# Robins Air Force Base
# Base Facility Standards

78ABW WR/ALC 78CEG

Prepared By: 78 CEG/CEN, Robins AFB, GA

## 23 June 2014

**The requirements of this document are mandatory as stated herein for all facilities work at Robins AFB**

Revision History (Since December 2012):

26 Jan 2005 Major update to Comm requirements. 78 CS pulled out sections from Elec area, created separate Comm area, and updated the details.

27 Jan 2005 Added info on new IntelliNet transceivers for fire alarm.

22 Feb 2005 Added note about MILCON projects running cable and conduit for Comm to base cable plant.

24 Aug 2005 Divided into 7 different documents as Parts 1-7, with 2 appendices. In the future, each Part will have its own revision record. This became Part 1.

27 June 2006 Change from "dgn" to "dgn or dwg"

19 Dec 2007 Revised location of Base Contracting Office

2008-2011 Miscellaneous Revisions in several BFS Parts.

15 Sep 2011 Total overhaul of BFS including developing subsets/modules from previous large BFS Parts. New Special Category modules/parts developed and published for the first time. Added Criteria Reference Documents section to the first segment of each BFS Part. Developed and published new INDEX in new format to cover all published and under-development future modules/parts. Major update to the Base Architectural Compatibility Plan and separated it into its own stand-alone document. Inserted in the Introductory Section of the Part 1B General Requirements module several key major parallel documents to be used in conjunction with the Base Facility Standards. Also included in this section primary General Standards and Special Initiatives instructions.

24 Oct 2012 Revised BFS Part 3G – Civil Stormwater

26 Oct 2012 Revised BFS Part 4D – Elevators and Lifts

1 Nov 2012 Revised BFS Part 4C - Landscaping

7 Nov 2012 Revised Section 1.2. Deleted reference to BFS Sections 7C and 7F.

14 Nov 2012 Revised BFS Part 7E – Antiterrorism and Part 7F – Fall Protection Program

18 Nov 2012 Revised BFS Part 6A – Facility Electrical, General

27 Nov 2012 Revised BFS Part 3E, Sub-Soil Investigation and Part 3F – Termite Pre-Treatment

12 Dec 2012 Revised BFS Part 2, Environmental and Part 3G Atch, Civil Stormwater Flowchart

7 Jan 2013 Revised BFS Part 4A - Architectural

11 Jan 2013 Revised BFS Part 7CC – Green Procurement Program

# BASE FACILITY STANDARDS INDEX as of 22 November 2013

**(Italicized titles denotes recent revisions)**

BFS Part 6D – Auxiliary Power (Emergency Generators/Uninterruptible Power Supplies],
BFS Part 6E – Lightning Protection
BFS Part 6F – Communications, w/Atch
BFS Part 6F – Atch, UFC 3-580-01
BFS Part 6G – Exterior Lighting
BFS Part 6H – Medium Voltage Electrical Distribution, w/2 Atch
BFS Part 6H – Atch, A3 ALPHA Meter
BFS Part 6H – Robins AFB Wireless Modem for Electrical Meter
BFS Part 6I – Intrusion Detection Systems (Security Alarm Systems)
BFS Part 6J – Traffic Signal Systems
BFS Part 6K – Emergency Lighting Systems

BFS Part 7 – Special Programs
BFS Part 7A – Energy Conservation Program
BFS Part 7B – Corrosion Control Program and Cathodic Protection
BFS Part 7C – Sustainable Design & Development
BFS Part 7CA – AF SDD Implementing Guidance w/7 Atchs
BFS Part 7CA – Atch 1 LEED Minimum Program Requirements
BFS Part 7CA – Atch 2 USGBC LEED 2009 MPRs SG
BFS Part 7CA – Atch 3 AF MILCON Sust Req Scoresheet LEED 09
BFS Part 7CA – Atch 4 Applying LEED NC 2009 Horizontal
BFS Part 7CA – Atch 5 Applying LEED NC 2009 Utilities
BFS Part 7CA – Atch 6 Applying LEED NC 2009 Industrial
BFS Part 7CA – Atch 7 Implementing Guidance to Meet EISA 2007 Section 438 Requirements
BFS Part 7CC – Green Procurement Program
BFS Part 7D – GeoBase
BFS Part 7E – Antiterrorism
BFS Part 7F – Fall Protection Program

*NEPA Program Coordinator
- Mark Hickman, 78CEG/CEIEC

**CEAN Subject Matter Coordinators:

- Water Quality – Daniel J. Rieker
- Toxics (Lead Based Paint/Asbestos) – Darryl Mercer
- Solid Waste – Randall Stillwell
- Weapons System P2, QPE – Gary Belconis
- Natural Resources – Bob Sargent
- Cultural Resources – Andrea Pyron
- Hazardous Materials – Christopher Langston
- Storage Tanks – Ester Lee-Altman
- Air Quality – Heidi Schwingle
- Pollution Prevention – Ester Lee-Altman
- Hazardous Waste – John Gullock
- EPCRA – David Palmer
- IRP – Gary Cox

# Robins Air Force Base
# Base Facility Standards

**Title: General Requirements**

**Date: 23 June 2014**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 1B – GENERAL REQUIREMENTS

**KEY REFERENCE DOCUMENTS TO BE USED WITH THE ROBINS BASE FACILITY STANDARDS**

***RAFB Procedural Guide for Designers, Including Architectural-Engineer (AE) and Contractor Firms***

***RAFB Architect-Engineer (A-E) Services: Open-End Statement of Work***
***(or)***
***RAFB Architect-Engineer (A-E) Services: Discrete Contract Statement of Work***

## 1.0 Introduction

### 1.1 General Standards

1.1.1 **The RAFB Procedural Guide for Designers**, referenced above, provides detailed instructions on administrative rules, and on preparation of specifications, drawings, design analyses, cost estimates and other components of design packages prepared for construction contracting actions. Several of these key issues bear bringing forward in this introductory part of the Base Facility Standards…

1.1.2 **Drawings** – In recent years the RAFB standard has been to use MicroStation CADD format V8 version or Auto-CAD 2007 version, closely conforming to the Tri-Services Standards requirements as well as mandatory Base supplements. The specific format must be IGDS. ***With the publication of this edition of the BFS that is now changed to Auto-CAD 2010 version***. This will adjust in the future as the RAFB use-version changes, and all designers will be notified officially via BFS changes when that happens.

