

Providing solutions and efficiencies for MRO and FBO facilities

Contents

Introduction

AECOM has provided design-related services for maintenance, repair and overhaul (MRO) facilities at some of the largest international airports. Our clients include major passenger airlines, regional airlines, Department of Defense branches, general aviation operations and airport authorities.

We recognize that aircraft hangars are not just aircraft storage buildings, but advanced technical facilities for maintaining operational conditions and guaranteeing safety and security for commercial and national defense aircraft. We have a strong grasp of aircraft MRO work and how it affects airport site development and facilities. Basing aircraft maintenance operations at an airport can enhance the airport's overall value, particularly when the airport is a major hub for commercial, cargo or integrator airline operations.

Our knowledge of the MRO industry helps us understand the challenges our clients face in delivering new infrastructure and enables us to successfully plan, design and deliver new facilities and expand capabilities across the world. Based on our wide-ranging experience delivering both aviation and aircraft maintenance projects, AECOM knows how to accommodate aircraft MRO operations, from airframe and aircraft component work to supporting aerospace operations.

Comprehensive in-house capabilities and specialist skills

Bringing our proficiency to the entire project life cycle, our services include MRO planning and requirements analyses, site design and environmental analysis and on-site construction delivery. With full in-house engineering capabilities, we can support both building projects as well as unique MRO support equipment and systems. We understand the benefits of different building structure types and how to implement special systems such as fall safety systems, overhead crane systems and aircraft utility systems. Our specialized knowledge also covers building codes and fire protection.

By drawing on our global aviation network of multidisciplinary aviation professionals — experienced in finance, planning, design, program management and construction management — we can create integrated solutions for our clients for aircraft maintenance projects. Additionally, we can tap into AECOM's wider capabilities in aviation planning and environmental services and airport design to bring informed expertise to MRO hub developments.



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We recognize that MRO facilities are not just large-span aircraft storage structures, but infrastructure that's critical to the airport and community being served.

Our approach

Operational analysis and strategic planning

SERVICES

- Airport data analysis
- Aircraft fleet analysis
- Target market analysis
- Stakeholder consultation
- Hangar capacity analysis
- Airport negotiation assistance

Site planning and development

SERVICES

- Airfield planning
- Landside access planning and traffic studies
- Site utility analysis
- Building and site planning
- Airport Navigation Restrictions
- Facility and site optimization
- Aircraft maneuvering assessment
- Environmental permitting
- Cost consulting

Infrastructure and facility design

SERVICES

- Architecture
- Civil and building engineering
- Aircraft utility planning
- Aircraft MRO equipment coordination
- Fire protection consulting
- Building information modeling (BIM)
- Energy-use analysis
- Sustainability
- Commissioning

Management and facility delivery

SERVICES

- Project management
- Cost estimating
- Construction scheduling
- Site logistics planning — airside and landside
- Design-build
- Construction management
- Life-cycle assessment



Operational analysis and strategic planning

SERVICES

- Airport data analysis
 - Aircraft fleet analysis
 - Target market analysis
 - Stakeholder consultation
 - Hangar capacity analysis
 - Airport negotiation assistance
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With a deep understanding of the challenges related to developing aircraft maintenance and repair operations at an airport, we recognize the importance of cooperation between the airport, airline operators, potential new operators and independent MRO operators.

As airport development can be a lengthy process, understanding the current and future market is critical to the planning process for MRO facility operations and supporting infrastructure. For the new development to be successful, it must grow overall airport operations. Our strategic planning experts can take an in-depth look at an airport's existing aircraft MRO infrastructure, provide a detailed analysis of growth opportunities and conduct MRO facility network planning and market assessments.

With a full range of operational analysis and strategic planning capabilities, we can develop a strategy for an airport's MRO operations with its surrounding real estate assets and help plan for future development and expansion of MRO infrastructure.



Site planning and development

SERVICES

- Airfield planning
 - Landside access planning and traffic studies
 - Site utility analysis
 - Building and site planning
 - Airspace analysis
 - Facility and site optimization
 - Aircraft maneuvering assessment
 - Environmental permitting
 - Cost consulting
-

Our approach to new MRO site development combines technical airport planning and airfield expertise. Based on our experience we know that most challenges — adequate land area, cost, approvals, infrastructure and schedule — are related to site development. We have the specialized capabilities to respond to these challenges and provide a suitable building solution for the site.

Since land availability and airport operations inform site selection, MRO site development requires both physical and aeronautical planning and often involves environmental and other challenges. Whether this means managing an existing wetland or checking stormwater capacity or site grading, we take an integrated approach to handling site challenges.

Our integrated approach includes conducting early due diligence to reveal potential regulatory hurdles, preparing site layout alternatives and working closely with airport engineering staff and local permitting authorities to identify the preferred alternative. While the MRO facility is the main driver of the value of the development, the site, its utility infrastructure and its development cost often determine the overall return on the development investment.



Infrastructure and facility design

SERVICES

- Architecture
 - Civil and building engineering
 - Aircraft utility planning
 - Aircraft MRO equipment coordination
 - Fire protection consulting
 - BIM
 - Energy-use analysis
 - Sustainability
 - Commissioning
-

We design MRO facilities that focus on the aircraft maintenance process and technologies for aircraft MRO, as well as the aircraft special systems and digital technologies that enable MRO processing. We draw on our capabilities and experience to look beyond building floor plans to focus on enhancing proposed operations and the MRO process, increasing productivity and profitability.

A key challenge in MRO facility development is providing flexibility — in terms of overall space accommodation, adaptability, building durability and cost efficiency — to meet the current and future requirements of MRO tenants. The air cargo facility must work in unison with landside and airside operations, providing an efficient operation that is appealing to tenants interested in long-term leases.

As an integrated architecture and building engineering firm, with capabilities in construction management, we are sensitive to flexibility and durability in building systems, long-span structures, hangar door typologies, lifecycle costs, operating costs, maintenance costs and futureproofing through advanced technology.



Management and facility delivery

SERVICES

- Project management
 - Estimating
 - Construction scheduling
 - Site logistics planning — airside and landside
 - Design-build
 - Construction management and supervision
 - Life-cycle assessment
 - Commissioning
-

Supporting the delivery of new MRO facilities and infrastructure, we provide a range of services from project management, estimating, construction scheduling and site logistics planning, to construction management and supervision and commissioning.

AECOM has extensive experience implementing Lean design and construction within an airport environment to improve productivity, reduce costs and reduce risk on projects. As an integrated global design and construction leader, we provide project delivery flexibility to create the best value for our clients using BIM for both design and construction, advanced scheduling techniques and databases for cost estimating, energy use analysis and commissioning.

We help our clients determine the best project delivery method — design-bid-build, design-build, design-assist subcontracting or construction management — based on their unique goals and requirements for the construction project and the overarching goals of controlling cost overruns and limiting risk. With our in-house design-build approach, we can offer a single point of responsibility for turnkey delivery.

Our approach

Specialized Aircraft Hangars

AECOM has experience planning, designing and constructing special use hangars that feature emerging technologies. Whether the facility will be used for atypical operations such as modifications or aircraft conversions or testing military systems, we know how to integrate technology, create flexible work areas and future-proof facilities to meet the evolving needs of the MRO sector.

In addition to more standard commercial, military and general aviation hangars, our experience includes several special use hangars with unique capabilities. Integrating technology with the hangar shell, these facilities are used to test navigation and detection systems and provide flexible work areas that are not dedicated to a specific design aircraft or service. In all cases we work closely with technology providers to integrate special systems into hangars to solve many of the specific problems that MRO operations face.

Projects



United Airlines Hangar

O'Hare International Airport, Chicago, IL, U.S.A.

