



NATIONAL GUARD BUREAU

3501 FETCHET AVENUE
JOINT BASE ANDREWS MD 20762-5157

1 May 2015

MEMORANDUM FOR DISTRIBUTION

FROM: NGB/A7

SUBJECT: Air National Guard Engineering Technical Letter (ANGETL) 15-01-05: "Electrical and Communications Engineering"

1. **PURPOSE.** This ANGETL provides guidance in implementing the electrical design policy.
2. **APPLICABILITY**
 - 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. Application of this ANGETL for projects that have obtained formal approval of the Type A-2 Submittal shall be on a case-by-case basis and as directed by the NGB/A7O Project Manager.
3. **REFERENCE PUBLICATIONS.** Refer to Attachment 1 for a list of referenced publications and active links, if available.
4. **GENERAL**
 - 4.1. The electrical systems including lighting, interior and exterior power distribution, and telecommunication systems shall follow the guidelines set in Unified Facility Criteria (UFC) Series 3-500: Electrical and referenced criteria.
 - 4.2. Deviation from the minimum criteria, where a valid need exists and where an alternate solution involving equivalent concept and sound engineering is available, may be considered. Any deviation from minimum criteria must have written approval from NGB/A7O.
 - 4.2.1. The request for deviation approval must include justification, analysis, cost comparison, criteria used and other pertinent data.

- 4.2.2. Should approval be granted, it shall apply only to the specific request under consideration and not to cases with similar circumstances.

5. FUNDING

- 5.1. For all projects, non-real property installed equipment such as electrical equipment (e.g., uninterruptible power supplies (UPS)) will not be funded with project funds in accordance with AFI 32-9005, Real Property, Accountability, and Reporting.
- 5.2. For sustainment, restoration, and modernization (SRM) projects, communication cable & installation (e.g., telephone, data, PA, CCTV, fiber optics, etc.) shall be funded through NGB/A6. During the programming of SRM projects, the BCE shall notify base communications and the regional Cyber Systems Integrator, base level (CSI-B) for the acquisition of these Communications funds so they are available at construction award.

6. ELECTRICAL

6.1. POWER SYSTEMS

- 6.1.1. Building power distribution, grounding, and service entrance metering shall meet UFC 3-520-01, Guidelines for Interior Electrical Systems and AFI 32-1065. 400Hz distribution and direct current systems (28VDC) systems shall meet UFC 4-121-10N, Design: Aircraft Fixed Point Utility Systems. Exterior electrical distribution and building service transformers shall meet UFC 3-550-01, Exterior Electrical Power Distribution.
- 6.1.2. Sub-Metering shall meet the following requirements:
- 6.1.2.1. All facilities shall have sub-meters installed in accordance with UFC 1-200-02, High Performance and Sustainable Building Requirements.
- 6.1.2.2. Engineering Technical Letter (ETL) 08-13: Incorporating Sustainable Design and Development (SDD) and Facility Energy Attributes in the Air Force Construction Program
- 6.1.2.3. At a minimum sub-metering is required for the following facility types:
- a) High electrical usage areas.
 - b) Parking lot site lighting.
 - c) Simulator areas.
- 6.1.3. Load calculations shall be provided to verify size and adequacy of distribution systems. Identify connected load, demand factor and demand load for all panels and transformers.
- 6.1.4. Conductors #10 or smaller shall be solid copper, #8 and larger shall be stranded. Aluminum conductors will not be allowed for any size.