1.1.3 **Specifications** – In recent years the RAFB standard has been to use locally BCE developed Division 1 sections and Technical sections. ***With the publication of this edition of the BFS that is now changed to Unified Facilities Guide Specifications (UFGS)*** for all Technical Sections. Continue to use RAFB BCE developed Division 1 sections. The RAFB BCE is currently editing the basic UFGS Division 1 specifications to adapt them to RAFB specific requirements. Upon completion of that effort, these will be mass-issued to all designers for use in design packages. All designers will be notified officially via BFS changes when that happens.

1.1.4 **Warranties** – On all warranty calls the contractor shall provide a service ticket with the following information:

a. The piece of equipment or part that was causing the issue to warrant the call for service
b. The problem
c. The corrective action taken
d. Date and time of arrival and completion
e. Person (Technician) name and signature
f. If parts need to be ordered provide estimated date of delivery.
g. A separate ticket will need to be generated for each visit.

## 1.2 Special Initiatives

1.2.1 ***General:***
a. The Air Force and DOD often discover special situations that result in new requirements that must be incorporated into the latest facility design and construction documents. These are referenced by this section to be sure these areas are properly addressed.

b. Priorities:

1 - Force Protection/Antiterrorism criteria overrule all other standards.

2 - Sustainable Design comes next, but not in violation of the Base Architectural Compatibility Standards. Normally incorporate this concept in all cases where there is negligible cost difference from past practice. Discuss high cost cases with the Base Project Manager.

3 - Follow the Base Facility Standards for all other items.

1.2.2 ***Force Protection/Antiterrorism*** – A new module ***BFS Part 7E*** is " under development", and will cover the RAFB specific requirements for this facet of designs. It will be mass-published with a BFS official change when ready.

1.2.3 ***Metric Dimensions*** – Robins AFB does not use metric dimensions in preparation of design drawings. Use metric dimensions only when specifically mandated by other Air Force or DOD directives, and only after clearing it with the 778CES Technical Support Office.

1.2.4 ***Airfield Temporary Construction Waivers*** (TCW) on Robins AFB Airfield – All construction projects to be located on the RAFB Airfield (Industrial Area or Active Airfield Area) must be presented by the Base Design Project Manager to the Base Community Planning Office for review and determination on the need for an Airfield Temporary Construction Waiver [see attached map defining boundary of airfield area]. This procedure must start not later than the 65% Design Stage of each project that will be located on the RAFB Airfield. Specific instructions are contained in *UFC 3-260-01 Airfield and Heliport Planning & Design (current version published 17 Nov 08) and AFMCI 32-1056 Airfield Obstruction Management Program (current version published 17 Feb 09), and Draft RAFB Instruction/Supplement to AFPD 32-10, Installation & Facilities (see attached airfield boundary delineation map)*. It mandates the use of RAFB 78CEG/CEAOC developed preliminary information TCW Form, then if deemed necessary, the AFMC Form 300 for each of these projects to provide data on the project including scope description, location map, and other pertinent data to be used in the decision process. This form is also used to process the required requests through the proper channels for approval prior to construction start. Notice to Proceed will not be issued until TCW, if needed, is approved.

## 2.1 General Applications

## 2.2 Scope
The Robins Air Force Base Facility Standards are to provide the minimum requirements of engineering, quality and aesthetics expected for facility design at Robins Air Force Base. These standards reflect and incorporate the policies and direction of the Air Force, industry codes and standards, and compliance with these standards is mandatory unless a deviation is properly approved.

**2.3 Applicability**

These standards apply to all new facilities at Robins AFB. They apply to new additions and to all major repairs, renovations and upgrades. They apply where possible to all repairs, renovations and upgrades. Deviations from the standards are permitted on repair projects were it is required to match existing conditions and systems. Deviations from the standards may be permitted on new work but the request must be made in writing and submitted to the Civil Engineer Technical Support office for review in accordance with the procedures below. Failure to obtain written approval prior to implementation shall be considered an error and it shall be corrected or made compliant with these standards at no cost to the Government.

**2.4 Requests for Deviations**

Requests for deviations from the standards are to be submitted in writing to the Civil Engineer Technical Support office. The request shall include a statement describing which standard item the request concerns, what the deviation is, the reason why the deviation is needed and the name and contact information of the person who can respond to questions. The Supervisor of the Technical Support Office shall make the determination to approve or disapprove. The Technical Support Supervisor shall provide a written response for all requests and detail the reason for all disapprovals. The Supervisor of the Technical Support office may elevate the request for deviation to the Base Civil Engineer if the deviation has a significant impact to base appearance or operations. Also the originator of a disapproved request may request that the issue be elevated to the Base Civil Engineer for review. An approved Request for Deviation shall not be considered as a change to the standard and shall be applicable only for the project, facility and circumstances of the specific request.

**2.5 Revisions**

2.5.1 The CE Technical Support Office will periodically review and revise this Standard but no revision will be made and published without the approval of the Technical Support Office Supervisor. The document date will be changed to reflect the date of the change and the most recent version will be the one with the most current date. Individual parts may be released separately and may have different release dates. This is to permit portions to be updated and corrected without having to release the entire Standard. When an individual BFS Part is revised and issued, the Base Facility Standards (BFS) Index will also be revised and issued with the revised BFS Part.

2.5.2 Anyone may submit a proposal for a change to the standards. A proposal for a change shall be sent to the Technical Support Office. The Request will be logged in and forwarded to the appropriate BFS Part Team Lead for review. If the proposed revision is acceptable, then the revision will be presented to the Technical Support Office Supervisor for approval. If the revision is approved, then the revision will be incorporated in the correct section of the standard and that section will be signed and dated. This section will then replace the previous section in computer files where the master Base Facility Standards are stored, and the Revised Section/Part will be issued electronically to all In-House and Contract Designers (AEs, etc). If the proposed revision is not approved then the request will be returned to the originator with the reason for the disapproval.