Client: United Airlines



SERVICES

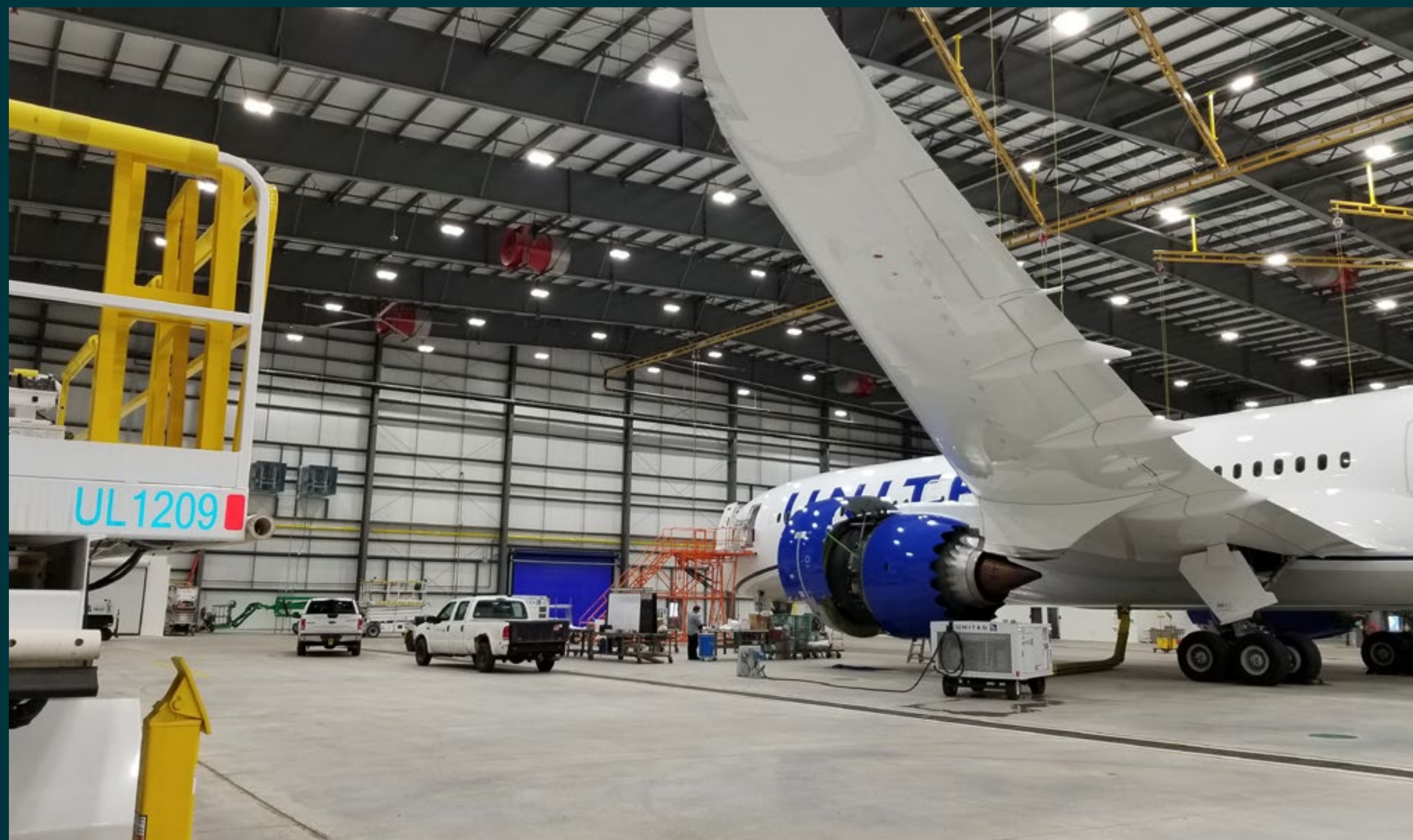
- Architecture
- Structural and civil engineering
- HVAC, electrical, low voltage and fire suppression design review
- Design-build construction services (as AECOM Hunt)

As part of the O'Hare Redevelopment Program, United Airlines needed to develop several new airline facilities and aircraft ramp area with a connector to existing maintenance operations. Since the new widebody hangar designed for B777-300ER aircraft was the last of the facilities to be built, funding was limited, and construction needed to be expedited.

AECOM was awarded the design-build contract based on our qualifications and an initial GMP estimate but we needed to reduce the construction budget by 20% to coincide with available funding. Working closely with our client, we investigated a wide range of value engineering items, including design program scope, steel construction type, hangar door type, hangar shell profile, subcontractor design engineering and other general scope reductions to balance the budget with stakeholder and operator input.

The project included aircraft ramp area, a connector to the existing United Airlines hangar complex and the 80,000-square-foot hangar. The hangar included a high expansion foam fire protection system, a fall safety system, high velocity low speed fans and in-floor pits. Using structural-engineered fill, we raised the project site by six feet to meet aircraft apron elevation.

As a result of our value engineering, the construction schedule was shortened to meet the airport-mandated deadline. Changes in scope also impacted the schedule. Permits and approvals for site, piles, foundation, building and tenant buildouts were fast-tracked to accelerate the construction process, and we completed the project in 14 months.





Pratt & Whitney Canada Hangar

Montréal-Mirabel International Airport, Montreal, Canada

Client: Pratt & Whitney Canada

SERVICES

- Programming
- Conceptual design
- Stakeholder workshop

AECOM provided facility programming and conceptual design for a flight test hangar for Pratt & Whitney Canada. We conducted direct stakeholder interviews and workshops to establish the program and scope and features of the hangar. Programming required a synthesis of differing operations and a stakeholder workshop to pull the program elements together.

This facility serves as a maintenance base for testing new jet engines on the test-bed aircraft for this engine manufacturer located outside of Montreal. The hangar base consists of two side-by-side B747 hangars with associated shops, storage, support offices and customer offices. The project included customized mezzanine design, mobile work platforms coordination and overhead craneage. Our concept study was used to develop a design-build implementation for the project.





Qantas Line A380 Maintenance Hangar

Sydney Kingsford Smith Airport, Sydney, Australia

Client: Qantas

AECOM provided site development analysis, hangar planning and aircraft system consulting for a new advanced line maintenance hangar to accommodate three A380 enclosed hangar positions and four A380 hardstand positions. The project included shop planning, advanced docking systems, utility pit design, ground run-up enclosure accommodation and an advanced material handling concept. This included the capability to deliver aircraft parts via automated delivery systems from an adjoining centralized warehouse to hangar aircraft work positions. We made numerous assessments for the main hangar structural shell, including teleplatform support and hangar door, as well as long-span canopy shelters for hardstand positions.

Site planning for this restricted area required numerous site plan test fits to meet our client's programmatic needs. Design considerations included maximizing hangar accommodations, developing hardstand positions, evaluating site maneuvering and responding to airport navigation restrictions. We also evaluated airfield height restrictions and radar reflection impacts and conducted ATCT line of sight and wind tunnel studies as part of the overall concept design.



SERVICES

- Site planning
- Hangar planning
- Space planning and test fits
- Concept design
- Aircraft system consulting





Narrowbody Hangar Complex

Nashville International Airport, Nashville, TN, U.S.A.

Client: Metropolitan Nashville Airport Authority

Together with a prime consultant, AECOM provided programming and hangar design for two 50,000-square-foot regional jet hangars with 35,000 square feet of support space. Initially the site planning involved siting the two hangars on a very hilly site with difficult access to the main airfield. Our focus was on the hangar shell, hangar door type, special systems and overall hangar operations optimization. Based on negotiations between possible tenants and the airport authority, only one hangar went ahead into full design and construction. This was complicated by a shared fire pump operation being planned for the hangar that was not implemented.

Design and planning services included site planning, aircraft positioning for four regional jets in a single hangar, hangar shell alternatives analysis, structural analysis, hangar typology review, stakeholder interviews, hangar shop planning, aircraft utility consulting and operational assessment. Intensive site planning was required due to both topography and the use of micropiles for the structure. Best value analysis targeted fire protection engineering and capture of any sprinkler foam discharge or fuel spill in the hangar.



