Aircraft Hangar Construction Guide

A practical guide to aligning aircraft requirements, airport coordination, development strategy and construction execution from the start.

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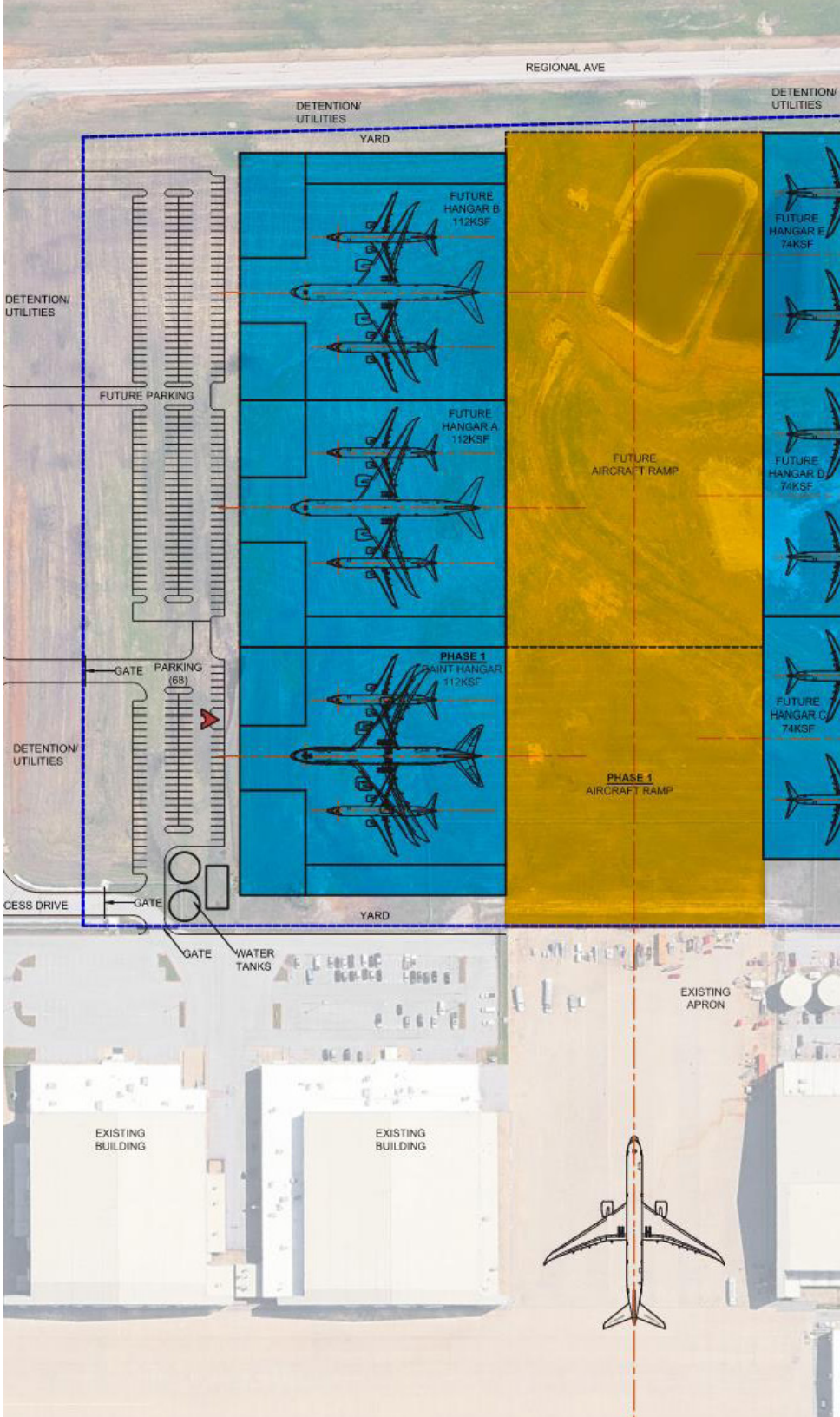
Aircraft Hangar Construction Starts Long Before The First Piece of Steel is Set

A successful hangar project requires more than designing and constructing a large open-span facility. Aircraft requirements, airport constraints, operational needs, lease considerations, capital planning and construction logistics all influence the final solution. Each decision affects the next, making early coordination critical to delivering a facility that supports both the operation and the long-term goals of the project.

