

31 Mar 24



NATIONAL GUARD BUREAU

3501 FETCHET AVENUE

JOINT BASE ANDREWS MD 20762-5157

31 Mar 2024

MEMORANDUM FOR DISTRIBUTION

FROM: NGB/A4

SUBJECT: Air National Guard Engineering Technical Letter (ANGETL) 24-01-07: Airfield and Vehicle Pavement Design Guidance

1. **PURPOSE:** To provide design policy for ANG airfield and vehicle pavements.
2. **APPLICABILITY:** Mandatory requirements are defined in specific paragraphs and in referenced publications.
 - 2.1. **Effective date:** Immediately.
 - 2.2. **Intended Users:** Base Civil Engineers (BCE) and Architect-Engineering consultants (A-E).
 - 2.3. This ANGETL shall be applicable for all new designs, designs for which NGB/A7O formal approval of the Type A-2 Concept Development Submittal has not yet been issued and for all code and criteria review. For projects that have obtained formal approval of the Type A-2 Submittal, application of this ANGETL shall be on a case-by-case basis and as directed by the NGB/A4O Project Manager.
3. **REFERENCES:** Refer to Attachment 1 for a list of referenced publications and active links, if available.

4. AIRFIELD PAVEMENTS

4.1. **General.** Airfield Pavements shall be designed in accordance with UFC 3-260-02, Pavement Design for Airfields. UFC 3-260-01, Airfield and Heliport Planning and Design, shall be referenced for planning and geometric design of airfield facilities.

4.2. Airfields

4.2.1. Use "Air Force Mixed Traffic" design criteria provided in the UFC 3-260-02. Pavement Design shall be made for "Light Load, Mixed Traffic" or "Medium

Load, Mixed Traffic” in accordance with the UFC design standards and according to the classification of the mission aircraft.

- 4.2.2.** In some cases a “Light Load, Mixed Traffic” design may be sufficient for a Medium Load aircraft such as the C-130. In this case the designer should compare the pavement section required to support the design number of passes and loading of the C-130 with the pavement section required using a “Light Load, Mixed Traffic” design. If the pavement section required for the “Light Load, Mixed Traffic” design is thicker, then it is sufficient to use the “Light Load, Mixed Traffic” criteria even though the C-130 is classified as a Medium Load aircraft.”
- 4.2.3.** The pavement thickness design must be approved by NGB/A4O and NGB/A4IC as part of the A-2 approval. Computer aided thickness design programs which comply with these standards shall be used and are available for downloading at the Pavement-Transportation Computer Assisted Structural Engineering (PCASE) web site at www.pcase.com.
- 4.2.4.** Federal Aviation Administration (FAA) design criteria may be used, where applicable, for pavements used jointly with civilian aircraft off of ANG property.
- 4.2.5.** Marking of airfield pavements shall be in accordance with UFC 3-260-04, Airfield and Heliport Marking.

4.3. Hangar Floors

- 4.3.1.** Hangar Access Aprons. Design the pavement for hangar access aprons with the same design criteria as the hangar floors.
- 4.3.2.** Hangar Doors. Provide rigid pavements for the full width of hangar doors to a minimum distance of 30 feet from the hangar door.
- 4.3.3.** Shop and Administrative Floors. Administrative and shop floors shall be a minimum of 6 inches higher than the immediately adjacent hangar bay floor. Egress points shall be provided with appropriate sloped integral concrete ramps from the hangar bay into the adjacent areas. Floors shall be designed for a minimum load of 300 p.s.f. consisting of a minimum 6-inch PCC with 6.0 x 6.0, w2.4 x w2.4 Welded Wire Fabric (WWF).
- 4.3.4.** Hangar flooring thickness shall be designed as an airfield pavement, Type C traffic area, in accordance with UFC 3-260-02, Pavement Design for Airfields standards. The hangar floor shall be designed for the expected use of the facility.
- 4.3.5.** Floor drains are only allowed in hangars where aircraft washing (corrosion control) is a function. Corrosion control hangar floors shall be sloped at minimum of 1/8 inch per 1 foot to floor drains.

4.3.6. Epoxy Floor Coating Systems. It is not recommended to apply floor coating on hangar bay floors where aircraft washing is a primary or secondary function of the space and its use must be approved by the base safety officer. Where floor coating systems are used, it shall be compatible with the concrete floor finish procedures specified during construction. Primer specifications should account for presence of moisture. Grit shall be added.

4.3.7. Provide light color floor coatings with light to medium grit surface for hangar bay space. Follow criteria found in UFC 3-190-06, Protective Coatings and Paints. Floor coatings shall be durable and completely resistant to discoloration from POL products, rubber, tires, and other equipment which will roll across or be parked or stored on the flooring system. The floor coating shall be spark and slip resistant.

4.4. Pavement Type:

4.4.1. Rigid pavement shall be provided per the UFC 3-260-02, Pavement Design for Airfields. On joint-use facilities, the type of pavement will be provided in accordance with the Military Construction Cooperation Agreement (MCCA).