SERVICES

- Programming
- Planning
- Architecture





Spaceport America

Upham, NM, U.S.A.

Client: New Mexico Spaceport Authority

AECOM provided architectural, engineering and sustainability consultancy services, including security, telecom and information technology services, for Spaceport America, which was built on a 27-square-mile, state-owned site near the White Sands Missile Range, 45 miles north of Las Cruces. Programming and engineering work for the spaceport encompassed aprons, runway and taxiway, fire station, roads, utilities, launch pads and fuel storage facilities.

Sustainability consultancy services included assessing projected needs for the Spaceport. We advised on sustainability for innovative architectural and engineering design, provided renewable energy modeling and reviewed financing options, provided US Green Building Council's Leadership in Energy and Environmental Design (LEED) registration and accredited professional services for the terminal hangar facility, advised on sustainable design for the airfield rescue and fire fighting (ARFF) facility and developed sustainable design and construction guidelines. The spaceport includes several runways, hangars, a control building, launch pads, fuel storage facilities and roads and utilities.

The New Mexico Spaceport project was completed in two phases. Phase I was the programming stage and Phase II included full design. The AECOM team completed the design phase, which resulted in 10 distinct design elements distilled into three construction bid packages. The project integrated building materials and methods that promote environmental quality, economic vitality and social benefit throughout construction and operation.

Sustainability highlights

- LEED NC Silver certification
- Onsite wastewater treatment
- 50% water treatment
- 30% energy reduction
- Sustainable education program
- Enhanced commissioning



SERVICES

- Programming
- Architecture
- Multidisciplinary engineering
- Sustainability services
- LEED services





LAX

United Airlines LAX East Aircraft Maintenance and GSE Complex

Los Angeles International Airport, Los Angeles, CA, U.S.A.

Client: United Airlines

AECOM Hunt was the prime contractor for a new 420,837-square-foot aircraft maintenance hangar and ground support equipment (GSE) complex known as the Technical Operations Center (TOC) at Los Angeles International Airport (LAX). Construction included a hangar to accommodate two wide-body aircraft, a GSE maintenance facility and apron paving. This project is USGBC LEED Gold certified.

The state-of-the-art TOC enables United to provide exceptional service for all of its aircraft fleets. The new facility includes two connected buildings — a ground service equipment and facilities maintenance building and a line maintenance hangar — and includes an engine support shop that will focus on the aircraft's Dreamliner fleet.

The new TOC consolidated two facilities operated by United at LAX that were located a mile and a half apart. The TOC is now located near the airline's terminal and integrates state-of-the-art technology and a modern design. The new hangar accommodates up to six narrow-body or two widebody aircraft at a time, supporting United's 150 flights that depart from LAX each day.

SERVICES

- Construction management at risk
- Fixed fee
- Guaranteed maximum price
- LEED Gold construction implementation





Completion, Modifications and Refurbishment Facility

Port San Antonio, San Antonio, TX, U.S.A.

Client: Gore Design Completions

AECOM provided design-build services for a new aircraft completion, modifications and refurbishment facility for Gore Design Completions. The 120,000-square-foot facility houses a hangar, shop and offices. The state-of-the-art facility is at Kelly USA, formerly Kelly Air Force Base. The completed hangar can hold a B747-400 and a B767-300 simultaneously and is the largest of its kind in the completion and refurbishment business in North America.

The hangar also provides room for future growth. Gore Design Completions worked in a leased hangar at San Antonio International Airport for three years before moving into their new accommodations.

The hangar was designed to accommodate "concept to completion" turnkey interior design and engineering capabilities. The hangar includes a manufacturing shop with capabilities for cabinet fabrication, sheet metal parts fabrication, machine shop and complete upholstery shop.



SERVICES

- Design-build services





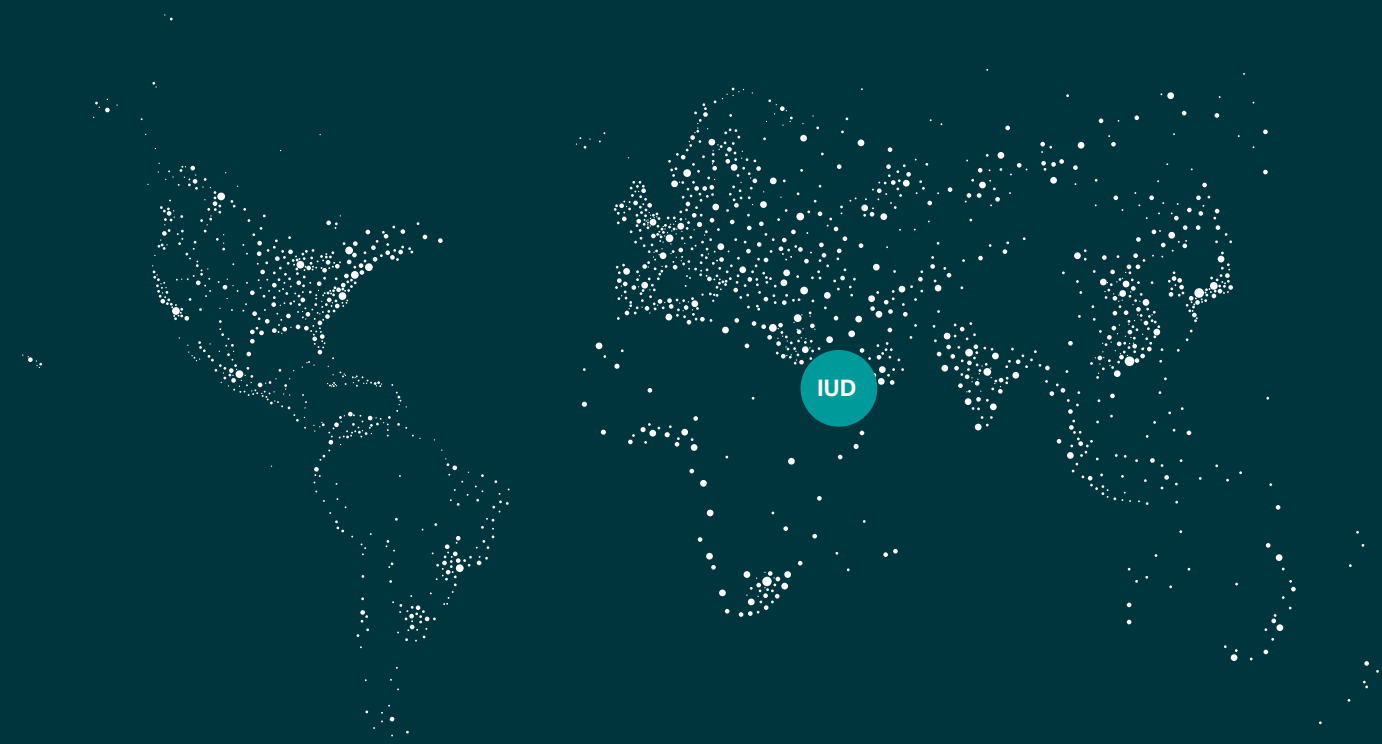
F-15QA Beddown Facility

Al Udeid Air Base, Qatar

Client: US Air Force

AECOM provided Title I design services for the F-15QA beddown facility to be constructed at Al Udeid Air Base southwest of Doha in the State of Qatar. In a strategy to build up the Al Udeid Air Base to a main operating base level, the Qatar Emiri Air Force has initially requested 48 F-15QA aircraft from Boeing. The new aircraft require a beddown facility comprising the necessary buildings, maintenance hangars and facilities, airfield apron and associated features, munitions storage and infrastructure to support and operate the aircraft and to train staff. Our services included program management and civil, electrical, structural and fire protection engineering. The scope of work focused on creating a design-bid-build advertisement package for the required facilities.