- 6.1.5. Conduit shall be a minimum of 3/4 inch.
- 6.1.6. All facilities not authorized a Real Property Installed Equipment (RPIE) for a fixed auto start generator, shall be provided with a generator connection point. The connection point shall include a generator plug, grounding, disconnect switch and concrete pad. If the BCE determines there is no need for a portable generator based on conditions such as climate or use, the BCE shall consult with NGB/A7OC to verify a generator connection point is not required for the facility. Refer to ANGETL 15-01-08: ANG Generator Guidance.
- 6.1.7. Power Conditioning and UPS. Where required due to the sensitive nature of connected equipment (e.g., mainframe computer systems), special conditioning and UPS systems shall be installed. The users shall fund the UPS system. Designers shall coordinate with the users for infrastructure requirements. Refer to ETL 02-12, AFI-32-1062, and AFI-32-1063.
- 6.1.8. The placement of all exterior facility and site electrical service items (e.g., lighting systems and supports) shall be architecturally coordinated. Transformers and switch gear shall be located in appropriately accessible locations but as unobtrusively as possible for maintenance. Placement shall not rely on landscaping for concealment.
- 6.1.9. Design for and require contractor to coordinate placement of all electrical equipment and components with other trades.
- 6.1.10. Install a raised concrete pad, minimum 3-1/2" high, for all floor mounted electrical equipment.
- 6.1.11. Provide provisions for photovoltaics panels for all buildings. Refer to ANGETL 15-01-01, Sustainable Design, Development, and Resource Conservation.

6.2. LIGHTING SYSTEMS

- 6.2.1. Exterior, interior, and emergency lighting and control systems shall meet UFC 3-530-01, Design: Interior and Exterior Lighting and Controls.
- 6.2.2. Exterior lighting requirements shall meet High Efficiency Exterior Lighting Policy memo (see Attachment 4).
- 6.2.3. To the greatest extent possible, standardize all lighting systems and devices in each facility with base wide systems. Standardization shall include manufacturer, type of lamp used, and color of devices and style of fixtures. For new facilities, coordinate with the BCE as to what standard lighting systems have been provided for other newly constructed facilities.

- 6.2.4. Provide motion sensor lighting systems in restrooms, locker rooms and other areas where energy savings are possible without causing safety concerns. Use of motion sensor lighting in mechanical, electrical, telephone room or other similar area where maintenance personnel may be working is prohibited.
 - 6.2.5. Zone building lighting systems that have areas that are typically not used during non-unit training assembly such that they can be isolated and turned off.
 - 6.2.6. Site lighting shall have a dedicated utility infrastructure and not fed from facility circuits where a base site lighting circuit is available. If a base site lighting circuit is not available, the site lighting circuit shall be sub-metered in accordance with section 6.1.2.3.
 - 6.2.7. Apron lighting shall be controlled from a minimum of two locations (security forces/command post and flight line operations). Lighting intensity levels for loading and parking areas shall be in accordance with UFC 3-535-01, Air Navigation Facilities.
 - 6.2.8. In major renovation, and new construction of parking lots, roadways and other facilities requiring exterior lighting, use high efficiency lighting (e.g., induction or solid state) where economically feasible.
 - 6.2.9. Facility exterior mechanical, electrical and communications courtyards shall have exterior lighting provided.
- 6.3. **ENERGY EFFICIENCY AND CONSERVATION:** Energy efficiency shall be a part of all projects regardless of LEED requirements. Refer to ANGETL 15-01-01, Sustainable Design, Development, and Resource Conservation.
- 6.4. **CATHODIC PROTECTION:** Provide cathodic protection wherever underground metallic structures (tanks and associated piping) will be used. Cathodic protection surveys and design shall be in accordance with the UFC 3-570-06, Cathodic Protection and AFI 32-1054, Corrosion Control.
- 6.5. **LIGHTNING PROTECTION**
- 6.5.1. Lightning protection shall meet UFC 3-575-01, Lightning and Static Electricity Protection Systems.
 - 6.5.2. Design shall be based on AFI 32-1065. Lightning protection shall be provided for all buildings with a risk assessment of moderate or high as outlined in Appendix I of National Fire Protection Association (NFPA) 780, and for the following types of facilities: munitions facilities, weapons storage vaults, alert aircraft hangars, fuel cell and corrosion control hangars, refueler vehicle maintenance facilities, intelligence facilities, and remotely piloted aircraft facilities. Additionally, munitions facilities shall have a ground loop around each building of the complex and the lightning protection down conductors shall be connected to the ground

loop. Provide inspection in accordance with UFC 3-575-01, Lightning and Static Electricity Protection Systems.

