Project: United Airlines Flight Training Center Building G
Category: 12 - Best Building Project – General Contractor ($40 - $70 Million)
Company: Hensel Phelps

Project Overview

The United Airlines Flight Training Center Building G project (Building G) expanded the training center's capacity and consolidated United's entire pilot training in Denver, Colorado. Now the largest flight training center in the world, the flight training center welcomes the airline's 12,000-plus pilots every year for new and recurrent training. Furthermore, two dozen other airlines and government agencies send their pilots to this renowned flight training center to sharpen their skills.

Promises made, promises kept! Prior to this project, United Airlines' experience with the construction sector had involved projects that were consistently delivered over budget and behind schedule. Hensel Phelps' goal was to change that trend through a collaborative design-build team approach. The project team not only delivered the project on budget, but the project actually returned half a million dollars to United Airlines and delivered Building G one week ahead of schedule.

United Airlines engaged owner's representative JLL, design-builder Hensel Phelps, and architect BOKA Powell to design and construct Building G. This new facility supports the airline's growth and provides training facilities for new aircraft models entering the fleet. This project added eight full flight simulators bays and four fixed training devices simulators, bringing the total to 40 full flight simulators and 20 fixed training devices. Totaling 80,000 SF, the expansion also includes support spaces for simulator operation and flight crew instruction, including computer rooms, briefing rooms, classrooms, instructor and pilot amenities, simulator technician work areas, and storage.

Solutions of Special Projects

The permitting process was a critical challenge to the project's budget and schedule success. The permitting process on the Building G project required turning in permits early and following up with the process all while maintaining good relationships with the City and County of Denver. From the initial concept review, the project faced many challenges in the permitting process,

such as building on top of an existing Denver Water easement, being one of the first projects to adopt the new Denver Green Roof Ordinance, and the owner's mandate of a very fast schedule.

Upon award, Hensel Phelps quickly realized that before any permit could be issued, the water easement must be resolved. This required a new waterline to be designed, approved, permitted, and installed so that the existing waterline could then be demolished. Additional permits for this new waterline included the acquisition of a new easement, updated title work, and approval by City Council. Concurrently, the design-build team worked diligently through the permitting process of the new training center so that when the easement was approved construction could commence. Hensel Phelps led the charge to obtain approvals through three rounds of Site Development comments, sewer use, and drainage permits, Denver Fire reviews, approval from Denver Water, and obtaining a footings and foundations permit. Hensel Phelps received the footing and foundation permit only after all other items were complete. In close coordination with the owner, architect, engineers, and trade partners, the entire team successfully completed the permitting within six months. As Graham Smith, Sr. Manager with United, stated, "Nice work everyone! SDs to full permit in this town in this time frame is impressive!"

Excellence in Project Execution and Management/Team Approach

In close coordination with the owner, Hensel Phelps implemented three value engineered savings on the Building G project. These included:

- **Elimination of a Basement -** The original bridging documents specified a basement underneath Building G's computer room to allow enough space for the installation of mechanical, electrical and simulator services. During the design-build process, Hensel Phelps evaluated the need of the basement and determined they could eliminate the basement by providing a 24 inch depression under the computer room and adding a raised floor to accommodate the required services. This value engineered idea saved the owner $1.75 million.
- **Over Excavation** - After reviewing the geotechnical report, the project team determined that over 11 feet needed to be over excavated beneath the project site. Instead of over excavating, Hensel Phelps proposed to use high energy dynamic compaction as this modification provided more than $175,000 in savings and reduced the schedule by three weeks.

- **Exterior Finish -** To find ways to stay within the budget for the exterior finish, the design-build team held multiple value engineering sessions to discuss and price out multiple options. The final design integrated many of the value engineering ideas including the incorporation of cast stone and a combination of brick and stucco instead of concrete. The project team's early coordination allowed them to order the selected brick to ensure no schedule delays to the project.

Construction Innovations/State-of-the-Art Advancement

As the design-builder, Hensel Phelps' quality control program extended beyond the construction to overseeing the design as well. Although quality concerns generally focus on craftsmanship and specifics such as the level of finish or precision joints in the masonry, on Building G the true evidence of quality control was in the successful installation of the full flight simulators. The $42 million Building G project is relatively small in comparison to eight full flight simulators that were valued at $25 million each, totaling $200 million. As such, the simulator manufacturer mandated above-industry tolerances for all systems within Building G, which Hensel Phelps added into their proven Six-Step Quality Control approach. From a long list of requirements, the following were the three features with the tightest tolerances:

- **Electro-Mechanical Motion (EMM)** – Hensel Phelps' craft used their concrete placement expertise for the motion base reinforced concrete pad requirements to support a dynamic load of 58,000 pounds per full flight simulator that required the flatness of the EMM motion base reinforced concrete pad to be within 0.08".
- **Crew Access Drawbridge** –Through close coordination with trade partners, the project team installed the crew access mounting support structure within 0.25".
- Ambient Conditions –The simulator bay flight compartment air conditioning system always needed to provide the crew area and on-board electronics a consistent temperature of 68 degrees with only two degrees of fluctuation.

As Graham Smith, United's Senior Project Manager, states, "Got a full pass, two thumbs up from CAE, the Full Flight Simulator's vendor, for the building (and they never give two thumbs up)."

Environmental/Safety

From a safety standpoint, Hensel Phelps' number one priority was the safety of the visiting pilots and crew. The project team implemented strategic procedures that included mandatory escorts for all deliveries onsite and employed flaggers at the entrance to the campus.