When those pieces are aligned early, hangar projects move forward with more clarity. When they are handled separately, projects can stall before they ever reach the field.

This guide breaks down the major planning, design, cost, operational and construction considerations that shape successful aircraft hangar projects.



Hangar Projects Stall When the Pieces Are Not Aligned

Aircraft hangar projects involve far more than designing and constructing a building. Development strategy, airport approvals, FAA requirements, lease structure, capital planning, aircraft-driven design, fire protection, mechanical systems, utility infrastructure, apron layout and construction logistics all influence the success of the project.

Because these elements are so interconnected, decisions made in one area often affect several others. Successful hangar development starts with understanding how all of these factors work together.

ARCO's aviation team takes an integrated approach to hangar development by bringing planning, design, budgeting and construction expertise together early in the process. By evaluating constructability, cost, schedule and operational requirements alongside development considerations, project teams can move forward with greater confidence and fewer surprises.

Before a hangar can be delivered successfully, the project needs a coordinated strategy that aligns development goals with a clear path to construction.

Why Design-Build Fits Hangar Construction

Aircraft hangar projects have too many connected parts for design, financing, approvals and construction to operate separately. Structure, doors, slab, utilities, fire protection, mechanical systems, apron layout, airport approvals, lease terms, cost and schedule all affect one another. If those decisions are made in isolation, the project is exposed to redesign, change orders, budget gaps and schedule delays.

A design-build approach gives the team a better way to manage those decisions. It brings construction expertise into the process early, when the project can still be shaped around the aircraft, the operation, the site and the budget.

One Accountable Team

Hangar projects need clear responsibility from concept through completion. The team needs to understand the aircraft, airport, site, operation, approvals, budget and schedule at the same time.

With one accountable design-build team, issues can be evaluated in real time. If a door option changes the structural approach, the team can price it. If mechanical requirements increase electrical demand, the team can coordinate utilities before design advances. If airport approvals affect the schedule, the team can adjust sequencing and procurement.

The value is not just speed.
It is better control.

Cost and Schedule Certainty

Hangar projects carry major cost drivers that need to be understood early. Door systems, fire protection, mechanical systems, electrical service, apron paving, site utilities, structural steel and specialty equipment can all move the budget.

ARCO's design-build process is focused on establishing cost and schedule confidence early. Through early pricing, procurement planning and coordination with trade partners and suppliers, ARCO works to identify cost and schedule risks as soon as possible.

This is especially important on hangar projects, where long-lead procurement items such as structural steel, hangar doors, mechanical equipment and specialized aviation systems often dictate critical path activities and can significantly influence the overall project budget and timeline.

Faster, More Coordinated Delivery

Hangar projects often require design, permitting, procurement and construction planning to move at the same time. Airport approvals, utility coordination, door systems, steel or PEMB procurement, mechanical design, fire protection and sitework cannot always wait for a fully sequential process.

A design-build approach allows the team to package work strategically, release long-lead items earlier and keep cost feedback current while design progresses. That reduces downtime and helps prevent late-stage surprises.

Start With the Aircraft and the Operation

The first question on a hangar project is not how much square footage is needed. The first question is what aircraft and operation the facility needs to support.

That answer drives the building.

Layout | Door Orientation | Apron Depth | Access | Uses | Support Spaces

Aircraft Driven Design

Aircraft type determines the basic hangar layout. Wingspan, tail height, door width, door height, tow-in and tow-out movement, tug routes and required clearances all affect the layout.

A narrow-body hangar, wide-body hangar, MRO facility, corporate aviation hangar and coatings hangar each require a different approach. The aircraft and use case need to be defined before the team locks in the footprint, door system, structural approach or apron layout.