6.6. HAZARDOUS ZONES

6.6.1. Hazardous zones are identified and classified in NFPA 70 and the National Electric Code (NEC). Most of the areas encountered in ANG facilities are as identified below.

6.6.2. Where possible, mount equipment and wiring to avoid hazardous locations and use standard devices and wiring. Identify the classification and limits of each hazardous zone on the drawings.

Table 6-1 Hazardous Zone Classification Table:

HAZARDOUS ZONE CLASSIFICATION				
LOCATION	CLASSIFICATION			NOTES
	NON HAZARDOUS	CLASS I DIVISION I	CLASS I DIVISION II	
Battery Room	X			2
Bladder Maintenance Room	X			3,9
Blue Foam Storage Room (C130)			X	9
Carpenter Shop	X			9,11
Composite Materials Repair (Fiberglass)	X			9,11
Drop Tank Maintenance Room	X			3,9
Flammable Liquids Storage Room			X	14
Fuel Hydrant Pits		X		
Hangar - Maintenance, Alert and Load Crew		Floor Pits	X	4,5,13
Hangar - Weapons Calibration		Floor Pits	X	4,5,13
Hangar - Fuel Cell Maintenance		Floor Pits	X	4,5,6,13,19
Hazardous Storage Building			X	10
Hush House			X	4,5
Hydrazine Facility (Service)		X		9
Hydrazine Facility (Storage)			X	9
LOX Maintenance Shop	X			
LOX Storage Facility			X	7
Packing and Crating	X			9,11
Paint Spray Room		X		12

HAZARDOUS ZONE CLASSIFICATION				
LOCATION	CLASSIFICATION			NOTES
	NON HAZARDOUS	CLASS I DIVISION I	CLASS I DIVISION II	
POL Lab			Below 48" AFF	3,9,16
POL Pump house - POL System		X		8,9
Refueler Vehicle Maintenance Bay		Floor Pits	X	1,3,6,15
Refueler Vehicle Parking Structure			X	1
Solvent Rooms (within 5 feet of tank)			X	NEC Art 516
Vehicle/Automotive Maintenance		Floor Pits	Below 18" AFF	17
Welding Area(s)	X			9

NOTES:

- Classification area shall be from below height of overhead door, or below 5 feet above refueler vehicle, whichever is highest. The entire area within 5 feet (all directions) of the parked refueler vehicle and up to 3 feet above finish floor, shall be classified as Class I, Division II.. Areas beyond 5 feet (all directions) of the parked refueler vehicle and above 3 feet from finish floor are not part of the Class I, Division II classification area. Wherever possible, do not locate electrical distribution or utilization equipment in zones classified as hazardous.
- Interconnect charger with room exhaust fan. (Provide explosion proof fan with non-spark blades. Ventilate vertically to the extent possible. Exhaust duct shall be welded, drip-proof stainless steel. Exhaust duct shall be under negative pressure to the maximum extent possible (draw-through rather than blow-through)).
- All electrical equipment, outlets, conduit and wiring shall be located within 24 inches of walls and a minimum of 48-inches above finish floor.
- Classification area shall be in accordance with NEC Article 513 – Aircraft Hangars.
- Locate all electrical elements within the Hangar bay zone within 24 inches of walls and above 48-inches above finish floor. Electrical receptacles shall not be provided in hangar bays unless required for equipment in support of the aircraft. Justification for mounting locations outside of this parameter shall be only when no other cost effective or feasible location can be identified. Wherever possible, do not locate electrical distribution or utilization equipment in zones classified as hazardous.
- Trench drain exhaust fan shall be manually operated. Interconnect with the base energy management control system (EMCS). (Provide explosion proof fan with non-spark blades. Ventilate vertically to the extent possible. Exhaust duct shall be welded, drip-proof stainless steel. Exhaust duct shall be under negative pressure to the maximum extent possible (draw-through rather than blow-through)).
- Classification area shall be up to 8 feet above grade.
- Areas classified in accordance with current Air Force standards or American Petroleum Institute (API) requirements, whichever are more stringent.
- Provide segregated area with exhaust system at laboratory hood. (Provide explosion proof fan with non-spark blades. Ventilate vertically to the extent possible. Exhaust duct

shall be welded drip-proof stainless steel. Exhaust duct shall be under negative pressure to the maximum extent possible (draw-through rather than blow-through).