We developed the initial conceptual requirements for the proposed beddown facility in coordination with the USAF and host nation government agencies. The program included over 82 facilities, encompassing over 185,000 square meters of space. Designs were completed in Revit 3D BIM software (Revit 2015). We also prepared 3D renderings of the facility for charrette presentations. AutoCAD (in cloud-based ProjectWise environment) was used for the civil design and site electrical and telecom distribution drawings. Our design team also contributed to and verified cost estimates prepared using MCACES MII.



SERVICES

- Title I design services
- Program management
- Civil, electrical, structural and fire protection engineering
- BIM





Personnel Recovery 4-Bay Hangar/ Helicopter Maintenance Unit

Moody Air Force Base, Valdosta, Georgia, U.S.A.

Client: US Army Corps of Engineers, Savannah District

Located on an Air Force installation, this project required taking an existing design-build design (developed by another consultant) that was over budget and could not be awarded and delivering it as a design-bid-build procurement (with significant cost savings to ensure an acceptable award could be executed). AECOM completed this new building/structure design as a prime with multiple subcontractors. We developed and submitted designs for government review at 35%, 65%, 95% and 100%.

We completed the design for a new hangar and helicopter maintenance unit (HMU) to accommodate four HH-60 helicopters, a new centralized fire protection (FP) pump house with two storage tanks and 12 helicopter parking spaces. We prepared both structural interior design (SID) and furniture, fixtures and equipment (FF&E) packages for the hangar. The design meets Cyber Security and AFCEC Cyber Security requirements. We participated in a design charrette with our client and developed conceptual layouts for three provided courses of action with site plans, floor plans and exterior elevations before completing the design for the preferred layout.



SERVICES

- Architecture
- Structural, civil, mechanical, electrical, environmental and fire protection engineering
- Planning for vertical structure/horizontal infrastructure
- Cybersecurity services
- Interior design
- Cost estimating
- Commissioning
- Construction phase services
- LEED certification
- Sustainable design





LUF

F-35 Squadron Air Maintenance Unit/Hangar #3

Luke Air Force Base, AZ, U.S.A.

Client: US Army Corps of Engineers, Los Angeles District

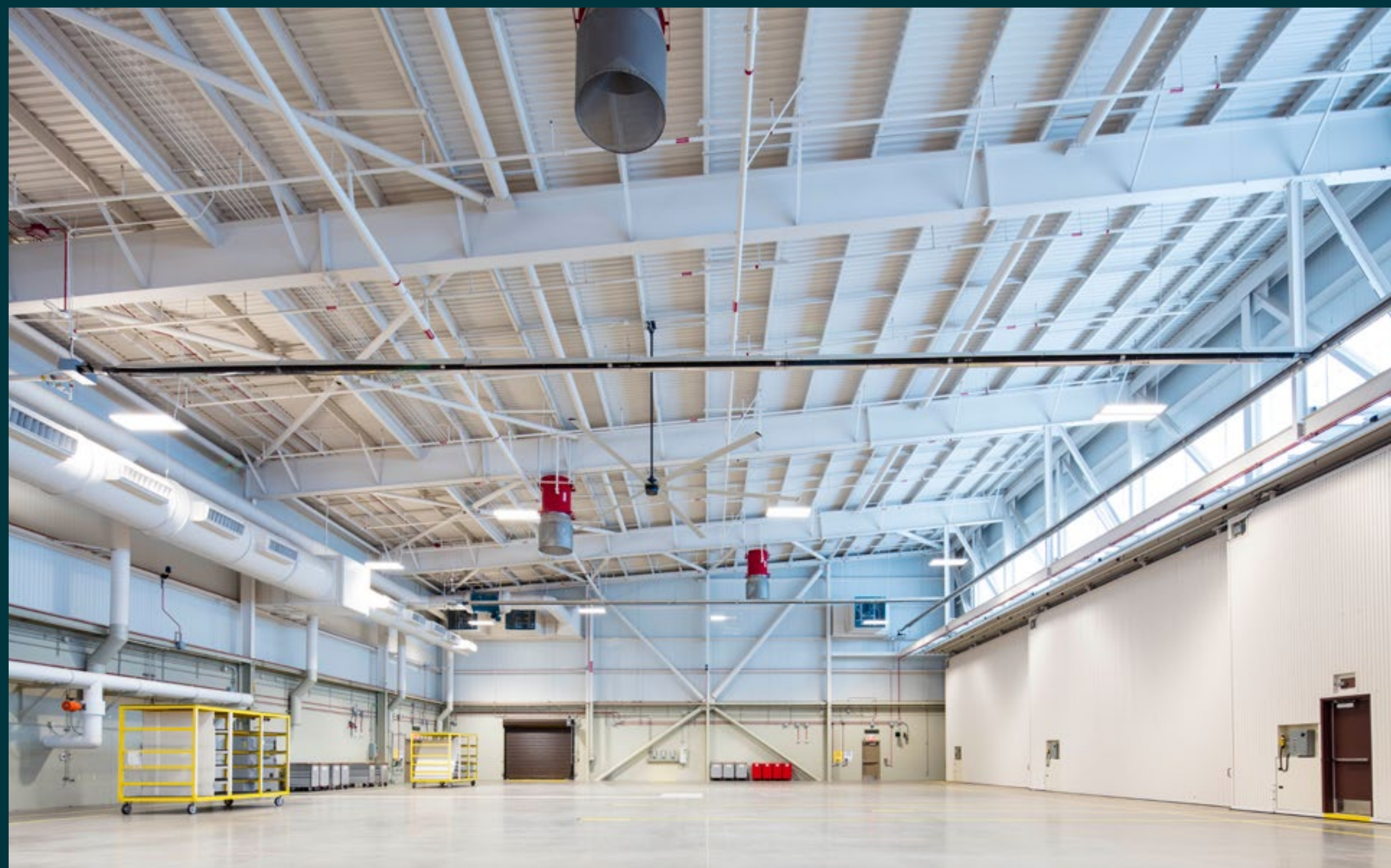
AECOM was the designer of record (DOR) and lead design firm for the new Joint Strike Fighter (JSF) F-35A aircraft mission beddown at Luke Air Force Base (Luke AFB), which includes an aircraft maintenance hangar. The overall architectural design goal for the facility was to provide a functional, visually appealing facility that is a source of pride for users and the base.

The design incorporated elements of the existing architecture and was compatible with the Luke AFB Architectural Compatibility Standards (ACS) and standards set by the previous F-35 facilities. We designed the facility to meet the requirements for LEED Silver certification. As the DOR, AECOM self-performed architectural design and provided design development and ITR services for local mechanical, electrical and plumbing engineering teams. We also self-performed LEED Advanced Professional services, energy modeling, BIM and interior design.

Our design work included a 29,666-square-foot maintenance hangar with support for six F-35 aircraft, sufficient space to pull and maintain engines, dedicated communications and other support facilities. The hangar includes a full intrusion detection system, dedicated aircraft cooling units and in-floor pop-up utility service centers.

SERVICES

- Architecture
- Multidisciplinary engineering
- LEED services
- Energy modeling
- BIM
- Interior design





Greenside/Whiteside Helicopter/ Aircraft Maintenance Hangars

Marine Corps Air Facility (Turner Field), Quantico, VA, U.S.A.

Client: Naval Facilities Engineering Systems Command (NAVFAC)

As part of a design-build team, AECOM designed two aircraft maintenance hangars, Greenside and Whiteside, at the Marine Corps Air Facility in Quantico, Virginia. These hangars support HMX-1, which is the sole helicopter transport squadron for the President of the United States. With over 1,000 personnel assigned, HMX-1, supported by the Greenside and Whiteside hangars, is the largest permanently formed aircraft squadron in the Marine Corps and is based at Quantico. The squadron is the sole helicopter transport squadron for the President of the United States. Although connected, the two superstructures are known separately as the 180,250-square-foot Whiteside Complex, which serves the Executive, and the 56,850-square-foot Greenside Complex, which supports the rest of the HMX-1 fleet. The Greenside and Whiteside hangars are similarly designed aircraft hangars with adjoining maintenance buildings that house offices, storage areas, briefing rooms, maintenance shops and flight crew support rooms.