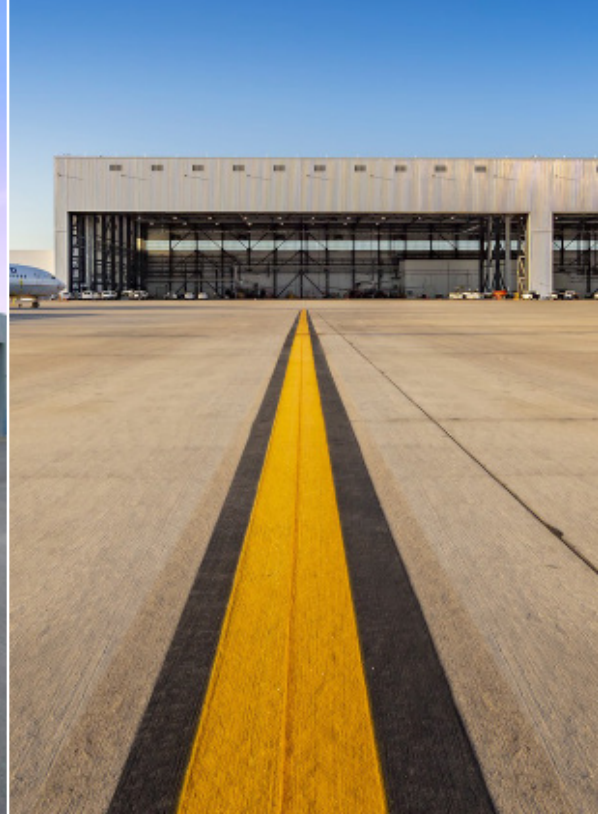
Clearances should not be treated as rough assumptions. Aircraft movement needs to be tested during planning so the building works when it is put into operation.

Door Orientation, Apron Depth and Taxiway Access

Door orientation affects how aircraft move between the hangar, apron and taxiway. It also affects site circulation, pavement, drainage, utility routing and future flexibility.

Apron depth needs to account for aircraft positioning, tug movement, pushback, service vehicles and operational access.

A hangar can meet the required square footage and still fail operationally if aircraft movement was not planned correctly. The site plan and building layout need to be developed together, with careful consideration given to aircraft circulation, vehicle access, safety clearances, utility routing and future operational flexibility.



Hangar Use

The intended use of the hangar has a direct impact on the building's layout, systems and support spaces.

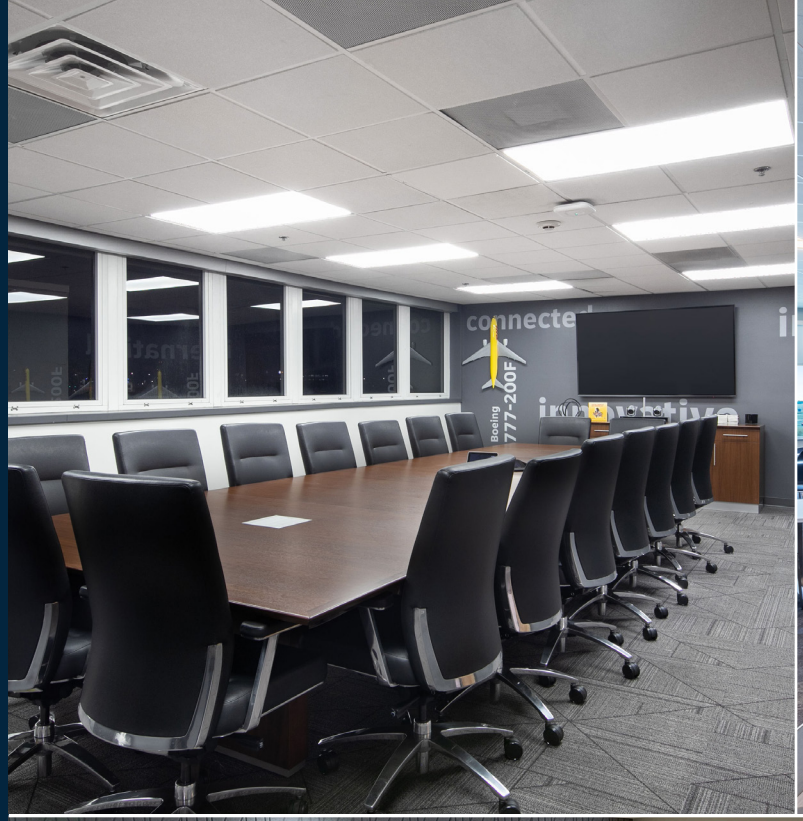
Storage facilities focus on protecting aircraft and maximizing efficient bay space. Corporate aviation and FBO hangars often incorporate offices, lounges and passenger-facing amenities alongside aircraft storage. MRO facilities require maintenance shops, parts storage, tool control and workflow-driven layouts, while cargo operations depend on staging areas, loading zones and efficient vehicle circulation. Paint and coatings hangars introduce another layer of complexity, requiring specialized ventilation, environmental controls, hazardous material handling, wastewater treatment and coordinated fire protection systems.

