Solutions of Special Projects:

The project consisted of the design and construction of a new operations and maintenance facility that can house Blackhawk, Apache, Kiowa, and Chinook helicopters, which supports the 13th Combat Aviation Brigade stationed at Fort Carson, Colorado. Primary facilities include the standard design maintenance hangar, aircraft aprons, and aircraft wash aprons. The hangar building consists of 48,000 SF of administration space, including offices, shop areas, work benches, and locker rooms; 87,000 SF of hangar space; 521,000 SF of paving around the hangar and Air Traffic Control Tower; and supporting facilities.

Special project features include:

- ✓ Designing the project to outperform ASHRAE 90.1 2007 baseline building energy consumptions levels by 50% to meet the Department of Defense mandate that the Butts Army Air Field and 13th Combat Aviation Brigade be a Net Zero Energy Installation by the year 2020.
- ✓ Overcoming substantial challenges, including a late owner-driven design change from a wet fire suppression system throughout the hangar to a High Expansive Foam (HEF) system on the hangar sides of the building.
- ✓ Providing an exemplary safety environment with zero lost-time accidents.
- ✓ Harboring a totally integrated team with real-time communication.
- ✓ Incorporating Design-Build Best Practices.
- ✓ Promoting sustainability by exceeding the LEED Silver mandate with an innovative approach related to design and construction that achieved LEED Gold level (currently pending) at no additional cost to the Government.
- ✓ A commitment to quality that was established immediately during the design process and continued throughout the life of the project.

Excellence in Project Execution and Management / Team Approach

The 13th CAB ASB Hangar project had an aggressive schedule and challenging site within an active airfield. In order for it to succeed, the right team with the right plan was required. Led by both trained and experienced managers in Design-Build Best Practices, the Hensel

Phelps/JACOBS approach was to aggressively attack any issues, provide decision-ready information to all stakeholders, and then follow through to make sure it happened, using the following strategies:

- **Design Management:** A project can be delivered faster and at a lower cost if designers know how it's going to be built. To facilitate this, our design managers from both Hensel Phelps and JACOBS were in constant communication through routine Owner meetings, internal design meetings, and co-location
- **No Information Drops.** Hensel Phelps' portal-based information exchange — Proprietary MEO Technology — played a critical role in getting the right information to the right people by integrating data and giving the entire project team access to real-time, digital resources.
- **Co-Location | Constructability Reviews:** With real-time dialogue between Hensel Phelps and JACOBS on constructability and means and methods through over-the-shoulder reviews in our co-location environment, and comprehensive "follow the water" reviews, a continuous process of quality assurance and build-ability in the design was maintained.

Construction Innovations / State-of-the-Art Advancement

The Design-Build Team provided an accessible resolution center to the owner, where open communication and issue resolution was a top priority to all stakeholders. The value-added benefit that the Hensel Phelps/JACOBS Design-Build Team provided with this collaborative approach is demonstrated by the successful implementation of an owner-driven design change that occurred immediately prior to the production of Construction Documents. This Design-Build Team could be relied on for any issue that presented itself to the USACE because it had the readily available resources that the other design-bid-build prime contractors in the area could not provide to arrive at prompt solutions.

One visual example of this effective collaborative effort was the witnessing of a High Expansive Foam (HEF) test successfully completed on the first attempt. The Design-Build Team adapted to the USACE District Office change to the HEF system and started the re-design immediately. In lieu of waiting for a design to be created then priced then accepted, as would be the case for a design-bid-build contractor, that process was fast-tracked to allow minimal impacts to the overall schedule. It was discovered later during flow testing that there could be a potential concern with inadequate supply water to facilitate a passing HEF test. The entire team engaged local authorities, USACE district office engineers, as well as the Ft. Carson Department of Public Works, to provide insight to work towards a collaborative solution, with the Designer of Record (Fire Protection Engineer) and Fire Protection Specialist actively engaged. The results of these meetings, and a demonstration of best value for dollar spent, was evident the day the foam discharge station was tested successfully on the first undertaking, meeting the coverage criteria identified in the Engineering Technical Letter that the team was contracted to satisfy.

