A New Guidebook for Managing Small Airports and What to Consider With Corporate Aircraft Operations

So Someone Wants to Build a Corporate Aircraft Hangar at Your Airport...What You Need to Know

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Why the New Interest in Hangars?
Corporate Traffic Growth and Forecast

**Active General Aviation Aircraft**

**General Aviation Hours Flown (in thousands)**

- **Calendar Year:** 2007, 2017, 2027, 2037
- **Categories:**
  - Fixed Wing Piston
  - Fixed Wing Turbine
  - Rotorcraft
  - LSA
  - Experimental and Other

FAA Aerospace Forecast, Fiscal Years 2017-2037
Aircraft Hangars - Types

- We will not be talking about T-Hangars
- We will be talking... “Conventional Hangars”
- These are more commonly described as:
  - Storage: Aircraft Parking out of the Elements Only
  - Maintenance: Storage and Aircraft Maintenance
  - Corporate: Storage and Offices
  - Executive Hangar: Single Large Structure with Multiple Units
  - Greater than 3,600 sq. ft. (60 ft. by 60 ft.)

RWN – 80 ft. x 60 ft. Maintenance Hangar
FKR – 100 ft. x 110 ft. Corporate and Maintenance Hangar
TYQ – 162 ft. x 122 ft. Corporate and Maintenance “Repair” Hangar
Aircraft Hangars - New Trends

- Executive Hangars or “Box Hangars”
- Considered Large T-Hangar or Multi-Corporate Hangar Units
- Designed for Larger Piston, Smaller Jets
- “Spec” Building

BAK – 6 Units, 62 ft. x 65 ft. with 18 ft. Door Clearance New Aircraft Hangar
Airport Hangar Development Planning – DO’S

- Identify Qualified, Best Use Hangar Location Options on Airport Layout Plan
- Know your Zoning-Permit-Environmental Requirements
- Involve Your Tenant/Pilot Community in the Decision Making
- Establish Business Case with Financial Analysis and Airport Performa
- Prepare Lease/Build Agreements
- Be Ready, Flexible for Anything but don’t Sign Up for Everything

LAF – Multi-Size/Use Hangars in Flexible Build Out Locations on ALP
Airport Hangar Development Planning – DON’TS

- Promote “Site Ready” that is NOT “Site Ready”
- Start Design/Construction without sufficient Funds
- Over/Under Estimate Your Potential Income/Costs – Be Honest
- Interfere with Long-Term Planning (e.g. Approaches) for Short Term Gains
- Demolish if it can be Refurbished

HUF – 100 ft. x 60 ft. Hangar Re-Modernization in Lieu of Demolition
Hangar Facility Planning – First Steps

• Know your Funding Sources and Funding Amount *with Contingency*:
  – FAA/State AIP grants
  – Airport Cumulative/General Development Funds
  – Economic Development Corporations (Community Funds)
  – Municipal/County Bond
  – Bank Loan
  – Private-Public-Partnerships (P3’S)

• To start Budgeting the “PROJECT” for Funding, Plan Approximately for:
  – Basic Storage Hangar: $750 to $1M in Funds
    (5,000 to 6,000 sq. ft.)
  – Corporate/Executive Hangar(s): $1M to $2M in Funds
    (10,000 to 11,000 sq. ft.)
  – Corporate/Maintenance Hangar: +$2M in Funds
    (Over 12,000 sq. ft.)
Hangar Facility Planning – First Steps

Approximate Metal Hangar Building Group/Costs with Amenities (Site Not Included)

60 ft. x 60 ft. Units (5 Minimum)
• 18-20 ft. Tail Clearance
• $175,000-$250,000 per Unit

75 ft. x 75 ft.
• 5,000 - 6,000 ft.
• 20-22 ft. Tail Clearance
• No Built Out Space
• $70-110 per sq. ft.
• $450,000 - $660,000

100 ft. x 100 ft.
• 100 ft. x 100 ft.
• 10,000 – 11,000 sq. ft.
• 22-28 ft. Tail Clearance
• Utilities/Bathrooms/Offices
• $80-200 per sq. ft.
• $800,000 - $2.2M

150 ft. x 150 ft.
• 20,000 – 25,000 sq. ft.
• ≥ 28 ft. Tail Clearance
• Office/Meeting Space
• Kitchen/Shop Space
• Sleeping Space
• Multi-Purpose Space
• Covered Entry Drive
• Fire Protection System
• $200-400 per sq. ft.
• $4M - $8M
Hangar Facility Planning – First Steps

• Once you are a go... Decide Procurement Method
  – Design-Bid-Build
  – Design-Build
  – Private Partnerships