Because operational requirements vary so widely, the intended use should be clearly defined early in planning. That allows the facility to be designed around how it will actually function rather than forcing operational needs into a building that was not planned for them.

Integrated Support Spaces

The hangar bay is only one part of the facility. Offices, shops, tool rooms, parts storage, locker rooms, mechanical rooms, electrical rooms, hazardous material rooms, paint mixing rooms, wastewater treatment areas and tenant spaces all need to be planned into the building.

These areas affect the footprint, adjacencies, utilities, code requirements, workflow and security. If they are treated as leftover space, the building will be harder to operate.



Planning Around the Airport Environment

Hangar construction is often delivered in constrained, operationally sensitive environments. Unlike a typical commercial site, an airport project may be surrounded by active taxiways, aprons, fuel operations, emergency routes, occupied hangars, tenant facilities, security checkpoints and restricted access areas. Construction sequencing needs to account for those constraints without compromising safety, airport operations or

Airport Authority and Stakeholder Coordination

Airport projects require coordination with more stakeholders than most commercial construction projects. Airport authorities, operations teams, tenants, airport security, operators, ownership, design partners, trade partners, regulatory agencies and local jurisdictions all influence how the project is planned and executed.

The project team should establish stakeholder communication early and define who approves what,

FAA, Entitlements and Local Requirements

Hangar projects may require coordination with FAA standards, airport-specific design criteria, local permitting, environmental review, building height restrictions, lighting requirements, fire protection codes, accessibility requirements, site security standards and hangar-use limitations.

The approval path should be treated as a critical project workstream. Design, permitting, agency review, utility coordination and procurement need to be aligned so the team is not waiting on unresolved approvals while long-lead materials, sitework or structural packages are ready to move.

Limited Laydown and Logistics

Airport sites often have limited laydown space because of adjacent hangars, aprons, taxiways, service roads, tenant operations, security boundaries and airfield clearances. This can affect how materials are procured, delivered, stored and installed.

The logistics plan should identify what can be stored onsite, what needs to be staged offsite and which materials must arrive just in time for installation. Large components such as structural steel, pre-engineered metal building packages, hangar door systems, mechanical equipment and fire protection materials may require dedicated staging plans and carefully sequenced deliveries.

Crane locations, lift paths, haul routes and equipment movement also need to be coordinated with airport operations.

The ARCO team performed exceptionally well in many areas including pre-construction planning, estimating, design, permitting, scheduling, procurement, quality, safety, closeout, reporting, communications, and maintaining relationships with all project stakeholders.

Tom Neidecker
DHL

Aligning the Development Pro Forma With the Buildable Plan

A hangar project has to work financially before it can move forward in the field. The lease structure, site control, airport approvals, capital plan, construction cost, schedule and rent commencement all need to support the same project strategy. If the pro forma is built on assumptions that do not match the construction plan, the project can lose momentum before it reaches construction.

