



Cost Estimates: Aircraft Shelters - Construction

Capt Nathanael Clark



Overview



The AFIT of Today is the Air Force of Tomorrow.

- Background
- Sources
- Assumptions
- Cost Estimation



Background



The AFIT of Today is the Air Force of Tomorrow.

- **Hardened Aircraft Shelters (HAS):** Housing for fighter aircraft as a passive defensive measure to enhance survivability under attack
 - 9 – 12 ft thick walls and roofs
 - Blast Doors
 - Overpressure PSI: 200 – 500+
- **Protective Aircraft Shelters (PAS):**
 - Offer less protection from attack than HAS
 - Overpressure PSI: 50 – 200 PSI
- **Deployable Shelters:** Kevlar Lined Shelters with moderate protection
 - Rapid Deployment
 - Helps with Debris from Bomblets
 - Overpressure below 50 PSI



Sources



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- **USINDOPACOM (2020)**
 - 20 HAS Third Gen facilities at a cost of \$125 M
 - Ventilation and Engine Exhaust systems allow aircraft engines to run inside while hangar doors closed
 - Fire Prevention Systems
- **Air and Space Forces (2009)**
 - Estimated that a hardened aircraft shelter of 36 fighters would cost \$700 M
- **RAND Corporation (1955)**
 - Study for Aircraft Shelter Cost Estimate by Airframe
 - Measuring cost by PSI of the structural integrity
- **Indian Air Force (IAF) (2017)**
 - Built 108 protective (NGHAS) in 2012 at \$770 million dollars Numerous
- **Companies Regarding Sunshades:**
 - GSA Advantage



Assumptions



The AFIT of Today is the Air Force of Tomorrow.

- HAS facilities estimated for fighter/UAV aircraft
 - Recent literature and figures are all point towards and focusing on fighters
- Facilities are not broken down into special case hardening or customization
 - Chemical
 - Biological
 - Nuclear
- Construction Costs Include (Not itemized due to lack of data)
 - Design
 - Materials
 - Labor
- Alternatives: Hardened Shelters, Protective Shelters, Sunshades
- Inflation Index: DoD Greenbook FY23 Consumer Price Index (CPI-W)
- AirandSpaceForce.com has an unverifiable dollar figure



Cost Estimation: HAS



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- Kusan Air Base Case Study: 20-Bay Fighter
 - **Source Year:** 2020
 - **CPI:** 88.84
 - **Cost in Source Year:** 125 M Total
 - **Cost in Base Year FY23\$:** **\$141,498,755.00**
- RAND Cost Estimates: 500 PSI Shelters
 - **Source Year:** 1955
 - **CPI:** 10.70
 - **Cost in Source Year:** \$666,000 per aircraft
 - **Cost In Base Year FY23\$:** **\$7,434,597.76**
- Air & Space Force Case Study: 36-Bay Fighter
 - **Source Year:** 2009
 - **CPI:** 73.77
 - **Cost in Source Year:** \$700 M Total
 - **Cost In Base Year FY23\$:** **\$991,834,900.18**



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Cost Estimation: PAS

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- RAND Cost Estimates: 200 PSI Shelters
 - **Source Year:** 1955
 - **CPI:** 10.70
 - **Cost in Source Year:** \$207,500 per aircraft
 - **Cost In Base Year FY23\$:** **\$2,316,334.89**
- Indian Air Force 108 Protective Shelters:
 - **Source Year:** 2017
 - **CPI:** 84.12
 - **Cost in Source Year:** \$772.1 M Total
 - **Cost In Base Year FY23\$:** **\$942,351,325.88**





Cost Estimation: Sunshades



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- Reached out to Celina Tents
 - GSA Advantage Pricing:
 - **\$395,505.80**
 - **\$ 405,752.07**





Cost Estimates: Bottom Line



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- Price Averaging per aircraft cost in FY23 dollars for alternatives
 - Serving as educated estimates of costs examined

Shelter Type	Hardened	Protective	Sunshade
Weighted Avg	\$7,254,767.76	\$3,598,162.96	\$ 400,628.94



Summary



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Questions?



Work Cited



The AFIT of Today is the Air Force of Tomorrow.

- Bracy, Will. “Hardened Aircraft Shelters Constructed at Kunsan.” *U.S. Indo-Pacific Command*, 5 Aug. 2020, <https://www.pacom.mil/Media/News/News-Article-View/Article/2301725/hardened-aircraft-shelters-constructed-at-kunsan/>.
- Bureau, Our. “Indian Air Force Plans Building 108 Hardened Aircraft Shelters.” *Defense Aerospace News, Exhibitions, Contracts and Procurement*, 3 July 2017, https://www.defensemirror.com/news/19740/Indian_Air_Force_Plans_Building_108_Hardened_Aircraft_Shelters#.Y_UsQ3bMJPY.
- “CPI Inflation Calculator.” *U.S. Bureau of Labor Statistics*, https://www.bls.gov/data/inflation_calculator.htm. Accessed 21 Feb. 2023.
- Hammer, J. G., and C. A. Sandoval. “Comparison and Evaluation Protective Alert Shelter Concepts for SAC Aircraft.” *RAND*, Apr. 1961.
- “National Defense Budget Estimates for FY 2023.” *Comptroller Defense*, https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2023/FY23_Green_Book.pdf. Accessed 21 Feb. 2023.
- Peter Jr, Marc. “Estimates of Aircraft Shelter Costs.” *RAND*, Dec. 1955.
- Stillion, John. “Fighting Under Missile Attack.” *Air & Space Forces Magazine*, 1 Aug. 2009, <https://www.airandspaceforces.com/article/0809fighting/>.
- *GSA Advantage*, gsaadvantage.gov. Accessed 21 Feb. 2023.