10. Locate facility separately (detached) from main facility.
11. Provide dust tight fixtures.
12. Do not provide interior doors leading into hangar bay.
13. Reference NEC Article 513 – Aircraft Hangars. All adjacent and communicating areas not suitably cut off from the hangar bay and within 25 feet of travel distance from the hangar bay, shall be classified as Class I, Division II up to a level of 18 inches above the hangar bay floor. Wherever possible, do not locate electrical distribution or utilization equipment in zones classified as hazardous.
14. Flammable liquids shall be stored inside the building in approved containers or in grounded metal cabinets, up to the maximum amount identified in NFPA 30.
15. Do not provide doors leading to adjacent interior spaces. Provide exit doors (minimum 2) leading directly to the outside.
16. The entire area within 5 feet (all directions) of the laboratory exhaust hood shall be classified as Class I, Division 1.
17. To the greatest extent possible, locate all electrical elements above the hazardous classification zone.
18. Exhaust Barrier Pit from floor Level. Exhaust fan motor outside of air stream and use non-sparking blade.
19. Wall-mounted outlets shall be Class I, Division 1 or 2 (Zone 1 or 2). To ensure no unclassified tools or equipment are taken into the classified area around the aircraft, wall-mounted outlets are required to be classified, even though they are outside the classified area. Wall-mounted switches that are outside the classified area do not need to be Class I, Division 1 or 2; they do not affect tools or equipment brought into the area in accordance with Technical Order 1.1.3 Inspection and Repair of Aircraft Integral Tank and Fuel Cells.

7. SPECIAL SYSTEMS AND COMMUNICATIONS

7.1. GENERAL

- 7.1.1. These systems shall include telephone/intercom, computer/data, public address (PA), closed circuit television (CCTV), fire suppression/alarm, security, etc. Verify all requirements with Base Communications Officer, Visual Information Manager, Base Fire Chief, and Security Officer, as appropriate, through the Base Civil Engineer.
- 7.1.2. Telecommunications cabling systems are installed using a total network concept, supporting a multi-product, multi-vendor environment. The common thread among all installed equipment is performance specifications and interoperability. All components of the telecommunications system such as cabling, patch panels, patch panel cables, connectors, modular jacks, etc., shall be rated with the same level of performance specifications. The minimum grade of cable and termination hardware to be used within buildings is Category 6 (Cat 6) unshielded twisted pair (UTP). The user will provide additional performance specifications, if required.

optical fiber may be used when supported mission dictates and or as deemed financially feasible. When optical fiber is used within the horizontal system, a 50/125µm OM3 (or better) two strand cable will be used and installed in accordance with referenced standards.

- 7.1.3. All telecommunications works shall be tested according to the standards in Attachment 1. Test results shall be provided to the BCE, Communications Flight, and Contracting Officer in electronic format prior to system acceptance. The test results must represent that the system is in complete working order.