The most successful hangar developments test the financial model against real building requirements early.

Lease Structure and Site Control

Many aviation facilities are delivered under long-term lease structures, often with airport or developer involvement. The lease terms need to support the capital investment, construction duration and intended operation of the facility.

Site control should be evaluated alongside design and schedule. The team needs to understand when the site is available, what conditions are tied to airport approvals, when construction access can begin, how rent commencement is structured and how delays affect the financial model.

Lease terms, site control and construction planning should be reviewed together. That allows the team to identify schedule constraints, approval risks and rent exposure before the project is too far along to adjust.

Capital Sourcing and Financeability

Capital partners need reliable information. A hangar project should not be financed on generic cost assumptions or conceptual schedules that have not been tested against the actual facility requirements.

Early pricing, conceptual design, constructability review and procurement planning help determine whether the project is financeable. The team needs to understand the major cost drivers.

A square-foot cost can be a useful starting point, but it does not tell the full story. A paint hangar, MRO facility, storage hangar and FBO hangar can have very different system requirements and cost profiles. The more specialized the operation, the more important it is to validate cost assumptions early.

Buildable Cost and Schedule

The goal is to align a financeable structure with a buildable cost and schedule. That requires the development model and the construction plan to be built from the same information.

The design must match the budget. The lease structure must match the entitlement and construction timeline. Airport approvals must be built into the schedule. Procurement must account for long-lead materials and equipment. The construction strategy must support the aircraft, airport and operation.

When these pieces are aligned early, the project team can make decisions with better information.

Avoiding the Bid-Day Surprise

The most expensive time to discover a budget problem is after the design has advanced and the project team is expecting a construction number that supports the pro forma. At that point, a high bid can trigger redesign, delayed procurement, entitlement revisions, scope reductions or renewed financing discussions.

Early design-build involvement reduces this exposure. Real-time pricing, trade partner input, constructability review and procurement planning allow the team to adjust while the project is still flexible.

Designing the Hangar Shell

The hangar shell carries some of the most important technical decisions in the project. Structure, doors, slab, foundations and anchoring must support aircraft clearance, large openings, heavy loads, operational durability and long-term flexibility. These components also affect cost, procurement, schedule and constructability.

The shell should be designed around the aircraft and the

Clear-Span Structure

Hangars require large open bays with limited interior obstructions. Interior columns can conflict with aircraft movement, maintenance access, equipment staging and future flexibility. The structural system must provide the required clear span while accounting for roof loads, wind loads, seismic considerations where applicable, MEP routing, fire protection, door openings and erection sequencing.

Clear-span decisions influence both cost and constructability. Long-span steel, pre-engineered metal building systems, trusses, column spacing, door reactions, foundation loads and roof framing all need to be evaluated together.

Hangar Door

Hangar doors are major engineered systems and should be evaluated early in design. Door type, clear width, clear height, track system, wind load, structural support, insulation, opening speed, reliability, maintenance access and procurement timeline all affect the building.

The door system influences the structure, foundation, slab, envelope, air infiltration, energy performance, security and aircraft clearance.

It can also affect the construction sequence and long-lead procurement plan. If the door is not coordinated early, it may require structural revisions, foundation changes, clearance adjustments or schedule shifts.

Floor Slab Performance

The hangar floor is a critical performance element. Aircraft loads are heavy and concentrated, and the slab must support those loads over time while maintaining required flatness, levelness, joint layout, drainage, coating performance and durability.

The slab design should account for aircraft weight, landing gear configuration, tug movement, maintenance equipment, jacking points, trench drains, embedded utilities, coating systems and long-term repairability. For maintenance, paint or coatings operations, the floor may also need to resist chemicals, fuel, solvents, equipment impact and frequent cleaning.

Foundations and Anchoring

Hangars create significant foundation and anchoring demands because of large open spans, wide door openings, roof loads, wind loads, door reactions and soil conditions. These factors need to be coordinated with structural design, geotechnical recommendations, erection sequencing and long-term building performance.