In keeping with the base's Georgian-style architecture, design features for the new facility include a brick veneer exterior, east stone accents, a prominent cornice and a parapet.



SERVICES

- Architecture
- Multidisciplinary engineering
- Fire protection
- LEED services





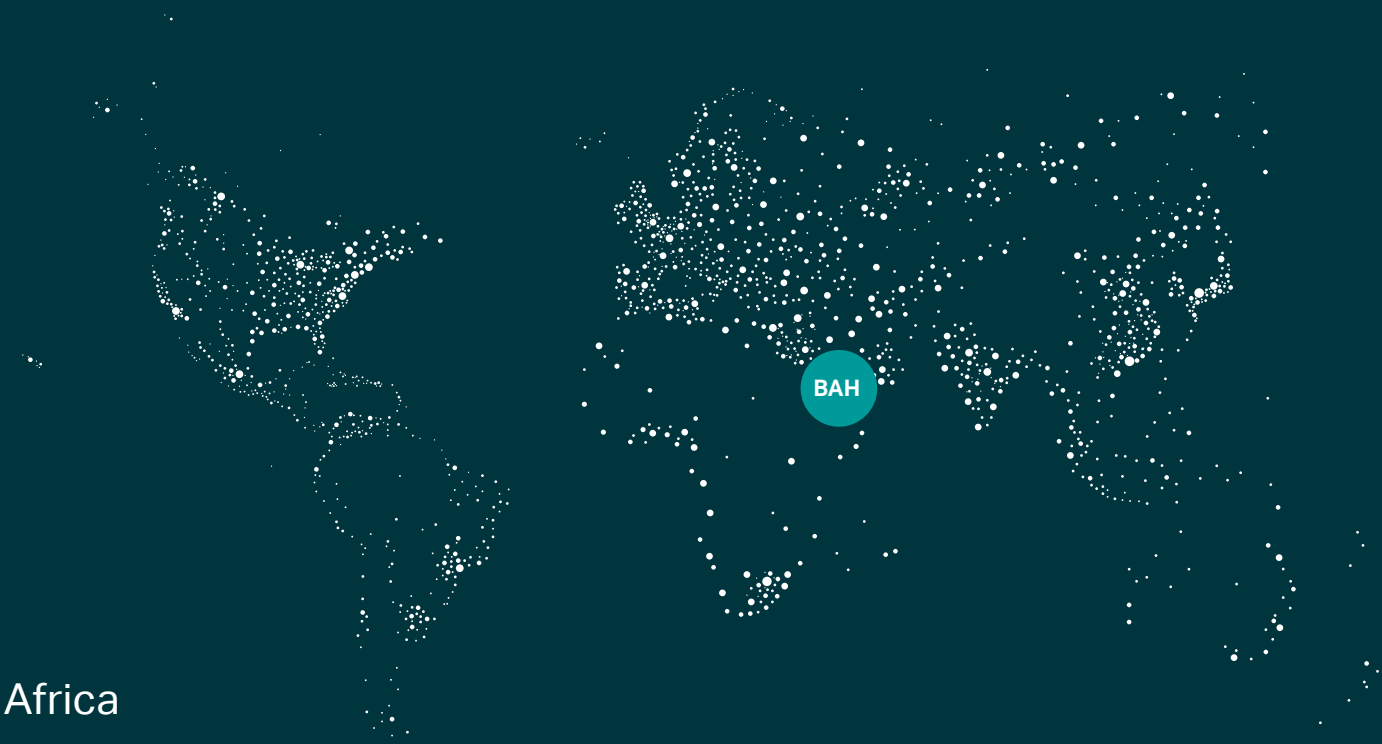
Consolidated Aviation Unit

NSA Bahrain, Manama, Bahrain

Client: Naval Facilities Engineering Command Europe Africa Southwest Asia (NAVFAC EURAFSWA)

AECOM provided architectural design and engineering services for the preparation of a lease construct request for proposal (RFP) package for a 120-acre parcel on the north side of the Bahrain International Airport with facilities to house and maintain aircraft. The client's goal was to co-locate and consolidate the aviation unit (AV) at Naval Support Activity (NSA) Bahrain into an appropriately sized base. The existing AV unit facilities were divided between NSA Bahrain, BANZ area leased facilities and various sites at the Bahrain International Airport. We developed a master plan, concept designs and a complete set of programmatic requirements for combining the various facilities into one new consolidated AV unit. The package included the site work and site adaptation of designs of both the primary and supplemental facilities.

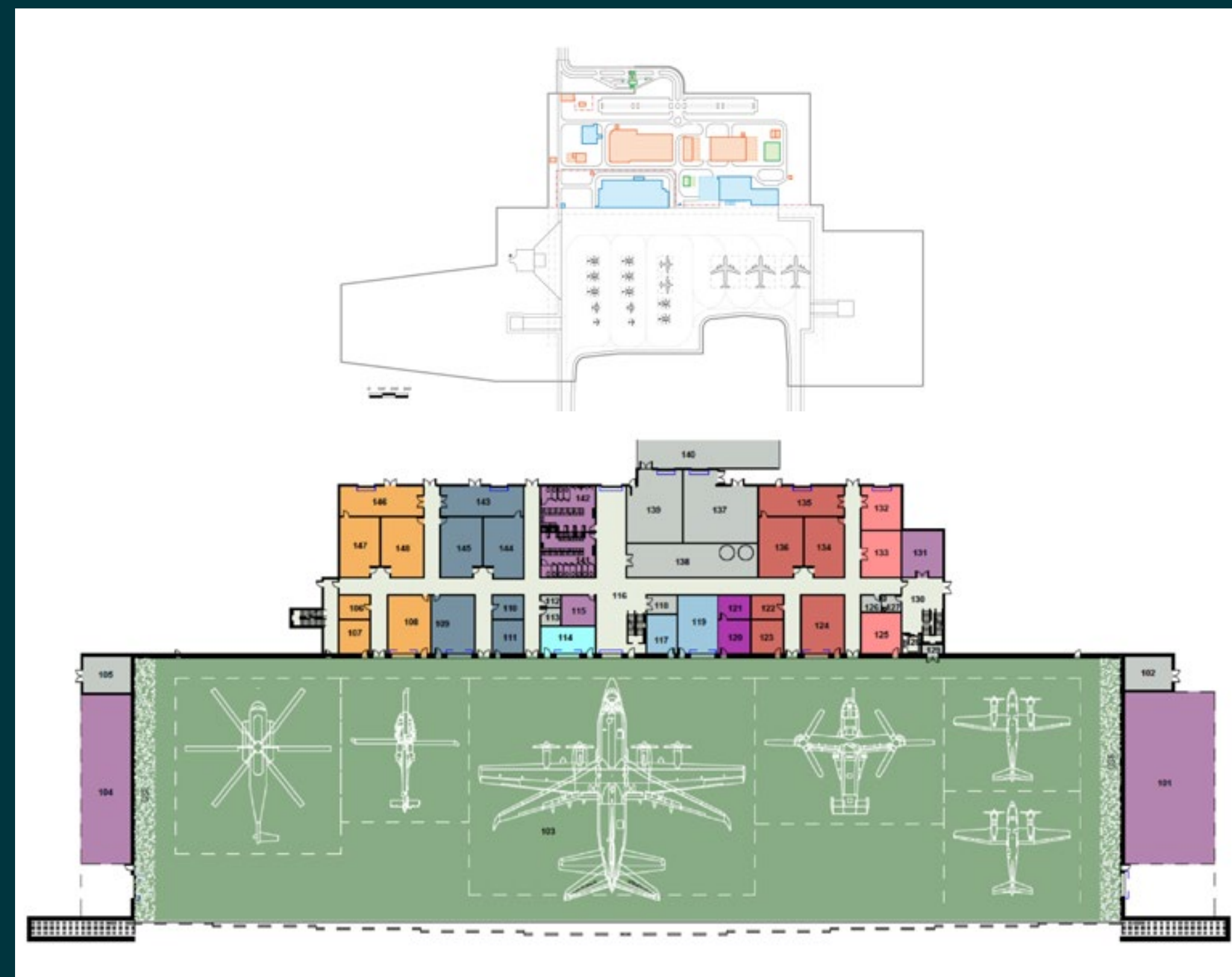
Primary facilities include a passenger terminal and air terminal operations center, freight terminal, aircraft hangar, aviation intermediate maintenance division facility, aviation support division facility, advanced tractability and control/fleet mail center, hazardous materials storage, defense courier service building, community service building, hazardous waste storage facility and a mine/countermine measures operations and maintenance facility.