2.5.3 If the Technical Support Office Supervisor determines that the proposed revision is significant, then he may route it to other Base Agencies/Affected Offices for comment prior to providing the final approval or disapproval.

2.5.4 The Technical Support Office Supervisor may determine that the proposed revision has a significant impact to Base appearance or Base operations. In these cases he may deem that higher

level approval must be obtained prior to issuing the revision.

**2.6 Authority Having Jurisdiction**
The Base Civil Engineer is the Authority Having Jurisdiction. The Construction Managers and Project Managers are the first level of enforcement of the Base Facility Standards. Appeals or questions must be brought to the attention of the Technical Support Supervisor prior to elevating any issue concerning these standards to the Base Civil Engineer.

***Other Parts/Modules in Separate Documents:*** *See* ***INDEX of BFS Parts published with this edition of the Base Facility Standards.***

***Revision History of this BFS (At end of this module)***

<<<End of Part 1B – General Requirements>>>

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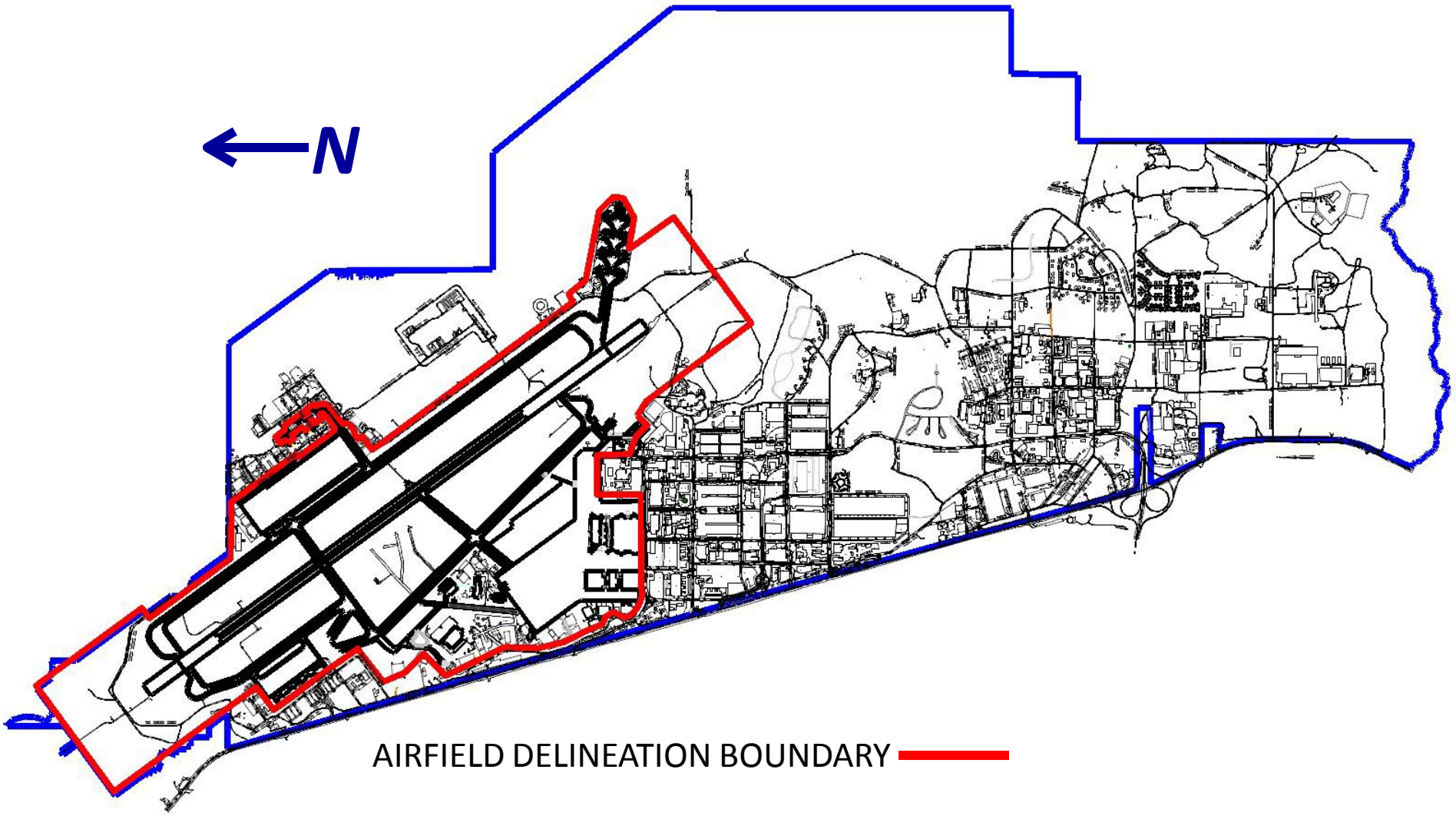
Approval: ***Original Signed By***
Terry Landreth, 778 CES/CEPT, 478-327-2910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15 Feb 2013 Revised Specification Section, Environmental Requirements, BFS Part 2, attachment

19 Feb 2013 Revised BFS Part 4B, Architectural Compatibility Standards

26 Mar 2013 Revised BFS Part 3C – Water Supply and BFS Part 5C – Plumbing

22 Apr 2013 Revised BFS Part 6H - Medium Voltage Electrical Distribution, Index, Part 1A – Cover Page, Part 1B – General, w/Atch