Foundation systems may include spread footings, shallow perimeter foundations, deep foundations, reinforced piers, anchor bolts, column bases and specialized connections. The right approach depends on soil conditions, structural loads, building layout and site requirements.

Building Systems That Make the Hangar Work

A hangar's building systems determine how well the facility supports the operation. Electrical service, mechanical and ventilation systems, fire protection, compressed air, hazardous material handling, wastewater treatment and specialty utilities must be sized and coordinated around the specific use of the building.

These systems should be evaluated early because they influence cost, approvals, layout, equipment selection, utility coordination and construction sequencing. They also carry long-term operational implications.

Electrical Service

Hangars can require significant electrical capacity for lighting, mechanical equipment, ventilation, compressors, offices, shops, ground support systems, low-voltage systems, security, controls and specialty equipment. The right electrical approach depends on the building's use and operating requirements.

Electrical requirements also affect utility coordination, permitting, switchgear procurement, equipment rooms, duct banks, generators where required and construction sequencing.

Mechanical and Ventilation Systems

Mechanical and ventilation requirements vary significantly by hangar type. Systems need to be coordinated with the structure, ceiling space, fire protection, electrical service, controls, hangar doors, envelope and operating requirements. Large volumes, wide door openings and specialty uses can make air movement and temperature control more complex than in a typical industrial facility.

The system should be evaluated against both performance requirements and budget early in design. Mechanical decisions can drive utility loads, equipment procurement, roof or wall penetrations, ceiling coordination, control strategies and long-term energy use.

Fire Protection

Fire protection is a major technical and cost consideration in hangar construction. Requirements may affect water service, pumps, tanks, sprinkler or foam systems, fire-rated assemblies, drainage, detection, alarms, controls and code coordination.

The appropriate system depends on hangar size, aircraft type, building use, fuel exposure, occupancy, local requirements and applicable NFPA criteria. Fire protection may also affect the site design. Water supply may need to be upgraded. Pumps or tanks may be required. Drainage may need to accommodate fire suppression discharge. System components may influence structural and MEP coordination.

Compressed Air and Specialty Utilities

Maintenance, coatings and finishing operations often require compressed air, process piping, air drops, oil-free compressors, receiver tanks and dedicated equipment rooms. These systems should be planned around the workflow, not added after the layout is set.

Air drops need to be located where work occurs. Compressor rooms require space, ventilation, power, service access and noise consideration. Piping must be coordinated with structure, fire protection, lighting, mechanical systems and other overhead components.

Specialty utilities may also include process water, vacuum systems, specialty drainage, fuel-related infrastructure, equipment power, controls and other operation-specific systems. The project team should identify these requirements early so they are coordinated with both the building layout and the construction sequence.

Hazardous Material and Environmental Systems

Paint, coatings, washing, fueling and maintenance operations may require hazardous material storage, paint mixing, wastewater treatment, chemical storage, containment and environmental controls. These spaces carry code, safety and environmental requirements that affect layout, ventilation, drainage, fire protection, separation, monitoring and operating procedures.

Hazardous material rooms, wastewater treatment spaces and chemical storage areas need to support the operation while meeting regulatory and life safety requirements. Poor placement can create workflow issues, additional piping, ventilation challenges or approval complications.

Case Study: International Aerospace Coatings

8,000 SF Aircraft Hangar | Rick Husband Amarillo International Airport | Amarillo, TX

ARCO's work with International Aerospace Coatings in Amarillo, Texas, demonstrates how early coordination can help move a technically complex hangar project forward despite airport, regulatory, utility and site constraints.

The Project

ARCO is delivering a nearly 80,000-square-foot aircraft hangar and aerospace coatings facility for International Aerospace Coatings at Rick Husband Amarillo International Airport in Amarillo, Texas. The facility is being built within an active airport environment and is designed to support advanced aircraft painting and finishing operations.