• Identify Stakeholders and Team Members

• Conduct a Stakeholder/Team Design Charette (Intensive Planning Review) – A MUST
  – Airport Owner Staff
  – Users/Tenants Staff
  – Lead Architect
  – Lead Engineer(s)
  – Maintenance Staff
  – Contractor(s) (Optional)
  – Local Permitting Agencies (Optional)
  – FAA/INDOT (Optional)
Hangar Facility Planning – First Steps

• Know the Five Basic Types of Spaces in a Hangar
  – Hangar Area
  – Building Utilities Area
  – Office/Administration and Specialty Areas (Bathrooms)
  – Shops Area
  – Warehouse/Storage Area
Hangar Facility Planning – First Steps

- Know what you need and want to what you can afford... there is a difference!
Hangar Facility Planning – First Steps

• Conduct Careful Analysis in the Charrette:
  1. Get Consensus on Business Case, Type of Hangar, Benefits (Vision)
  2. Establish the Budget and Schedule with Contingency
  3. ID Type of Aircraft(s) to be in the Hangar
  4. ID Functions to be Performed or Not
  5. ID Special Purpose Items or Needs (e.g. Bathrooms, Cooking Areas, Lobbies)
  6. Estimate Size of Each Space
  7. Define Critical Systems and Needs
     1. Design Requirements (e.g. Sustainability/LEED)
     2. Building Types and Openings
     3. Hangar Door: Sliding, Vertical Lift, Bi-Folding
     4. Security and Communications
     5. Mechanical Electrical Plumbing (MEP) Systems
     6. Interior Building Materials and Types
     7. Site/Civil Improvements
Hangar Facility Planning – First Steps (Check Your Size/Use/Group)

- The International Building Code (IBC) and the National Fire Protection Agency (NFPA) determine if HANGAR FIRE SUPPRESSION (FOAM/WATER) IS REQUIRED.
- This can be a significant cost, design changer.
- There are 2 Types of Occupancy Uses
  - **S-1 Occupancy:** Aircraft “Repair” Hangar (Moderate-Hazard Storage, Maintenance)
  - **S-2 Occupancy:** Aircraft “Storage” Hangar (Low-Hazard Storage)
- With 4 Building Types (**Groups I through IV**)
- If you have:
  - S-1 Hangar > 12,000 sq. ft.; and/or a
  - Group I hangar door > 28 ft. in height,
  - A FIRE SUPPRESSION SYSTEM IS REQUIRED and no variances are permitted.
- Maintenance does not always mean Fire Suppression. Professional advice is recommended for applicability review of the regulations.
Hangar Facility Planning – First Steps

• Know the Costs and the Cost Differences Makers:

1. **Pre-Engineered Building Costs** –  
   (Most Commonly Underestimated, Most Expensive Single Cost Item)

2. **Hangar Door Costs** –  
   (Most Commonly Oversized Item and Costly Maintenance Issue)

3. **Facility Building Improvement Costs** –  
   (Most Commonly Owner Over Estimated as Required Item)

4. **Site Development Costs** –  
   (Most Variable, Required Work Items)

5. **Bid Environment and Geography**
   • Union vs. Non-Union
   • Skilled General Contractors Availability
   • Specialty Work (Hauling or Build-on-site)
   • Bid Method (Design Build vs. Design-Bid-Build)
   • Material Pricing (Steel and Concrete are the Variable Killers)
Hangar Design/Bidding/Construction

• Tips when building a Hangar Facility:
  – **Plan on Last Minute Problems**
  – **Conduct Design/Costs Reviews** with Stakeholders at 60%, 90% and Final
  – **Review/Update Liability/Risk Insurance**
  – **Look for Bid Options** to Reduce Costs or Build at Later Date
    – Offices, Entrances and Building Extensions
    – MEP Systems and Equipment
  – **Push for Competitive Bidding**
    – Pre-Quality Local Bidders
    – Flex on Schedule (Low Damages), Materials (Approved Equals)
  – **Don’t Underestimate Airfield Operations Impacts/Constructability**
    – Runway Closures (Cranes) and Taxiway Closures (Construction Activity)
  – **Conduct Construction Inspection, Testing**
  – **Conduct a Detailed Final Walkthrough** with Permitting Agencies
Consider (Newer) Design Technologies

- Virtual Reality (VR) Design Reviews
- (LiDAR) Scan to CAD/GIS/BIM/Revit
Questions & Answers

Handouts Available:
ACRP – GA Facility Planning
AOPA – Aircraft Hangar Development Guide
Woolpert - GA Aircraft Characteristics List
(Height/Width/Length) for Hangar Fit