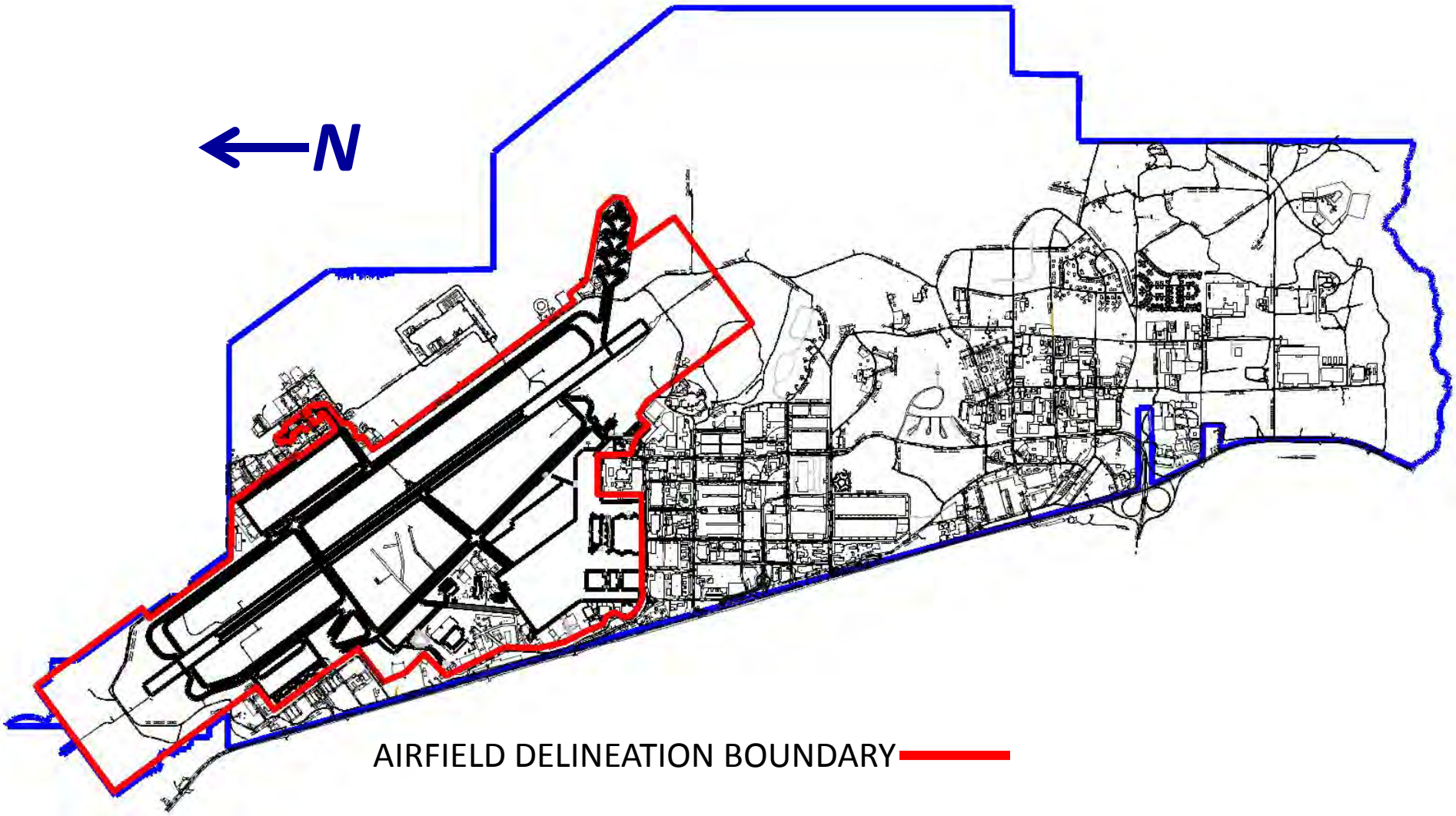
3 May 2013 Revised BFS Part 4C – Landscape Design to include "h. The Contractor shall cut all existing grass on the project site at least (1) one time after final acceptance of the Facility by the Government."

14 August 2013 Revised BFS Part 6C – Changed RCP to Robins Command Post. Included Attachment 1 – IDS Wiring Diagram. Updated f.5.

22 November 2013-Revised BFS Overall

12 May 14 – Revised BFS Part 5B – Refrigerant to only 410a.

23 June 14 – Revised BFS Part 1B – Added 1.14 Warranties.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AIRFIELD DELINEATION BOUNDARY

# Robins Air Force Base
# Base Facility Standards

**Title: Environmental**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 2 - ENVIRONMENTAL

# Air Force and Department of Defense Environmental Legal Requirements

| Air Quality | | |
|---|---|---|
| **Requirement Type** | **Citation** | **Requirement Description** |
| State of GA | | Georgia Rules for Air Quality Control, Chapter 391-3-1 |
| GA Permit | | Robins AFB Title V Air Operating Permit 9711-153-0033-V-02-0 and Amendment 9711-153-0033-V-02-2 |
| AFI | AFI 32-1068 | Heating Systems and Unfired Pressure Vessels |
| AFI | AFI 32-7040 | Air Quality Compliance |
| AFI | AFI 48-145 | Occupational and Environmental Health Program |
| AFPD | AFPD 32-70 | Environmental Quality |
| DoD | DODI 3020.37 | Continuation of Essential DoD Contractor Services |
| DoD | DODI 4715.6 | Environmental Compliance |
| DoD | DODI 4715.9 | Environmental Planning and Analysis |
| DoD | DOD 4160.21-M | DRMO Defense Material Disposition Manual |
| Executive Order | Executive Order 12088 | Federal Compliance with Pollution Control Standards |
| Executive Order | Executive Order 12902 | Energy Efficiency & Water Conservation at Federal Facilities |
| Executive Order | Executive Order 13123 | Greening the Government Through Efficient Energy Management |
| Executive Order | Executive Order 13423 | Strengthening Federal Environmental, Energy, and Transportation Management |
| Executive Order | Executive Order 13514 | Federal Leadership in Environmental, Energy, and Economic Performance |
| **Water Quality** | | |
| **Requirement Type** | **Citation** | **Requirement Description** |
| AFI | AFI 32-1066 | Plumbing Systems |
| AFI | AFI 32-1067 | Water Systems |
| AFI | AFI 32-7041 | Water Quality Compliance |
| AFI | AFI 48-145 | Occupational and Environmental Health Program |
| AFPD | AFPD 32-70 | Environmental Quality |
| DoD | DODI 3020.37 | Continuation of Essential DoD Contractor Services |
| DoD | DODI 4715.6 | Environmental Compliance |
| DoD | DODI 4715.9 | Environmental Planning and Analysis |
| DoD | DOD 4160.21-M | DRMO Defense Material Disposition Manual |
| Executive Order | Executive Order 11514 | Protection and Enhancement of Environmental Quality |