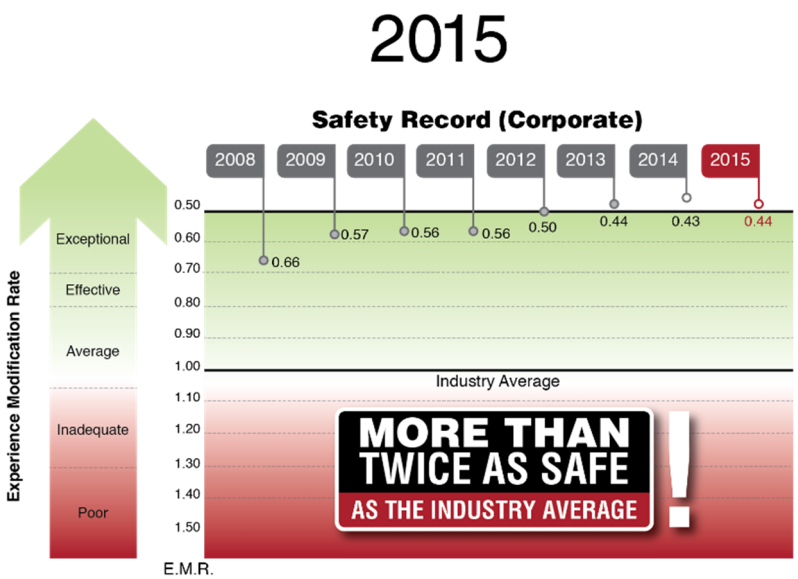
Another value-adding, collaborative element that this Design-Build Team offered was early turnover of facets of work identified by the USACE to be a higher priority to the project. Working through schedule concerns and requests made by the end user allowed phased turnover of the helicopter aprons, a critical aspect because the 13th Combat Aviation Brigade was moving from another installation and was incrementally moving helicopters to Fort Carson. As the helicopters arrived (ahead of final project completion), space was required to park and store the equipment. Clearly communicating the schedule against the end users' priorities was definitely a strength to the project team.

Building Information Modeling was used extensively throughout the design and construction phases of the project. The BIM requirements for this project were outlined in detail in Section 01 33 16 of the RFP. The design-build team thus was able to utilize BIM technologies, executed in Revit 2011, from the earliest stages of the project, including the design

phase. Early identification, review, and coordination of complex construction issues were made possible by the use of 3-D modeling and resulted in the prevention of potential conflicts. A BIM execution plan was developed prior to design and implemented throughout the project. With the input of subcontractors, the model was developed to include the following systems: Architectural/Interior Design, Spaces, Walls and Curtain Walls, Doors Windows Louvers, Roof, Floors, Ceilings, Structural, Foundations, Floor Slabs, Structural Steel, Cast in Place Concrete, Mechanical, HVCA, Plumbing, Electrical, Fire Protection, etc. The model also reflected as-built final construction conditions.

The RFP required LEED Silver Certification, and during the proposal stage of the project, Hensel Phelps developed a predetermined LEED scorecard to visualize a LEED Gold certification. The team held a series of collaborative LEED design workshops during the design phases to determine opportunities to meet or exceed the required LEED Silver certification. The designer, subcontractors, and construction teams all worked together to evaluate sustainability and building performance. LEED Gold certification with the US Green Building Council is currently pending.

Environmental / Safety



Hensel Phelps' commitment to a "Zero-Accident" safety culture extends beyond the employees of Hensel Phelps to every subcontractor and vendor working on a Hensel Phelps project, resulting in one of the industry's best safety records and a current Interstate Experience Modification Rate (EMR) of 0.44, more than twice as safe as the national average of 1.0. Hensel Phelps' Safety & Health Program is focused on accident prevention. The backbone of this approach is the use of **project-specific Accident Prevention Plans** designed around EM 385-1-1, OSHA Standards, client requirements, and other commonly accepted safe practices in the construction industry.

Safety features included:

- The Design-Build Team was able to implement and incorporate safety-conscious final products into the end deliverable by trending during design development. One example of this is the utilization of an alternating tread device coordinated to be installed on the interior of the building away from the elements in lieu of the typical exterior-mounted ladders, which were subject to slips, trips and falls, especially when carrying service equipment/tools up to the roof.
- Utilization of delayed pushbutton programming, early audible alarms, and door edge shutdown switch/bumpers to eliminate the hazard of being struck by a hangar door. With these features, when the doors strike an object in the path of travel, it will automatically shut down.

Excellence in Client Service and/or Contribution to Community

As a result of USACE District Office direction, the fire suppression system in the hangar side of the building was revised to an HEF system. As part of this design, a 28' -8"CMU wall was added running between the administration and hangar sides of the building. As a result of the project re-design, there was a major effort early on to re-sequence early site work activities, while concurrently working through multiple utility and infrastructure changes. Because of these efforts, all critical scope items (steel/MEP equipment/HEF system) had timely material deliveries.

Substantial additional contract modifications for utilities were redirected to be under the auspices of Hensel Phelps as a result of the multi-prime contractors on site that were also part of the challenge. In the final CCAS report, Resident Engineer Matt Ellis, US Army Corps of Engineers, gave the following testimony:

> *[Hensel Phelps] spent a lot of time and energy considering ways to keep construction on track during a period of multiple Government-directed scope changes. These multiple changes could have easily caused a less professional, intelligent, and experienced team to fall off course.*