4.4.2. For rigid pavement used by vertical/short takeoff and landing (V/STOL) heat resistant type pavement and joint materials should be considered. Applications of this requirement shall be coordinated with NGB/A4IC.

4.4.3. For maintenance projects, consider use of emulsified asphalt sealcoat or other surface treatments for flexible pavement systems.

4.4.4. For new construction in liquid oxygen (LOX) storage and handlings areas, use continuously reinforced concrete pavements to eliminate as many joints as possible. For joints in LOX areas, use Poly-Jet LOX as a compatible joint sealant. If these recommendations cannot be followed, leave the joints in the LOX areas unsealed. Siting shall meet minimum separation distances as governed within UFC 3-600-01.

4.4.5. For localized patching, follow the requirements contained in UFC 3-270-01 Asphalt Maintenance and Repair, UFC 3-270-02 Asphalt Crack Repair, UFC 3-270-03 Concrete Crack and Partial-Depth Spall Repair, UFC 3-270-04 Concrete Repair. Approval of proprietary materials and methods shall be obtained from NGB/A4IC.

4.5. Airfield Rigid Pavement Materials and Criteria

4.5.1. The jointing plan shall be done in accordance with the Air Force requirement in UFC 3-260-02, Pavement Design for Airfields.

4.5.2. Odd-shaped slabs shall be reinforced per the UFC 3-260-02, Pavement Design for Airfields.

4.5.3. For all utility penetrations which are centered in the slab, use thickened edge

expansion joint and reinforcement. The jointing layout shall be coordinated with all the utility penetrations early in the design.

4.5.4. For joint sealant in new concrete, compression seals are preferred. The use of other sealant types shall be coordinated with the NGB/A7OC. For repair of joint sealant in existing concrete, silicone sealant is permitted. Material used for repairs shall be compatible with existing materials.

4.5.5. The A-E shall specify material testing for potential alkali-silica reaction (ASR) in the technical specification of rigid pavement design. Local aggregates and sands shall be tested by ASTM C1260-06 & ASTM C1567 for the susceptibility to ASR before they are used.

4.6. Flexible Pavement Materials and Criteria: Refer to UFC 3-260-02, Pavement Design for Airfields.

4.6.1. When within 2 degrees of the upper or lower bounds of superpave asphalt to the temperature thresholds, switch to a polymer modified asphalt.

5. VEHICLE PAVEMENTS

5.1. General: Pavement design criteria specified in this ANGETL shall be in accordance with UFC 3-250-01FA, Pavement Design for Roads, Streets, Walks, and Open Storage Areas, which shall be supplemented or modified by local and state highway department practices, where investigation has shown that they are adequate and economical, or are required by local conditions.

5.2. Concrete edge protection. Provide hot-dipped galvanized steel edge cast integrally into the slab for all horizontal edges or corners such as loading docks, vehicle entrances into facilities and other similar areas. Also provide similar protection for vertical cast concrete surfaces to the appropriate height.

5.3. Selection of Pavement Type

5.3.1. Provide rigid pavement in fueling, refueler parking and all service areas where petroleum and/or products are used and/or may drip or spill onto the pavements, and wherever its use results in a lower life-cycle cost than other paving alternatives. Also provide rigid paving in all areas subject to unique traffic or loads which would otherwise result in asphalt damage, rutting or shoving.

5.3.2. The life cycle cost analysis shall be calculated based on a 25 year service life.

5.3.3. Where rigid pavement is not required, the A-E shall perform an LCCA comparing rigid and flexible pavements and select the most economical option.

5.3.4. Use of aggregate or alternate materials in areas not requiring regular daily use such as overflow vehicle parking areas, roads to remote facilities, and temporary and

31 Mar 24

seasonal equipment storage areas is recommended, provided that it does not pose foreign object damage (FOD) potential to the airfield.

5.4. Vehicle Parking: Total privately owned vehicle parking spaces shall be 75 percent of the UTA population in addition to ABA requirements, visitor parking, and government vehicles. Spaces for visitor parking shall not exceed one percent of the UTA population. The BCE shall provide the A-E the authorized number for the UTA. A minimum of two

5.4.1. Visitor parking spaces shall be provided for headquarters and squadron operations facilities.

5.5. Project Site Geometry

5.5.1. All project designs shall be in accordance with UFC 3-201-01, Civil Engineering.

5.5.2. Project site layout shall be designed for the largest expected vehicle to use the site.

5.5.3. Roadway width shall be designed for a full circulation of the largest expected vehicle with turn-radii of a WB-67 vehicle being the minimum.

6. POINT OF CONTACT: The point of contact for this ANGETL is CETB Civil Engineer, NGB/A4IC at (701) 857-4398, DSN 344-4398, or email NGB CETB Workflow

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Signed by: USAF

CHAD R. CALLAN, GS-15, DAF, P.E.
Associate Director, Engineering
National Guard Bureau

Attachment:
References

Distribution: Each USPFO Each BCE