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| Executive Order | Executive Order 12088 | Federal Compliance with Pollution Control Standards |
| Executive Order | Executive Order 12777 | Implementation of Federal Water Pollution Control Act & Oil |
| Executive Order | Executive Order 12902 | Energy Efficiency & Water Conservation at Federal Facilities |
| Executive Order | Executive Order 13123 | Greening the Government Through Efficient Energy Management |
| Executive Order | Executive Order 13514 | Federal Leadership in Environmental, Energy, and Economic Performance |
| **Restoration** | | |
| **Requirement Type** | **Citation** | **Requirement Description** |
| GA Permit | | Hazardous Waste Facility Permit No. HW-064(S) |
| Robins AFB Plan | | Excavation Plan for the Base Industrial Area (2001) |
| AFI | AFI 32-7020 | The Environmental Restoration Program |
| AF FAR Supplement | AFFARS 5305.303 | Announcement of Contract Awards |
| DFARS | DFARS 205.303 | Defense Federal Acquisition Regulation Supplement |
| DERP | DERP | Defense Environmental Restoration Program |
| Executive Order | Executive Order 12580 | Superfund Implementation |
| **Hazardous Materials Program** | | |
| **Requirement Type** | **Citation** | **Requirement Description** |
| Robins AFB Plan | | Robins AFB Hazardous Material Management Plan (2011) |
| Robins AFB Plan | | Robins AFB Refrigerant Management Program Plan |
| AFI | AFI 32-7086 | Hazardous Material Management |
| AFI | AFI 48-145 | Occupational and Environmental Health Program |
| AFMAN | AFMAN 23-227 | Storage and Handling of Liquefied and Gaseous Compressed |
| AFMAN | AFMAN 32-4004 | Emergency Response Operations |
| AFMAN | AFMAN 32-4013 | Hazardous Material Emergency Planning and Response Guide |
| AFPD | AFPD 32-70 | Environmental Quality |
| DoD | DODI 3020.37 | Continuation of Essential DoD Contractor Services |

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| DoD | DoD 4145.19-R-1 | Storage and Materials Handling |
| DoD | DODI 4715.6 | Environmental Compliance |
| DoD | DODI 4715.9 | Environmental Planning and Analysis |
| DoD | DODI 6050.5 | DOD Hazard Communication Program |
| DoD | DOD 4160.21-M | DRMO Defense Material Disposition Manual |
| DoD | DOD 4160.21-M-1 | Defense Demilitarization Manual, Oct 91 |
| Executive Order | Executive Order 12088 | Federal Compliance with Pollution Control Standards |
| Executive Order | Executive Order 13423 | Strengthening Federal Environmental, Energy, and Transportation Management |
| Executive Order | Executive Order 13514 | Federal Leadership in Environmental, Energy, and Economic Performance |
| **Hazardous Waste Program** | | |
| **Requirement Type** | **Citation** | **Requirement Description** |
| Robins AFB Plan | | Robins AFB Hazardous Waste Management Plan (2004) |
| AFI | AFI 32-7042 | Waste Management |
| AFI | AFI 32-3001 | Explosive Ordinance Disposal Program |
| AFI | AFI 136-8 | Interservice Responsibilities for Explosive Ordnance Disposal. |
| AFI | AFI 48-119 | Medical Service Environmental Quality Program |
| AFI | AFPD 32-70 | Environmental Quality |
| AFPAM | AFPAM 32-7043 | Hazardous Waste Management Guide |
| DoD | DODI 3020.37 | Continuation of Essential DoD Contractor Services |
| DoD | DODI 4715.6 | Environmental Compliance |
| DoD | DODI 4715.9 | Environmental Planning and Analysis |
| DoD | DODM 4160.21 | DRMO Defense Material Disposition Manual |
| DoD | DODM 4160.21-M-1 | Defense Demilitarization Manual, Oct 91 |
| Executive Order | Executive Order 12088 | Federal Compliance with Pollution Control Standards |
| Executive Order | Executive Order 12580 | Superfund Implementation |
| Executive Order | Executive Order 13148 | Greening the Government through Leadership in Environmental Management |
| Executive Order | Executive Order 13423 | Strengthening Federal Environmental, Energy, and Transportation Management |

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| Executive Order | Executive Order 13514 | Federal Leadership in Environmental, Energy, and Economic Performance |
| **Solid Waste and Recycling Programs** | | |
| **Requirement Type** | **Citation** | **Requirement Description** |
| State of GA | | Georgia Rules for Solid Waste Management, Chapter 391-3-4 |
| Robins AFB Plan | | Robins AFB Integrated Solid Waste Management Plan (2010) |
| Robins AFB Plan | | Robins AFB Resource, Recovery and Recycling Plan for Recoverable and Unusable Liquid Petroleum Products |
| AFI | AFI 32-3001 | Explosive Ordinance Disposal Program |
| AFI | AFI 32-7080 | Pollution Prevention |
| AFI | AFI 48-104 | Quarantine Regulations of the Armed Forces |
| AFI | AFI 23-502 | Recoverable and Unusable Liquid Petroleum Products |
| AFI | AFI 41-201 | Managing Clinical Engineering Programs |
| AFR | AFR 136-8 | Interservice Responsibilities for Explosive Ordnance Disposal |
| AFI | AFI 32-7042 | Waste Management |
| AFI | AFI 48-145 | Occupational and Environmental Health Program |
| AF Policy | | HQ USAF/A7C Memorandum, Air Force Solid Waste Diversion and Qualified Recycling Program (QRP) Policy. |
| AFPD | AFPD 32-70 | Environmental Quality |
| DoD | DODI 3020.37 | Continuation of Essential DoD Contractor Services |
| DoD | DODI 4715.6 | Environmental Compliance |
| DoD | DODI 4715.9 | Environmental Planning and Analysis |
| DoD | DOD 4160.21-M | DRMO Defense Material Disposition Manual |
| DoD | DODI 7301 | Disposition of Proceeds from DoD Sales of Surplus Personal Property |
| DoD | DODI 4715.4 | Pollution Prevention |
| DoD Policy | | Department of Defense Strategic Sustainability Performance Plan FY 2010 (Public Version, 26 Aug 2010) |
| Executive Order | Executive Order 11514 | Protection and Enhancement of Environmental Quality |
| Executive Order | Executive Order 12088 | Federal Compliance with Pollution Control Standards |
| Executive Order | Executive Order 13423 | Strengthening Federal Environmental, Energy, and Transportation Management |