Safety went beyond the campus protocols, and it was a culture that extended to every trade partner and vendor working on the Building G project. Safety goes hand-in-hand with production, schedule, and quality for Hensel Phelps – nothing is more important than sending everyone home safely each day. Evidence of Building G's safety excellence is the fact that the project achieved zero lost time accidents even with 217,000 worker hours, zero DART cases, and only one OSHA recordable case for all trade partners.

Another jobsite specific safety example is the prioritization of high-risk work. The construction of Building G's simulator bays required a tremendous amount of high bay work. Hensel Phelps meticulously coordinated and monitored the high bay work of multiple aerial lifts to install structural steel, 3-ton cranes, ductwork, fire protection, and multiple finish trades.

Excellence in Client Service and/or Contribution to Community

One of the driving forces behind the culture at Hensel Phelps is the emphasis placed on assisting our trade partners to develop into a strong, viable partner. Hensel Phelps understands that one of the main reasons a minority and women-owned business enterprise (M/WBE) program exists is because the City and County of Denver continue to find disparity in private sector contracting. Hensel Phelps believes it is important to engage and mentor M/WBE's on all projects, both private and public – not just the ones that have a participation requirement or goal. It is important to expose M/WBE firms to private sector projects so they gain experience working with private developers, which is very different from working with a government entity. It also helps M/WBE firms to build their resumes by gaining experience in both sectors.

The United Airlines Flight Training Center Building G project is a testament to this approach as Hensel Phelps established a United Airlines specific Subcontractor Diversity Program that will be used as a baseline for future construction projects.

The project team developed various-sized competitive bid packages to ensure maximum participation in the diversity program. During the purchasing process, they divided specific scopes of work into even smaller bid packages to ensure participation for new and smaller sized firms. This enabled MBEs, WBEs, VBEs, DVBEs, SBEs, DBEs, 8a Enterprises, HUBZone Enterprises, BEPDs, and LGBT Enterprises to bid work on this private sector project. The results were an astounding 28% or $11.8 million worth of contracts that were executed with M/WBE firms. United Airlines appreciated the seriousness of Hensel Phelps' approach to benefit the local M/WBE community.


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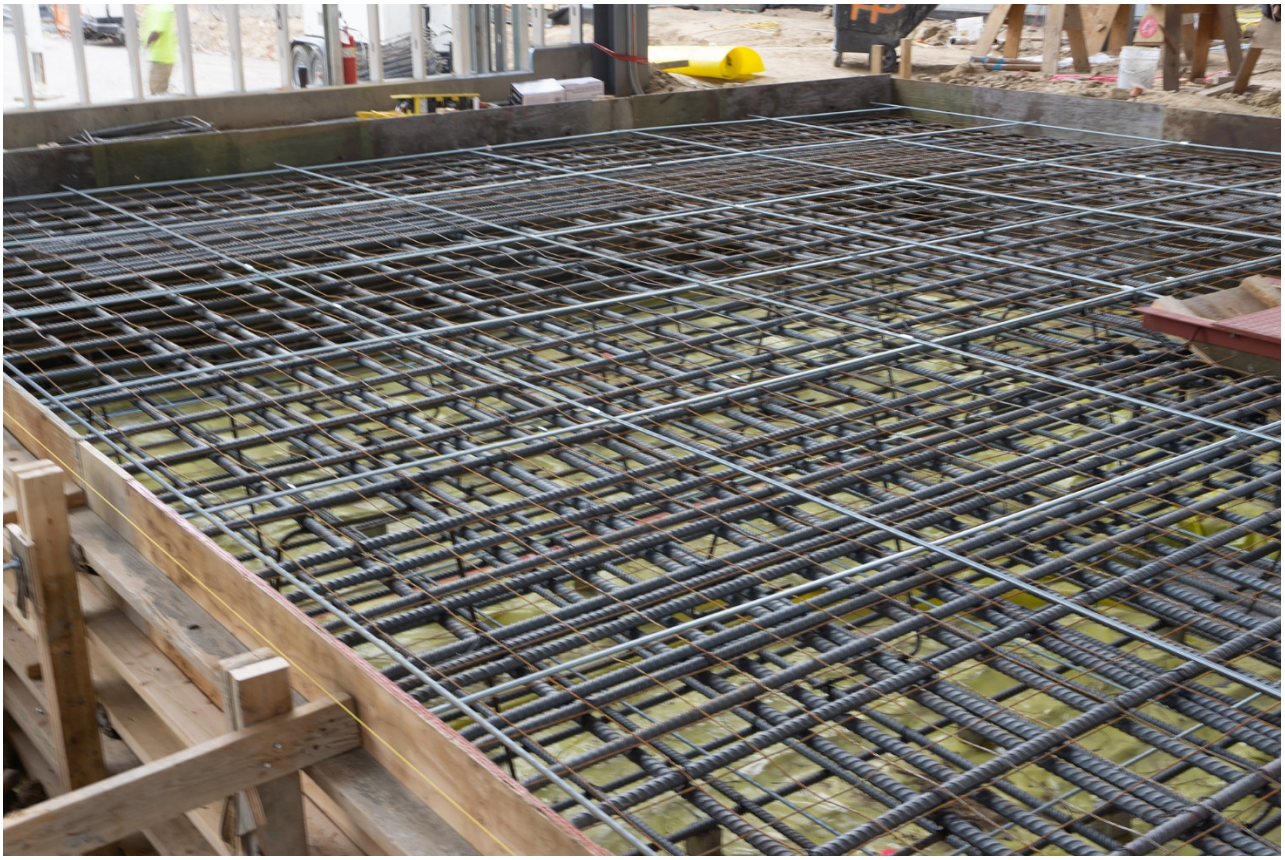


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