This is not a standard aircraft storage facility. The project requires specialized mechanical systems, hazardous material handling, aviation-grade infrastructure, airport coordination, agency review and field sequencing that supports both construction progress and airport operations.

The Facility Requirements

The project includes a large aircraft hangar, dedicated storage building and purpose-built support spaces. The hangar is designed to accommodate large aircraft while providing the environmental controls required for aerospace coating work.

Key components include a standing seam metal roof system, shallow perimeter and spread footings, full wet fire protection, high-capacity air distribution, an aircraft hangar door and multiple forklift drive-thru doors. Each component supports the operational requirements of the facility, from aircraft movement to material handling to life safety.

Airport and Regulatory Coordination

The project requires coordination with the FAA, NEPA reviewers, Texas Accessibility Standards and the City of Amarillo, which owns the airport. Those requirements affect approvals, access, site planning, security, environmental coordination and schedule.

Construction activities also need to be planned around the active airport environment.

Site and Constructability Challenges

The site includes several constraints that required early constructability input. Utility conflicts exist within restricted airport boundaries. Utility easements require airport approval. Soil conditions affect site development. Existing crushed concrete and site fill needed to be evaluated for reuse. Construction activities had to be resequenced to maintain progress despite changing site conditions.

Case Study: International Aerospace Coatings

8,000 SF Aircraft Hangar | Rick Husband Amarillo International Airport | Amarillo, TX

ARCO addressed these challenges through utility coordination within secured airport limits, resequenced construction activities, reuse of existing crushed concrete and site fill and close coordination with airport operations. These strategies helped maintain project momentum while reducing unnecessary cost and schedule impacts.

The structural scope also required careful planning. The approximately 80,000-square-foot clear-span hangar was engineered to withstand west Texas wind conditions. Foundation anchor bolts weighing approximately 200 pounds each required complex rigging before column placement and had to be coordinated with web-stiffened steel at the column base.

Cost and Schedule Strategy

ARCO's early involvement as design-builder allowed the team to evaluate cost-saving alternatives and schedule strategies before the project was locked in.

One major value-engineering solution reduced electrical service requirements from 3,000 amps to 2,000 amps while maintaining operational capacity. ARCO also released long-lead materials early to lock in pricing and reduce schedule risk. The wastewater system design was simplified to improve constructability and long-term efficiency.

To protect the schedule, ARCO advanced design, permitting and procurement activities in parallel. Grading and pad preparation were resequenced to recover time lost to unforeseen conditions. Agency reviews were overlapped where possible to reduce approval delays. PEMB components were staged so erection could begin immediately upon delivery.