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| Executive Order | Executive Order 13514 | Federal Leadership in Environmental, Energy, and Economic Performance |
| **Toxics -- Asbestos Management** | | |
| **Requirement Type** | **Citation** | **Requirement Description** |
| State of GA | | Georgia Rules for Asbestos Removal and Encapsulation, Chapter 391-3-14 |
| State of GA | | Georgia Rules for Solid Waste Management, Asbestos Containing Waste, |
| Robins AFB Plan | | Robins AFB Asbestos Management Plan (2005) |
| Robins AFB Plan | | Robins AFB Asbestos Operating Plan (2008) |
| AFI | AFI 32-7066 | Environmental Baseline Surveys in Real Estate Transactions |
| AFI | AFI 32-7040 | Air Quality Compliance |
| AFI | AFI 32-1052 | Facility Asbestos Management |
| AFI | AFI 91-302 | Air Force Occupational Health and Environmental Safety, Fire Protection and Health (AFOSH) |
| AFI | AFI 48-101 | Aerospace Medicine Operations |
| AFI | AFI 48-145 | Occupational and Environmental Health Program |
| AFI | AFI 32-9004 | Disposal of Real Property |
| AFH | AFH 32-9007 | Managing Air Force Real Property |
| AFOSH Std. | AFOSH Std. 48-137 | Respiratory Protection Program |
| AFOSH Std. | AFOSH Std. 48-119 | Medical Service Environmental Quality Program |
| AFOSH Std. | AFOSH Std. 161-21 | Hazardous Communication |
| AFPD | AFPD 32-70 | Environmental Quality |
| DoD | DODI 3020.37 | Continuation of Essential DoD Contractor Services |
| DoD | DODI 4715.6 | Environmental Compliance |
| DoD | DODI 4715.9 | Environmental Planning and Analysis |
| DoD | DOD 4160.21-M | DRMO Defense Material Disposition Manual |
| **Toxics -- Lead Based Paint** | | |
| **Requirement Type** | **Citation** | **Requirement Description** |
| State of GA | | Georgia Rules for Lead Based Paint Abatement, Certification, and Accreditation, |
| AFI | AFI 32-7040 | Air Quality Compliance |

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|---|---|---|
| AFI | AFI 32-9004 | Disposal of Real Property |
| AFI | AFI 48-101 | Aerospace Medicine Operations |
| AFI | AFI 91-302 | Air Force Occupational Health and Environmental Safety, Fire Protection and Health (AFOSH) |
| AFI | AFI 48-145 | Occupational and Environmental Health Program |
| AFM | AFM 85-3 | Paints and Protective Coatings |
| AF Policy | USAF/CC, 24 May 1993 | Air Force Policy and Guidance on Lead Based Paint in Facilities |
| AFPD | AFPD 32-70 | Environmental Quality |
| DoD | DODI 3020.37 | Continuation of Essential DoD Contractor Services |
| DoD | DODI 4715.6 | Environmental Compliance |
| DoD | DODI 4715.9 | Environmental Planning and Analysis |
| DoD | DOD 4160.21-M | DRMO Defense Material Disposition Manual |
| Executive Order | Executive Order 11514 | Protection and Enhancement of Environmental Quality |
| Executive Order | Executive Order 12088 | Federal Compliance with Pollution Control Standards |
| Executive Order | Executive Order 13423 | Strengthening Federal Environmental, Energy, and Transportation Management |
| **Natural Resources** | | |
| **Requirement Type** | **Citation** | **Requirement Description** |
| Robins AFB Plan | | Robins AFB Integrated Natural Resources Management Plan (2012) |
| Robins AFB Instruction | RAFBI 32-7064 | Integrated Natural Resources Management |
| AFI | AFI 32-7064 | Integrated Natural Resources Management |
| AFI | AFI 32-7061 | Environmental Impact Analysis Process |
| AFI | AFI 32-7063 | Air Installation Compatible Use Zone Program |
| AFI | AFI 32-7066 | Environmental Baseline Surveys for Real Estate Transactions |
| AFI | AFI 48-145 | Occupational and Environmental Health Program |
| AFPAM | AFPAM 32-1010 | Land Use Planning |
| AFPAM | AFPAM 91-212 | Bird Aircraft Strike Hazard (BASH) Management Techniques |
| AFPD | AFPD 32-70 | Environmental Quality |
| DoD | DODI 3020.37 | Continuation of Essential DoD Contractor Services |
| DoD | DODI 4715.3 | Environmental Conservation Program |
| DoD | DODI 4715.6 | Environmental Compliance |
| DoD | DODI 4715.9 | Environmental Planning and Analysis |