We conducted the two-week charrette process on site in collaboration with NAVFAC EURAFSWA and the AV Unit's end-users. The goal of the two-week design charrette was to establish the Site Development Requirements Plan as well as concept level floor plans of the required facilities to support the mission and vision of a consolidated AV Unit serving NSA Bahrain. Early in the charrette the AECOM design team worked to best determine requirements for the site, the aircraft apron, buildings and engineering systems needed to achieve the vision for the consolidated AV Unit — optimizing operations and ensuring necessary mission facilities are available at the International Airport using International Civil Aviation Organization airfield setbacks.

SERVICES

- Programming
- Project management
- Master planning
- Airfield planning and design
- Hangar/AIMD and passenger terminal planning
- Architecture
- Multidisciplinary engineering (including geotechnical)
- Constructability review
- Site access logistics





ADAL Benefield Anechoic Facility

Edwards AFB, CA, U.S.A.

Client: US Air Force, Edwards Air Force Base

AECOM provided programming, conceptual design, design development and construction support for alteration of the Benefield Anechoic Facility (BAF) at Edwards Air Force Base, California. The program requirements included additions and alterations to the existing BAF and upgrading the Avionics Test and Integration Complex (ATIC) capabilities.

The project was designed for construction in three phases:

- Phase I was a four-story addition to the BAF in the North Tower, with a gross floor area of 53,000 square feet. The addition houses electronic laboratories with radio frequency (RF) shielding to the 100db level, a classified telecommunications center and engineering and administration support.
- Phase II added RF shielding areas to the CNI laboratory space; enlarged Threat Site 1, 2 and 3; and added a new 40-ton hoist. The hoist is south of the existing hoist in the anechoic chamber.
- Phase IIA designed the third floor to support the future integration of the real-time electromagnetic analyzer and processor (RED CAP) program.

The entire facility is a secure compartmental information facility (SCIF), sound transmission class (STC) to the 50db level. The facility supports electronic testing involving security classifications up to the top-secret level. The project was designed to support future program growth within the facility. The facility complies with ADA requirements.

SERVICES

- Programming
- Conceptual design
- Architecture
- Structural, mechanical, fire protection and electrical engineering
- Construction support
- Commissioning and testing





HIF

F-22 Radar Cross Section Test Facility

Hill Air Force Base, Ogden, UT, U.S.A.

Client: US Army Corps of Engineers, Sacramento District

AECOM was the lead architect for design and construction of a new radar cross section test facility at Hill Air Force Base. The facility is used to test the low observable radar characteristics of the F-22 to ensure that required levels of radar stealth have been maintained prior to returning aircraft to the operational fleet. The 49,525-square-foot, high-bay industrial facility is similar in layout to an aircraft hangar but has unique internal design requirements to accommodate radar testing. These features include an aircraft turntable pit, aircraft conveying/mounting system, 50-foot turntable with retractable aircraft support pylons, vertically moveable antenna system, radar calibration pylon and target, structural steel frame with insulated wall and roof paneling system and an anechoic chamber with conductive interior finishing system. As the lead design firm and DOR, AECOM provided 60% of the overall design effort. DrChecks was used throughout design development for each milestone of the contract. Specsintact was used to develop specifications for this project.

We provided services to maximize the facility's performance in sustainability and energy efficiency. Increasing energy efficiency, reducing carbon footprint, conserving water and protecting the environment were important goals to both our client and our team. We led design efforts to incorporate specific elements that would help Hill Air Force Base move toward its Net Zero goals, including exceeding the ASHRAE 90.1 building energy efficiency standards and developing a design scheme that included passive and active systems elements.

SERVICES

- Architecture
- Civil engineering
- Structural engineering peer review
- Acoustical engineering
- Fire protection engineering
- LEED services





TN ANG 118th Airlift Wing C-17/C-130 Hangar

Nashville International Airport, Nashville, TN, U.S.A.

Client: Air National Guard 118th Airlift Wing, Nashville International Airport

AECOM provided engineering and design services for the two-stage development of a 53,000-square-foot hangar at the 118th Wing in Nashville. The new facility houses one C-17 aircraft and two C-130 aircraft in its 320-foot, clear-span hangar bay, and provides shop and support space as well. The hangar's 300-foot by 70-foot-high entry door provides a unique solution for containing the high expansion foam fire suppression system with an energy-efficient opening and closure. The project also involved the demolition of eight buildings, including two aircraft maintenance hangars.

In the first phase, the hangar was built with minimum shop space. In the second phase, 60,000 square feet of maintenance shops were added to the facility, surrounding the hangar bay on three sides. Energy conservation and green or sustainable architecture were pivotal issues in the planning and design of this project. To achieve a congressional schedule mandate, we took a fast-track approach to complete the field investigation, concept design and cost estimate in only two months.

The \$23.8M project involved extensive hazardous materials remediation and engineering design for site utilities, grading and storm water management. On all hazardous materials and airport issues, our design team coordinated with the State of Tennessee's Airport Authority and the Federal Aviation Administration.

The project also included replacement of the Aerospace Ground Equipment (AGE) equipment shop with a new building for maintenance and repair with four pull-through bays, a 5,000-square-foot vehicle storage shed and two acres of vehicle storage and circulation paving, all adjacent to the hangar.



SERVICES

- Planning
- Architecture
- Multidisciplinary engineering
- Hazardous materials remediation
- Energy conservation
- Sustainable design





Aerospace Maintenance and Regeneration Group Hangar

Davis-Monthan Air Force Base, Tucson, AZ, U.S.A.

Client: US Army Corps of Engineers, Los Angeles District



AECOM, teamed with Okland Construction, led the design-build of the Aerospace Maintenance and Regeneration Group (AMARG) Hangar at Davis-Monthan Air Force Base in Tucson, Arizona. Our involvement included design of a high-bay hangar, supporting shops and administrative office support functions. This project consists of one new, 76,746-square-foot, high-bay hangar needed to support maintenance, repair and inspection for planned Air Force regeneration/reclamation of C-130, KC-135 and P-3 aircraft to support Foreign Military Sales along with returning aircraft to DoD services and other federal and state agencies.

