Tinker Air Force Base
Installation Facilities Standards (IFS)

G07. STRUCTURAL ENGINEERING REQUIREMENTS

Comply with AF Corporate Standards for Structural Systems:
http://afcfs.wbdg.org/facilities-exteriors/structural-systems/index.html

G07.1. Design Load Calculations

1. All structural loads shall be calculated in accordance with the current edition of UFC 3-301-01 with the following exception:

2. Minimum roof live loads of 20 pounds per square foot (psf) shall not be reduced for tributary (influence) areas.

G07.2. TAFB Minimum Values in Structural Analysis

1. Minimum Risk Category for Buildings and Other Structures shall be II

2. Minimum Wind Exposure Category shall be C.

G07.3. Foundation Design

1. The predominant type of foundation used on TAFB is the pier-and-grade beam type. This foundation shall be utilized in combination with isolated, floating slabs-on-grade unless project geotechnical investigations recommend the use of structural slabs-on-grade.

2. Given the advance review and approval of 72 ABW/CE, projects can be designed and constructed which utilize mat-type foundations or spread footings. These types of foundations will only be considered where the depth-to-bedrock (predominantly sandstone and/or shale) warrants their use.

3. In the case of all projects classified in Category IV Essential Facilities, as defined by UFC 3-310-04, foundation ties shall be required for individual spread footings.

G07.4. Geo-technical Investigation

1. Soil borings and investigations shall be used to determine the average depth of bedrock and allowable bearing pressures of each type of geologic formation encountered in the investigation.

G07.5. Structural Economy

1. The most economical and efficient structural system of steel, concrete, and/or load-bearing masonry shall be utilized for building superstructures for all TAFB projects. The use of wood for building superstructures is prohibited.

G07.6. Facility Hardening

1. For required Antiterrorism building structural hardening refer to: UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings, UFC 4-020-01 DoD Security Engineering Facilities Planning Manual and UFC 4-023-03 DoD Design of Buildings To Resist Progressive Collapse.

2. The Base Anti-Terrorism Office can be reached at 405-734-7120 or 405-734-6381. Anti-

Terrorism Officers will assist project designers as to the incorporation of structural hardening requirements for proposed projects.

G07.7. Roof Design

1. Due to potential changes in facility use, all low-slope roof structures, which are designed to support a built-up roof membrane, shall be designed for a minimum Roof Dead Load of 25 psf.

2. This minimum value shall include the weight of proposed and future loads associated with the roofing system, including decking, insulation, suspended ceilings, mechanical ducts/diffusers, electrical lighting/conduit, and automatic fire suppression sprinkler systems.

3. A minimum Roof Dead Load of 20 pounds per square foot may be used for standing seam metal roof systems.

G07.8. Seismic Design

1. Seismic design shall be in accordance with the latest edition of the International Building Code, UFC 1-200-01, UFC 3-301-01 and UFC 3-310-04.

2. A soil site classification of "D" shall be assumed, unless proven otherwise by soil exploration testing.

G07.9. Shelter Design

1. TAFB Storm Shelter Policy: Organizations who would like to install or construct storm shelters (internal or external) at their facilities must submit a Base Civil Engineer Work Request (AF Form 332) to 72 ABW/CE in order to begin the assessment and approval process. All new storm shelters shall be above ground facilities.

2. New Facilities – (Mandatory) New occupied buildings must be constructed with internal storm shelters designed according to International Code Council 500 (ICC 500) standards and be sized to accommodate the maximum expected occupancy, as determined by civil engineering's siting criteria assessment.

3. Existing Facilities – (Optional) Dedicated ICC 500 rated storm shelters are authorized. Storm shelters shall be sized according to ICC 500 standards, comply with all applicable codes, and accommodate the maximum expected occupancy, as determined by the siting criteria assessment. Exterior storm shelters may be permitted when the siting criteria assessment deems the exterior solution the most feasible alternative.

4. Existing Facilities – (Mandatory) In occupied facilities that do not have designated areas of adequate refuge, major renovation projects must include the identification of structurally enhanced refuge areas if construction of new walls total 25% or more of the interior walls in the renovated area. Each project will be analyzed to determine the best solution.

5. Approval Process – (Mandatory) All storm shelters, even if incidental to renovation projects and even if interior to a facility, shall be approved by the Facilities Board to ensure compliance with this policy and the criteria herein. All renovation projects will be reviewed by the Civil Engineering Architectural/ Engineering Review Board (AERB) to ensure compliance with the structurally enhanced refuge requirement.

6. Shelter Priority Areas – Tinker AFB has determined that the following facilities should receive priority consideration when submitting shelter projects for funding and execution. They are:

1) Child Development Centers and Youth Centers; 2) Dormitories; 3) Air Traffic Control Tower; 4) Security Forces locations and gates; 5) Command Post; 6) Fire Department; 7) Base Defense Operations Center; and 8) Boiler Plant.

7. Policy Definitions:

a. ICC 500 – This code standard applies to design, construction, installation and inspection of storm shelters constructed as separate detached buildings or constructed as safe rooms within buildings for the purpose of providing safe refuge from storms that produce high winds, such as tornadoes and hurricanes.

b. Occupied Buildings – A building shall be considered occupied at any time it meets any of the following criteria: 1) It is open for general occupancy; 2) It is open to the public; and 3) It is occupied by more than 10 persons.

c. Storm Shelter – A storm shelter is any building, structure or portions thereof, constructed in accordance with the ICC 500 standard, designated for use during a severe wind storm event, such as a hurricane or tornado. A residential storm shelter serves occupants of a dwelling unit, with an occupant load of less than six people. A community storm shelter is defined as any storm shelter not classified as residential.

d. Tornado Refuge Area – Tornado refuge areas are those in an existing building that have been deemed by a qualified architect or engineer to likely offer the greatest safety for building occupants during a tornado. It is important to note that refuge areas are not ICC 500 compliant, but they do offer the best protection in a given area. People sheltering in the refuge area are more likely to survive than people sheltering in other areas of the building.

e. Siting Criteria Assessment – When determining the best location for a proposed storm shelter, civil engineering, in conjunction with the requestor, will consider: 1) Existing tornado shelter/refuge opportunities in or near the facility; 2) Cost effectiveness; 3) Land availability; 4) Architectural compatibility; 5) Accessibility; 6) Anti-terrorism/Force protection; 7) Environmental concerns; and 8) Facility personnel loading. This list is not all-inclusive, and some shelter siting proposals will have additional aspects to analyze.

8. Any approved shelter, regardless of the funding source, will be open to any personnel (with appropriate clearance/authorization) seeking protection.