7.2. Exterior System - All Systems.

- 7.2.1. Main Communications Distribution System. For all communications distribution systems a minimum duct size of 4 inches shall be used. When new construction demands an addition to the main ducting distribution system, the contractor shall provide a complete exterior raceway system comprised of six, 4 inches minimum diameter conduits, as well as hand holes, man holes, associated communication cables, splices, and terminations, from the selected information transfer node to the main telecommunications room in the building. It is required that the main telecommunications room for the facility be located in the building footprint as indicated elsewhere in this section.
- 7.2.2. Lateral Communications Distribution System. For new construction, provide a minimum of three, 4 inch conduit system and avoid direct burial. This is normal end building node (EBN). Provide at least one, 4 inch duct between co-located or composite facility construction. For buildings deemed as information transfer nodes (ITN) a minimum quantity of six, 4 inch ducts, shall be installed, if construction allows for a separate physical path, an additional quantity of six, 4 inch ducts, shall be either stubbed out or connected to the man hole duct system. See Attachment 2
- 7.2.3. All horizontal copper cabling will be tested per UFC 3-580-01, Telecommunications Building Cabling Systems Planning and Design. All outside plant telephone cable will be tested per United States Department of Agriculture Rural Utilities Service Bulletin 17S3F-201(PC-4) upon installation.
- 7.2.4. Hand holes shall be a minimum of 48"Wx72"Lx48"H. In locations where large splices or heavy cable convergence exists, larger man holes will be required. Communication Duct System provided between man holes should not exceed 500ft, and will not exceed 600ft.

7.3. Interior Systems - All Systems:

- 7.3.1. Contractors shall be required to provide a complete cable system for all security, all communication systems and all fire alarm systems, except as identified below.

- 7.3.2. Contractors shall provide a complete pathway system of open tray sized in accordance with Electronic Industries Alliance/Telecommunications Industry Association (TIA/EIA) 569 and stub a minimum 1 inch conduit from each outlet box to within 1 ft. of the pathway system.
 - 7.3.2.1. Outlet boxes shall be no smaller than 4 in wide, 4 in high and 2.5 in deep. This box will accommodate one or two (1 inch) size conduits.
 - 7.3.2.2. Where a larger conduit is required, the box size shall be increased accordingly.
- 7.3.3. Raceway systems shall be separate and dedicated, one each, for fire and security and PA systems but may be combined for telephone, CCTV, fiber optic, DDC/EMCS, etc. stubbing raceways only into ceiling space is not an acceptable practice. Approved conduit may be run to area serving telecom room or cable tray.
- 7.3.4. Cable trays of the centrally hung, two side loading type shall be utilized in all facility systems, except for fire and security systems. Cable tray design and layout shall allow cable tray system to only be located over corridors.
- 7.3.5. Fire detection and alarm systems as well as all security systems, may not be mixed with other communications systems nor routed in facility cable tray systems. Fire detection and alarm system wiring shall be installed in separate dedicated metal raceway (conduit) complete from device to fire and control panel (FACP). Security system wiring shall be installed in separate dedicated metal raceway (rigid conduit).
- 7.3.6. Raceway Identification. Communication system type (e.g., telephone, PA, CCTV, data, fiber optics, intrusion detection system (IDS), etc.) shall be clearly identified on the raceway by frequent color-coding and labels. Identification shall be at 10 foot maximum spacing and at every change in direction and wall penetration. Coordinate identification with the BCE. Each system shall be clearly identified with engraved plastic or metal labels fastened to each device, junction box, pull box, terminal and panel. Coordinate identification systems with the posted operations instructions and operations & maintenance (O&M) manuals and TIA/EIA 606.
- 7.3.7. Government shall provide all communications instrumentation and equipment unless otherwise indicated. IDS and fire detection systems shall be turn-key by the contractor.

