits, additional manpower was needed. Due to successful coordination and scheduling by Tyler Widener, General Superintendent, and Nate Guenette, General Foreman, teams of 20-25 were able to get the wire in place.

At this time, construction teams were still figuring out how to work with cases of COVID on the rise. As a small crew of 8, social distancing and face masks were easy to implement, but when extra crew members were brought in to pull wire, challenges arose as they did with every construction crew at this time. People were working in close proximity to each other, and IME was making safety a priority.

The team knew of room and vault challenges through 3D imaging. Each challenge required a different strategy. Some valve vaults and junction rooms were filled with water and required pumps, rubber boots and additional PPE. Others had damaged equipment covered with buildup. Some ESFO rooms had holes in the walls and temporary emergency wiring that needed patched and reworked. With every space, IME team members did what it took to get the job done.

Air quality in the vaults caused scheduling conflicts. Many times, work was assigned on a specific vault but the atmosphere in the confined space was deemed unsafe. This required the team to move their attention to another part of the job while the space was ventilated and prepared it for future work. IME monitored the air quality carefully, knowing that in just minutes, it could change from good to bad.

Flexibility was paramount during this project not only because of environmental precautions, but because of the substantial number of projects happening at DEN. The IME team worked closely with Hensel Phelps (HP), DEN and other crews on site to design a schedule that allowed everyone to be efficient. For example, during snowstorms, work was not scheduled on the west side of the airport, knowing DEN needed that space to de-ice planes. Other contractors would work with IME as their projects crossed paths with the EFSO system.

Communication was a big part of this project's success. As it progressed, communication with HP occurred at least once an hour. Weekly email briefings were sent to over 39 recipients, including members of DEN, HP, the FSMT and the DFD. Widener communicated action and testing plans. As changes occurred, he was quick to communicate to all invested parties.

Before finishing the project, IME faced one more challenge. Components of the legacy EFSO system had to be located, mapped and flagged for removal. These components were located in outdoor junction boxes and throughout multiple building rooms and ceilings, but there were no records of exactly where they were. Guenette laughs about it now, but he recalls his crew peeking behind ceiling tile after ceiling tile to find these components. "It was like searching for treasure!"

In the end, IME installed a new EFSO system while keeping the legacy system up and running. This allowed DEN to continue operations without interruption. Only after rigorous testing, the new system seamlessly took over as the old one shut down, ensuring not only the safety of the airport personnel and construction crews on site, but the general public who require the use of DEN every day. With IME's careful planning, determined crew and attention to safety, the project was finished with 0 safety incidents. And, by finishing the project on time, IME helped to future-proof concourse expansions already in progress.

From Hensel Phelps

This was very complex project that required a high level of daily coordination with multiple stakeholders, while making sure there were no disruptions to this critical system at DEN. From the beginning of this project to the final commissioning of the EFSO system, the IME team proved they had the grit and fortitude to get the job done right. They were an integral part of the initial investigation, evolving task planning, identifying and working through many unseen conditions in the field, innovating better ways to put work in place, assisting the design team find the right solutions, critical component install and commissioning, all while putting the work in place in a safe and efficient manner.

We cannot say enough about the level of commitment and professionalism their general superintendent, Tyler Widener and the entire IME team brought to this project. Their willingness to work long overnight hours during multiple wire pulls while always providing all resources available really helped keep the project on track. They constantly provided a detailed action and migration plan that we could properly relay to DFD and all stakeholders. IME made the acceptance testing very straightforward and transparent which made all the difference closing out the permits and turning over a fully functioning upgraded EFSO system to the end user.

IME met and exceeded the challenges of a difficult project and performed brilliantly. Overall, Hensel Phelps was very fortunate to partner with such an incredibly committed and elite team in IME. - John Woodward, HP Superintendent

From DEN

I would like to recognize Tyler Widener's efforts working on EFSO project. Tyler's continued efforts to coordinate, assemble and facilitate this elaborate project are greatly appreciated. He regularly keeps DEN up to date in the field with any changing conditions for the duration of the project and has an excellent look ahead to possible issues during construction. Tyler regularly contacted me of changing conditions and need for airfield closures and access to keep project moving forward in a very timely manner. His professionalism and ability to lead a high stress project has been exemplary and speaks highly of IME. I would also like to thank the entire crew of 1st class electricians led by Tyler for their dedication. - Michael Disney, DEN