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| DoD | DODM4160.21 | DRMO Defense Material Disposition Manual |
| Executive Order | Executive Order 11514 | Protection and Enhancement of Environmental Quality |
| Executive Order | Executive Order 11988 | Flood Plain Management |
| Executive Order | Executive Order 11990 | Protection of Wetlands |
| Executive Order | Executive Order 13112 | Invasive Species |
| Executive Order | Executive Order 12088 | Federal Compliance with Pollution Control Standards |
| Executive Order | Executive Order 13423 | Strengthening Federal Environmental, Energy, and Transportation Management |
| **Cultural Resources** | | |
| **Requirement Type** | **Citation** | **Requirement Description** |
| Robins AFB Plan | | Robins AFB Integrated Cultural Resources Management Plan (2011) |
| Agreement | | Comprehensive Programmatic Agreement (2008) |
| AFI | AFI 32-7065 | Cultural Resources Management Plan |
| AFI | AFI 48-145 | Occupational and Environmental Health Program |
| AFPD | AFPD 32-70 | Environmental Quality |
| DoD | DODI 3020.37 | Continuation of Essential DoD Contractor Services |
| DoD | DODI 4715.3 | Environmental Conservation Program |
| DoD | DODI 4715.6 | Environmental Compliance |
| DoD | DODI 4715.9 | Environmental Planning and Analysis |
| DoD | DOD 4160.21-M | DRMO Defense Material Disposition Manual |
| DoD | MIL-HDBK-1028/8A | Design of Pest Management Facilities |
| Executive Order | Executive Order 11593 | Protection and Enhancement of the Cultural Env. |
| Executive Order | Executive Order 12088 | Federal Compliance with Pollution Control Standards |
| Executive Order | Executive Order 13007 | Indian Sacred Sites |
| **Pollution Prevention (P2)** | | |
| **Requirement Type** | **Citation** | **Requirement Description** |
| Robins AFB Plan | | Robins AFB Green Procurement Program (GPP) Plan (2011) |
| AF Policy | | AF Policy on ODCs |

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| AF Policy | | HQ USAF/A7C Memorandum, Air Force Solid Waste Diversion and Qualified Recycling Program (QRP) Policy). |
| AF Policy | | USAF Memorandum, Policy to Establish the Air Force GPP, 29 September 2006). |
| AF Policy | | USAF Memorandum, Green Procurement Program (GPP) Training Update, 5 October 2006 |
| AF Policy | | USAF Memorandum, Air Force Green Procurement Program, 02 Jun 2011 |
| AFI | AFI 32-7080 | Pollution Prevention Program |
| AFI | AFI 32-7086 | Hazardous Materials Management |
| AFI | AFI 13-212 | Range Planning and Operations |
| AFI | AFI 21-101 | Maintenance, Aerospace Equipment Maintenance Management |
| AFI | AFI 32-7001 | Environmental Budgeting |
| AFI | AFI 32-7002 | Environmental Information Management System |
| AFI | AFI 90-801 | Environmental, Safety, and Occupational Health Councils |
| AFI | AFI 32-7047 | Environmental Compliance Tracking and Reporting |
| DoD | DODI 4715.4 | Pollution Prevention |
| DoD | DoD 4160.21-M | Defense Materiel Disposition Manual |
| DoD | DFARS 252.223-7001 | Defense FAR Supplement |
| DoD Policy | | Updated DoD GPP Strategy, 02 Dec 2008 |
| DoD Policy | | Department of Defense Strategic Sustainability Performance Plan FY 2010 (Public Version, 26 Aug 2010) |
| FAR Interim Rule | | Federal Acquisition Regulation; Sustainable Acquisition; Department of Defense, General Services Administration, and National Aeronautics and Space Administration; Interim Rule; 31 May 2011(Federal Register Doc No 2011-12851) |
| DoE | EPAct, Title I, Subtitle A | Energy Policy Act of 2005, Energy Efficiency, Federal Programs |
| Executive Order | Executive Order 13221 | Energy Efficiency Standby Power Devices |
| Executive Order | Executive Order 11514 | Protection and Enhancement of Environmental Quality |
| Executive Order | Executive Order 12856 | Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements |
| Executive Order | Executive Order 12902 | Energy Efficiency & Water Conservation at Federal Facilities |

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|---|---|---|
| Executive Order | Executive Order 13123 | Greening the Government Through Efficient Energy Management |
| Executive Order | Executive Order 13423 | Strengthening Federal Environmental, Energy, and Transportation Management |
| Executive Order | Executive Order 13514 | Federal Leadership in Environmental, Energy, and Economic Performance |
| **National Environmental Policy Act (NEPA)** | | |
| AFI | AFI 32-7061 | Environmental Impact Analysis Process |
| AFI | AFI 32-7066 | Environmental Baseline Surveys for Real Estate |

1. GENERAL SCOPE: This is one part of the Robins Air Force Base (AFB) Facility Standards. Any exceptions granted to these requirements shall be noted clearly in the project design analysis by using a Deviation Request. This section supplements the requirements and local criteria contained in the base's master Civil Engineering Specifications (CE Specs), 01560 Environmental Requirements.

*(Note: Environmental Management is the owner of all environmental issues detailed below; contact Environmental Management for concern or questions: (478) 926-9645) or (DSN 497-9645).*

2. CONTRACTOR RESPONSIBILITY: Comply with all applicable federal, state, any laws and regulations from other states where disposal might occur, permit requirements and local laws and regulations concerning environmental compliance and pollution prevention. Ensure all products produced or generated under contract shall meet all stated performance objectives and shall not violate in any manner the Environmental Requirements of any applicable local, state, or federal entity including the Department of Defense (DoD).

*(Note: Not all of these status statements must be used, but only those that apply to the subject project.)*

*[Note: All references to AE in this document apply to contracted AE designers, Corps of Engineers designers, In-house CE designers, and any other facility project designers that handle Robins Air Force Base projects for Main Base Units, ANG, Marine Corps, or any other Hosted Units on RAFB.]*

3. LOCAL CONDITIONS AND SPECIFICATIONS: Base CE Specs, 01560 Environmental Requirements is kept updated on the latest environmental issues at Robins AFB. Refer to it for disposal of fluorescent light tubes and ballasts, local disposal of solid, hazardous, and toxic waste, local landfill procedures, permits required, etc.