7.4. Voice/Data/Imagery Systems:

- 7.4.1. Provide all of the following features at the main telecommunication room. Refer to TIA/EIA 569 series and UFC 3-580-1, Telecommunications Building Cabling Systems Planning and Design for complete construction criteria. Consideration should be given to having a minimum 10 ft high ceiling. Minimum quantity four, 4 inch sleeves are recommended. Provide heating, ventilation, and air conditioning (HVAC) that will maintain a temperature and humidity level in accordance with TIA/EIA and ANGETL 15-01-04, Mechanical Engineering for equipment rooms.
 - 7.4.1.1. A dedicated ground wire (MILSTD-188) from building signal ground to Telecommunications Ground Bus Bar (TGBB) at plywood back board shall be provided. Telecommunications rooms (TR) shall be controlled via lock and key or cipher lock. Walls should be lined with AC grade or better, void-free plywood, 8 ft high with a minimum thickness of $\frac{3}{4}$ in. Cover with two coats of fire-retardant white paint (if fire rated plywood is used, do not cover the rating stamps). The plywood should be installed with the grade "C" surface facing the wall with bottom at 6" above finished floor (AFF).
- 7.4.2. There must be at least one TR or equipment room (ER) per floor unless pre-approved for small buildings.
- 7.4.3. Work area cabling and termination is critical to a well-managed distribution system. Provide a minimum of two telecommunications outlet arrays with four, modular type jacks (four RJ-45) per office, conference room, or training area; on opposing walls. Higher density may be considered via Building Industry Consulting Service International/Telecommunications Distribution Methods Manual (BICSI/TDMM) guidelines if the environment is deemed to be a cubical farm area. When the mission dictates it, there shall be 2-strand multimode 50/125um OM3 or better fiber cable terminated using LC-type connectors at each jack location. In addition, in large admin areas where the length of walls between corners exceeds 15 ft. provide additional outlets so that the maximum separation between outlets does not exceed 10 ft. Each four pair cable shall be terminated in an eight-position modular jack. The eight-position jack pin/pair assignment shall be T568A (according to National Communication System (NCS), FTR 1090-1997) in new construction and re-wire projects, however the authority having jurisdiction may grant a waiver if the majority of the facility is wired T568B. Specify, identify, and label all cables, jacks and patch panels, including all spare conductors in accordance with TIA/EIA 606. See Attachment 3.
- 7.4.4. When concrete slab floors are used, install under-floor ducts, multi-channel raceway, trench-duct systems, or floor-to-ceiling columns in large areas (such as conference and training rooms, amphitheatres, or any other large rooms) to support connectivity. Establish an outlet density of two outlets per every 100

square feet of work area. Extend ducts or raceways into any adjoining audio/visual support rooms. If the design allows, a cellular floor should be considered. Pathways in ground floor slab shall be considered wet locations in accordance with TIA/EIA and NEC standards, and cables used in them shall be rated for such environment.

- 7.4.5. External raceway or wire molding shall not be used without the permission of the Base Communication Officer. No exposed wires shall be permitted in any work area under any circumstances. If external raceway is the only practical means that a system can be deployed and is approved, it shall be sized accordingly and wrap the walls as to not detract from the esthetics of the room.
- 7.4.6. Provide copper backbone cable with minimum 30% spare pairs for system installation from main telephone terminal board (exterior/copper distribution) to telephone closets. Provide fiber backbone cable per referenced standards.

7.5. Computer Cable System.

- 7.5.1. Data cable shall be a minimum of CAT 6 UTP cable. Fiber cable should be considered if deemed financially feasible. When fiber is used it shall be 50/125 μ m OM3 or better multimode. All CAT 6 cable and connecting hardware shall have transmission parameters characterized to a minimum of 250 MHz and meet TIA/EIA 568. Performance testing will meet these standards.
- 7.5.2. CAT 6 cables shall be fully terminated in patch panels. All racks shall meet referenced standards and be provided finished in black or gray powder coat. Racks shall be securely bolted to the floor.
- 7.5.3. High pair count (greater than 4-pair) copper riser cable for voice grade services shall have a minimum rating of Category 3 (CAT 3).
- 7.5.4. PA System. Provide associated transformers, power supplies, interface equipment, system cabling, speakers, speaker grills and volume controls. Transformer impedance shall match that of the amplifier. PA amplifier and microphone shall be Government provided. Wiring (18 gauge S-R Insulated) shall be specified as tinned copper, S-R PVC insulated, conductors cabled with aluminum-polyester shield and 20 AWG stranded tinned copper drain wire (trade number 9418).
- 7.5.5. Closed Circuit Television/Community Access Television (CCTV/CATV). Contractor shall provide all taps, splitter and amplifiers as required as part of complete cable system and rebalance any existing system that is affected. Horizontal Cable shall be minimum RG 6 2200 MHz quad shield for use up to 250 ft. unless video over internet protocol (IP) is deployed.