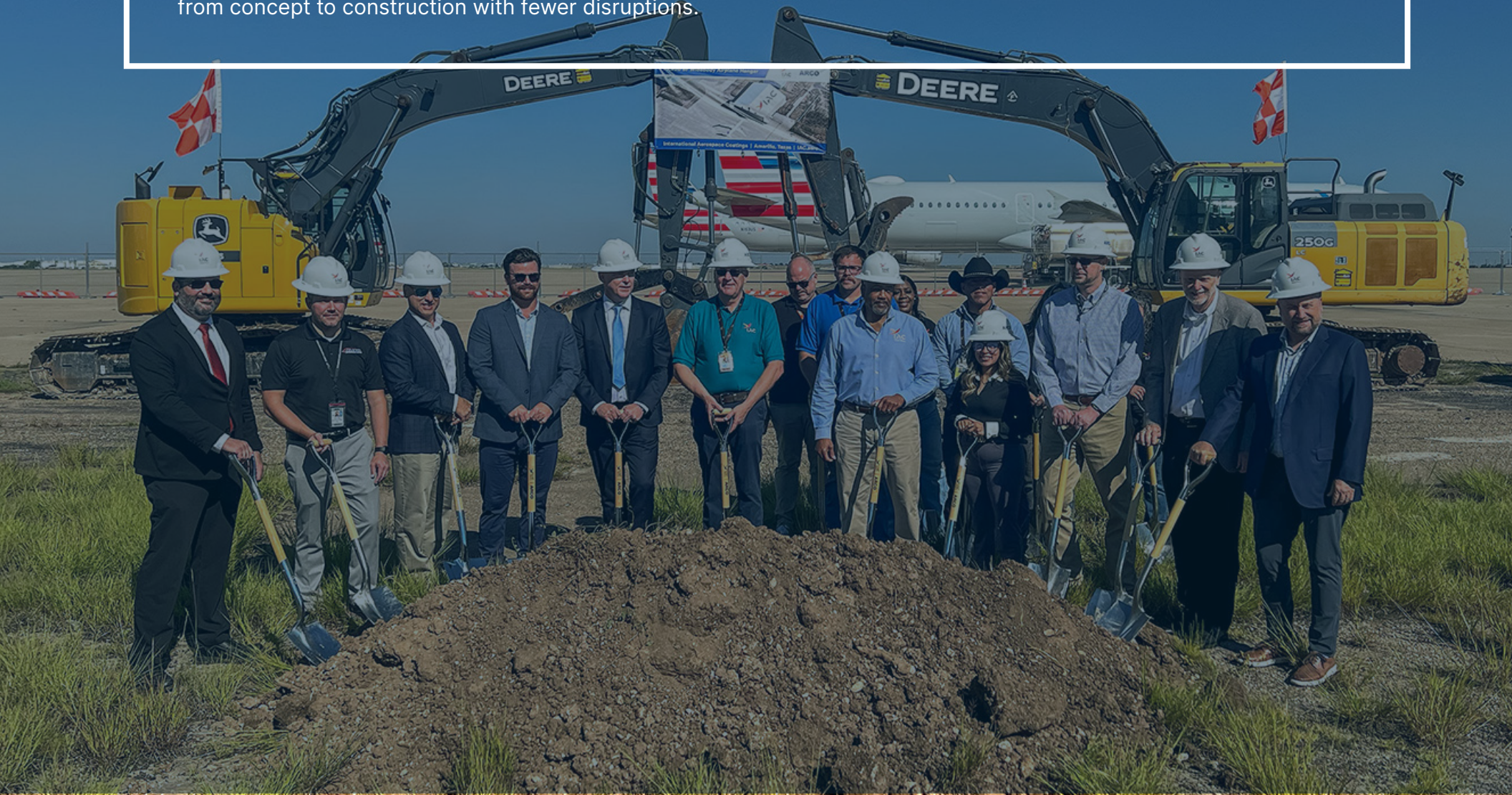
These decisions helped the project continue moving despite site, utility and regulatory challenges.

The Takeaway

The IAC project reflects the central requirement of complex hangar construction: aircraft requirements, airport conditions, regulatory review, utility infrastructure, cost strategy and field execution have to be coordinated early.

The operation defined the building systems. Airport requirements influenced access and approvals. Site conditions affected sequencing. Utility decisions shaped cost and constructability. Design-build kept those decisions connected.

For specialized aviation facilities, early alignment is not just a better process. It is what allows the project to move from concept to construction with fewer disruptions.



Building Around the Aircraft, Airport and Operation

Successful aircraft hangar construction depends on early alignment between the aircraft, airport, operation, development strategy and construction plan.

The aircraft drives the geometry. The operation drives the building systems. The airport drives access, approvals, logistics and security. The pro forma drives cost and schedule requirements. The construction plan has to account for all of them.

When those elements are coordinated early, project teams can make better decisions about door systems, slab design, fire protection, ventilation, electrical service, apron layout, procurement, site logistics and turnover. When they are not coordinated early, teams are more likely to encounter redesign, budget pressure, approval delays, procurement gaps and field conflicts.

Hangar projects work best when development, capital and construction are aligned into one executable path. ARCO helps aviation clients plan, price and deliver aircraft hangar projects built around the aircraft, the airport and the operation.

READY TO START PLANNING YOUR AIRCRAFT HANGAR PROJECT?

Connect with ARCO National Construction to align your development strategy, capital plan, airport requirements and construction approach from the start.

ARCO