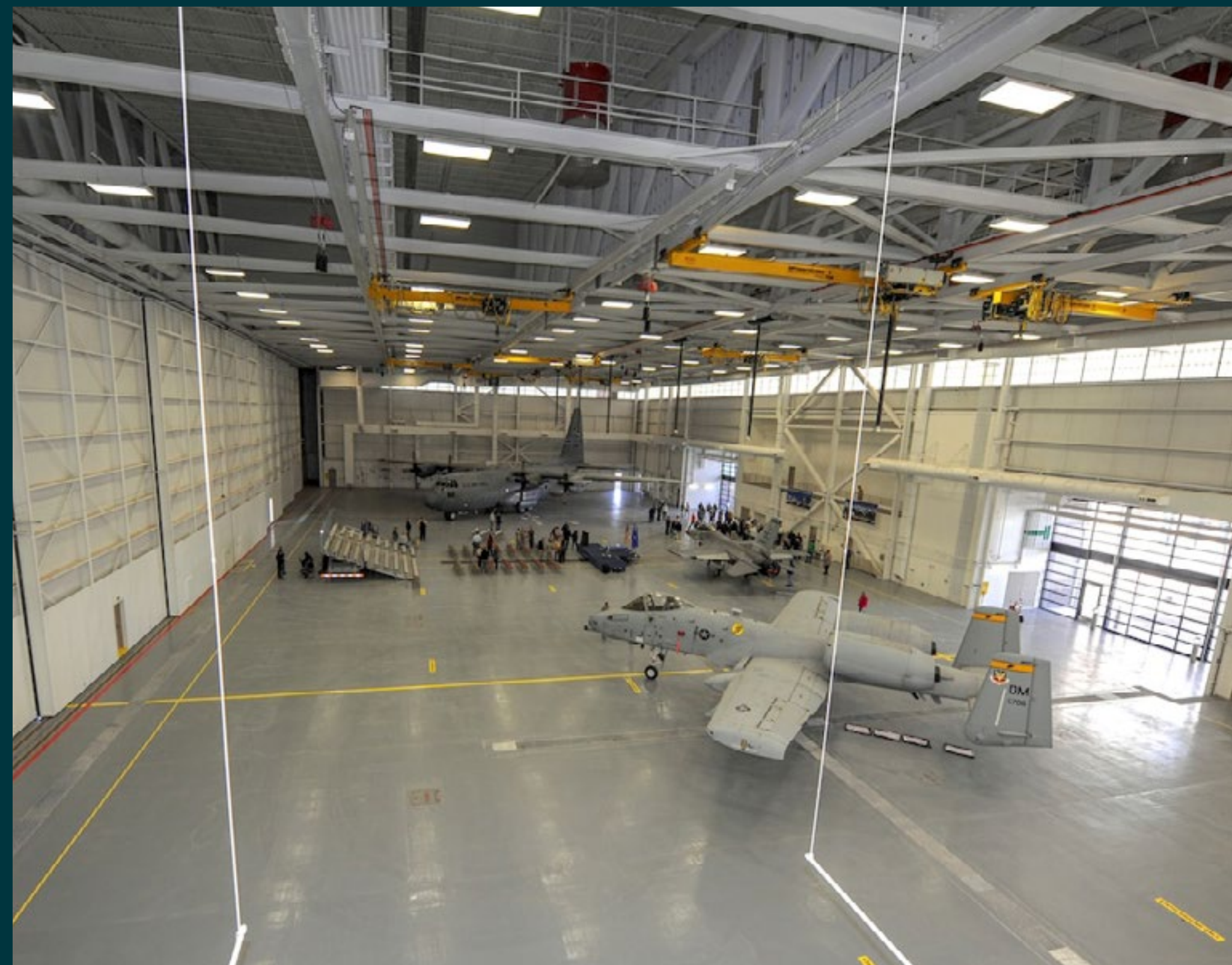
This facility provides maintenance space with a clear height of 52 feet to house two C-130 or two KC-135 aircraft with an approximate clear hangar span of 320 feet. The facility supports fuel cell work, aircraft jacking, landing gear removal and replacement, engine removal and installation, flight control rigging and Technical Order (TO) procedures needed to survey and repair air frame distortion and warping. Added support space (included in the 76,746-square-foot total) was needed for a TO library, record storage, tool cribs and equipment storage. The project also includes grading,

support utilities, a parking lot, entry drive, landscaping and interior finishes. This is a high visibility flagship AMARG hangar facility, accommodating VIP visitors in a two-story administration section with an observation deck overlooking the activities on the complete clear span double-wide hangar floor.

During the initial design and review process, we improved efficiency of building systems and overall aesthetics of the final design deliverable. LEED Silver certification was targeted for this project.

SERVICES

- Architecture
- Structural, civil, mechanical, plumbing, electrical and fire protection engineering
- Building system design
- LEED services





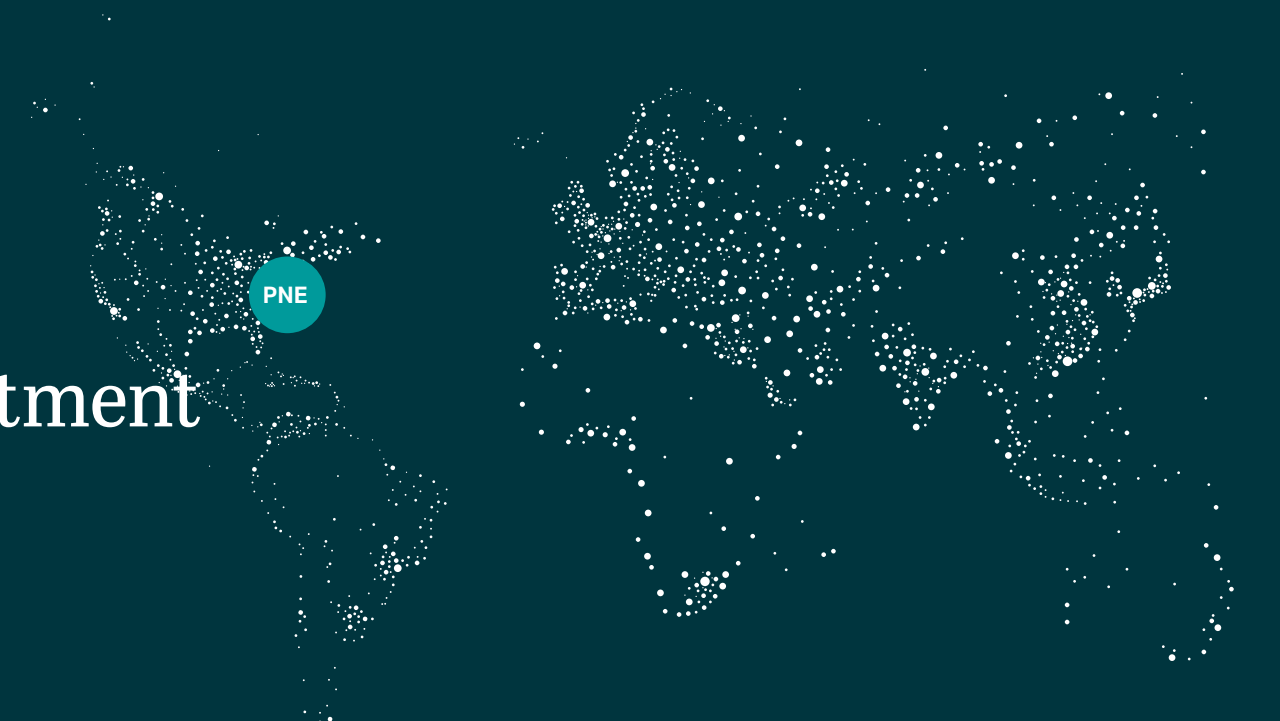
Corporate Hangar/Flight Department for Chubb Insurance

Northeast Philadelphia Airport, Philadelphia, PA, U.S.A.

Client: Chubb Limited

The City of Philadelphia initially retained AECOM to help Chubb Flight Operations, as a current airport tenant, with site selection analysis for a new, larger corporate hangar at Northeast Philadelphia Airport (PNE). Upon completion of the site analysis process, Chubb selected AECOM to serve as the design-build contractor in partnership with AECOM Tishman, with Tishman acting as the construction manager.

Under the design-build contract, we integrated planning, design and construction phase services into a single point of responsibility for project delivery. Design planning included site design and building design for a 36,000-square-foot hangar with 19,000 square feet of lean-to space for workshops, offices and support areas. Ancillary items include an access taxiway, aircraft parking apron, fuel storage, vehicle access and employee parking, utilities, stormwater management, perimeter fencing and site lighting. The hangar opened in 2019.



SERVICES

- Concept plan and feasibility
- Schematic design
- Architecture
- Value engineering
- Permitting/approvals
- Construction management (at-risk)
- Commissioning





Nationwide Hangar Facility

Port Columbus International Airport, Columbus, OH, U.S.A.