- 7.5.6. RF Distribution over Category Cable. If facility will utilize an RF Broadband Video Distribution System that distributes CATV/HDTV, satellite, internally generated video, video on demand (VOD) services, and IP video over twisted pair/Category cable, contractor shall provide telecommunications outlets as prescribed in 7.4.3.
- 7.6. **Fire Suppression/Alarm System:** Refer to UFC 3-600-01 Fire Protection for Facilities and ANGETL 15-01-03 Fire Protection Design Guidance.
- 7.7. **Security Systems:**
- 7.7.1. Refer to ANGETL 15-01-02: SCIF and ATPF Design Guidance.
- 7.7.2. Intrusion Detection Security System (IDS) and information security. The provided design shall be in accordance with DoD 5200.1-R, "Information Security Program" and shall include all security program requirements. Comply with ICD-705, Sensitive Compartment Information Facilities when applicable.
- 7.7.3. System Equipment. The contractor shall provide a complete (turn-key) IDS system including instrumentation and equipment. System equipment shall not be Joint-Services Interior Intrusion Detection System equipment (J-SIIDS), but shall be equipment that is commercially available and locally maintained that meets or exceeds J-SIIDS requirements.
- 7.7.4. System Layout. Locate the IDS control panel (and all IDS control switches) in the alarmed area, and the annunciator panel at the security forces 24-hour duty station. Secondary alarm capability may be provided to alarm at the command post. Provide an authorized entry phone at the entry to the alarmed area. The first level of IDS shall be infrared motion detection. The second level, if required (I.E. small arms storage, Category I & II munitions), shall be door/window contacts and vibration sensors on all walls and ceiling (and floor, if not reinforced concrete floor located at grade). Provide a duress button in small arms vaults and munitions storage facilities, which alarm at the security forces 24-hour duty station and at the base command post.
- 7.7.5. Raceway system shall be minimum 3/4 in. rigid conduit, continuous, complete and separate from all other systems
- 7.7.6. Cable system shall include cable from control panel to telephone closet.
- 7.8. **Information Transfer Nodes (ITNs)**
- 7.8.1. ITNs shall be designed as large Telecommunications Equipment Rooms. An ITN serves as the collection point for all inter-building fiber within a particular zone of a Base and is directly connected with two distinct routes on the base fiber optic cable backbone. All other facilities in each designated base zone are serviced

from the ITN in that zone. Air National Guard (ANG) bases normally will have no more than four ITNs. The ITN room must be located within 50 ft. of the outside plant cable entrance. In facilities where ITNs are provided, this space may also serve as a telecommunication room (TR) for that building. The number and location of base ITNs are determined by the base CSI-B and documented in the base communications and information systems blueprint.

7.8.2. Minimum space requirement for an ITN room shall be 110 sf. and shall be treated as an equipment room per standards.

7.9. Telecommunications Room (TR)

7.9.1. All ANG facilities shall have dedicated telecommunications room(s). Refer to UFC 3-580-1, Telecommunications Building Cabling Systems Planning and Design, for basic TR requirements.

7.9.2. All Entrance Facility TR's must be located within 50 ft. of outside plant cable building entrance.

8. **POINT OF CONTACT.** The point of contact for this ANGETL is Mr. David Knudsen, NGB/A7OC, at (701) 857-4314, DSN 344-4314, or email david.knudsen@us.af.mil.



MICHAEL E. MCDONALD, P.E., Colonel, USAF
Director of Installations and Mission Support

Attachments:

1. Reference Documents
2. Lateral Communications Distribution System
3. Typical Premise Wire Diagram
4. High Efficiency Exterior Lighting Policy Memo
5. Current ANGETL Index

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