Client: Nationwide Mutual Insurance Company

AECOM provided professional architectural and engineering services for Nationwide's aircraft hangar and office facility at Port Columbus International Airport. The fixed base of operations for the corporate jet fleet of Nationwide consists of a new 35,000-square-foot hangar area designed for a future 10,000-square-foot expansion. The design included an extra 14,000 square feet of maintenance and support space for access to the hangar. A 5,900-square-foot automobile garage and 10,000-square-foot Class A office area has a double-height lobby overlooking the airfield. The striking steel and glass canopy enhances both exterior and interior. Fire protection for the hangar is a Group I AFFF (low expansion) system. A one-ton crane and fall protection system complement the hangar's maintenance shop areas.



SERVICES

- Architecture
- Multidisciplinary engineering
- Interior design
- Fire protection design





Aircraft Maintenance Hangar for Dassault Aircraft Services

Wilmington Airport, New Castle County, DE, U.S.A.

Client: Dassault Aircraft Services – Wilmington

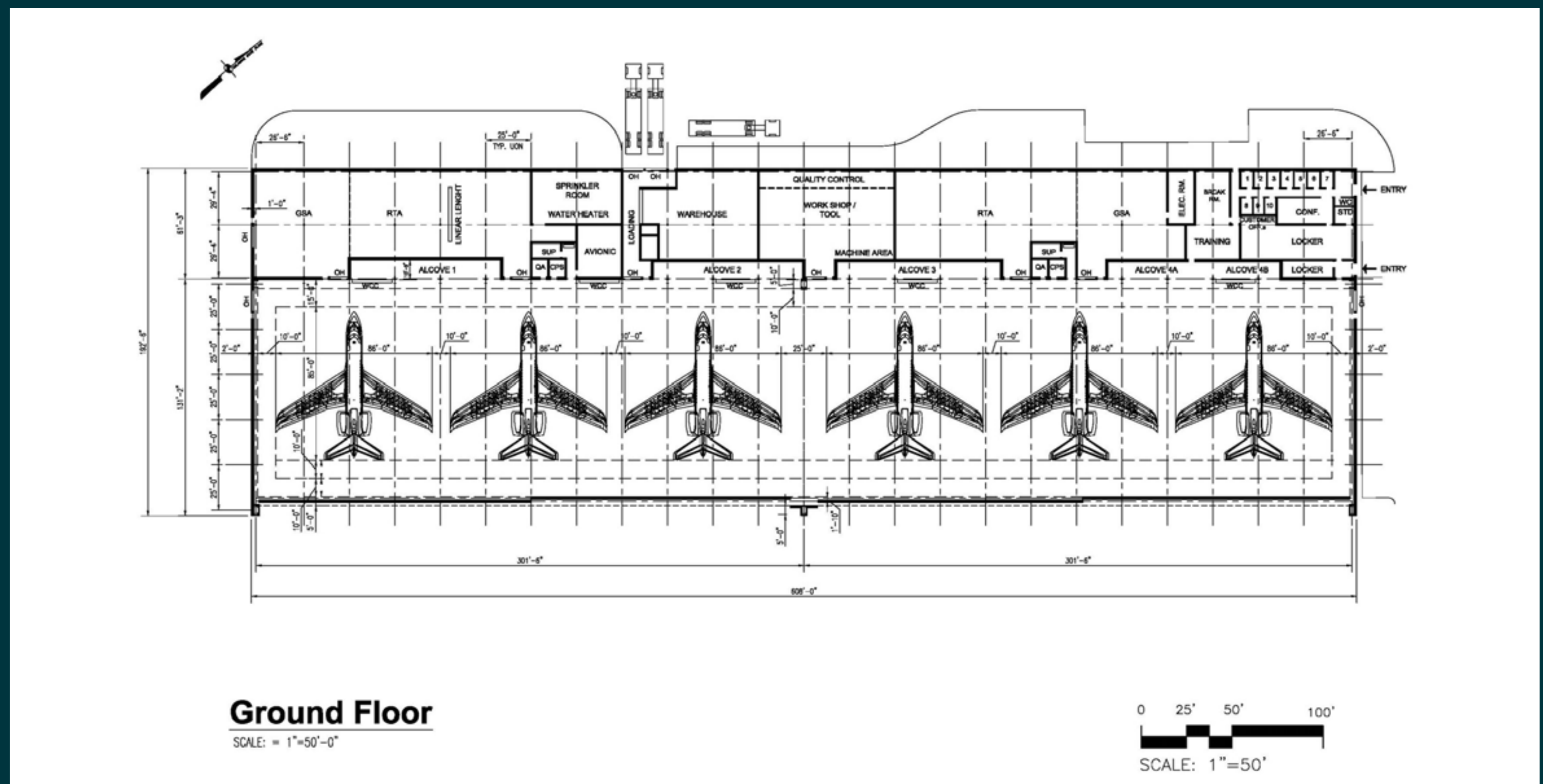
AECOM provided the program definition document for a new MRO facility for Dassault Falcon in Wilmington, DE. The current campus of existing buildings and aircraft ramp space is restricted and congested, and Dassault asked us to evaluate on-campus and off-campus site areas to accommodate the new hangar. The project work involved site selection and planning for a new 110,000-square-foot aircraft maintenance facility. The selected site is across a taxiway from the existing campus. We reduced the project learning curve by leveraging our airport knowledge and utility engineering experience gained through nearly 20 years of work at New Castle Airport.

Major elements of the project included 70,000 square feet of clear span hangar space designed to accommodate up to six Falcon 5X/7X/8X aircraft plus 35,000 square feet for workshops, storage areas, offices and support space. Ancillary items include the aircraft parking apron, employee access road improvements, auto parking, utility connections, stormwater management, perimeter fencing and site lighting. As part of concept planning and cost estimating, we investigated structural shell types and hangar door arrangements.



SERVICES

- Site selection
- Site development property analysis
- Program/process operations analysis
- Concept planning and feasibility study
- Alternatives analysis
- Implementation and cost analysis
- Concept design/approval





Signature Flight Support Passenger Terminal and Hangar

Miami International Airport, Miami, FL, U.S.A.

Client: Signature Flight Support



SERVICES

- Architecture
- Multidisciplinary engineering
- Interior design
- Conceptual design
- Terminal master planning

AECOM provided planning and design services in two phases for Signature Flight Support's passenger terminal and hangar at Miami International Airport. Phase I of this project involved the renovation and rehabilitation of the 8,000-square-foot Executive Terminal. A complete interior overhaul of the terminal next to a 25,000-square-foot hangar for maintenance and operations was the project's main component. The project updated the lobby, restrooms, flight operations, pilot support area, administrative space and the HVAC system in compliance with all ADA requirements.

Phase II of this project called for the conceptual design and master plan of a new terminal and hangar complex to be phased in. Construction took place on an existing site adjacent to the newly proposed runway on the north side of the airport. The project also included a two-bay vehicle maintenance facility and provision for a future hangar for small, narrow-body jets. Project construction was phased, and demolition of the existing facility was sequenced to maintain continuous operations of existing facilities.



Contact us

CONTACTS

Dwight Pullen

Global Aviation Leader

dwight.pullen@aecom.com

Navin Nitish

Air Cargo Practice Leader

navin.nitish@aecom.com

Paul Krieger

Project Management – Transportation

paul.krieger@aecom.com

About AECOM

AECOM is the world's trusted infrastructure consulting firm, delivering professional services throughout the project lifecycle – from advisory, planning, design and engineering to program and construction management. On projects spanning transportation, buildings, water, new energy, and the environment, our public- and private-sector clients trust us to solve their most complex challenges. Our teams are driven by a common purpose to deliver a better world through our unrivaled technical and digital expertise, a culture of equity, diversity and inclusion, and a commitment to environmental, social and governance priorities. AECOM is a Fortune 500 firm and its Professional Services business had revenue of US\$14.4 billion in fiscal year 2023. See how we are delivering sustainable legacies for generations to come at [aecom.com](https://www.aecom.com) and [@AECOM](https://www.aecom.com).