4. AIR QUALITY (Georgia Rules for Air Quality Control, Chapter 391-3-1; Robins AFB Title V Air Operating Permit 9711-153-0033-V-02-0 and Amendment 9711-153-0033-V-02-2): For purposes of Title V air permitting under the 1990 Clean Air Act Amendments and subsequent implementing regulations, Robins AFB is considered to be a major source of air emissions for one or more regulated air pollutants as defined in Title 40 Code of Federal Regulations 70.2. The Architect-Engineer (A-E) firm shall review the project to see if the air quality will be affected and to determine if any of the following apply:

a. According to Georgia Environmental Protection Division (GA EPD) Rules for Air Quality Control, Chapter 391-3-1-.03, any person prior to beginning the construction or modification of any facility which may result in air pollution shall obtain a permit for the construction or modification of such facility. The contractor shall submit the required data to Environmental Management in order to complete the permit application form as early in the planning process as possible. Since an approved permit to construct is mandatory prior to start of construction, the contractor shall not install the equipment until the permit has been approved and government approval of the contractor's submittal has been obtained. Contractor shall anticipate nine months to one year from air source data submittal for this to occur.

b. Certification that generators meet federal standards must be submitted and approved prior to order and delivery of the unit. Some generators require permitting as indicated in (a) above.

c. New sources require utilization of Maximum Achievable Control Technology to reduce emissions of hazardous air pollutants.

d. For work involving refrigerants, submit the following documentation to Environmental Management:

   i. The name, address, telephone number, and technician certification of each person who will service, repair, maintain, and/or dispose of any equipment containing and/or using a refrigerant (Class I Ozone Depleting Substance (ODS), Class II ODS, or non-ozone depleting substance).

   ii. A list of appliances located on base that have a capacity of 50 pounds or more of a Class I or Class II refrigerant, to include type, location, manufacturer, serial number, amount of full charge and date full charge was determined.

   iii. Records, work logs, service tickets, invoices, and supporting documentation for maintenance, service, repair, and/or disposal of base appliances containing 50 pounds or more of a Class I or Class II refrigerant.

   iv. Invoices, purchase or rental documents, and a copy of the equipment certification sent to Environmental Protection Agency for any equipment used to recover or recycle refrigerants on base.

   v. Receipts, invoices, purchase orders, or bills of lading for any purchases or acquisitions of refrigerant used for any service on base.

e. Open burning operations are prohibited on base and shall not be used.

f. Where construction/demolition operations create dust, perform dust control as the work proceeds and whenever a dust nuisance or hazard occurs.

5. WATER SUPPLY: The project shall be reviewed to determine if any backflow prevention device or flow meter will be installed, or modification to the Robins AFB public water system (PWS) will occur as a result of construction activity. Each of these activities requires adherence to base-specific or Georgia-specific requirements and regulations.

a. Backflow Prevention, See *Base Facilities Standard Part 3C, Water Supply.*

b. Flow Meters, See *Base Facilities Standard Part 3C, Water Supply.*

c. Modification to Public Water System, See Base Facilities Standard Part 3C, Water Supply. A Georgia Professional Engineer is required to certify all plan sheets related to modification of the Robins AFB PWS. Approval of all designs to modify the PWS is required by GA EPD prior to construction. Project designer shall ensure appropriate time for regulatory review/comment period in design schedule.

6. WASTEWATER: The project shall be reviewed to determine if any connection to the Robins AFB Sanitary or Industrial Wastewater Collection System will be performed. See *BFS Part 3D, Wastewater.*

7. STORMWATER: The project shall be reviewed to determine applicability of each stormwater requirement. See *Base Facility Standard Part 3G, Stormwater.*

8. INSTALLATION RESTORATION PROGRAM (Hazardous Waste Facility Permit No. HW-064(S), Excavation Plan for the Base Industrial Area): Any activities that may impact a restoration site, remedial systems, groundwater monitoring wells or environmental piping must be coordinated with Environmental Management. Excavation on an Installation Restoration Program (IRP) site requires a Hazardous Waste Operations and Emergency Response (HAZWOPER) certified crew unless otherwise determined by Environmental Management.

a. Sampling plan representative of the construction site must be provided to and approved by Environmental Management. Sampling results must be provided to Environmental Management for waste determination.

    i. Environmental Management must also concur with the contractor's plan for disposal at an approved, permitted facility. Disposal method must be coordinated through Environmental Management prior to removal from Robins AFB.

    ii. Excavated soil identified as contaminated must be stored in a covered, water proof container until hauled to the approved disposal facility. Excavations on restoration sites must be backfilled from a clean soil source.

    iii. Contaminated water from the site must be contained and properly treated prior to release in accordance with base requirements.

b. Excavation in the Base Industrial Area must be performed in accordance with the "Excavation Plan for the Base Industrial Area".

c. Groundwater monitoring wells, aboveground remedial equipment, underground vaults and piping must not be disturbed without prior approval through Environmental Management. If wells or other environmental assets within construction zones are damaged, the contractor is responsible for all required repairs or replacements. In the event that assets are damaged, the contractor must notify Environmental Management immediately.

d. Work performed on an IRP site will have an assigned Environmental Management inspector that checks progress and verifies work is performed properly and to the expected standards.

9. POLLUTION PREVENTION (P2): The project must be reviewed to determine if any pollution prevention initiatives need to be addressed. All activities must actively pursue the pollution prevention hierarchy of source reduction, re-use, recycle, and as a last resort, disposal. Such pollution prevention initiatives include:

a. Use of EPA 17 Top Priority Chemicals:

    i. Robins has a goal of reducing the chemicals listed in the EPA 17 Top Priority list. Contractor must notify Robins Hazardous Materials Program Manager if these chemicals are going to be brought onto base premises. See *Base Facility Standards, Environmental section 10. Hazardous Materials.*

ii. All projects will incorporate Green Procurement and Sustainable Acquisition policy. *See Base Facility Standards Part 7CC, Green Programs.*

iii. All design projects will incorporate the U.S. Council of Green Building Council (USGBC) policy which sets the benchmark standards for green design. All design projects must be able to achieve a Leadership in Energy and Environmental Design (LEED) rating of silver. *See Base Facility Standards Part 7C, Sustainable Design.*

10. HAZARDOUS MATERIALS (Robins AFB Hazardous Material Management Plan): The project shall be reviewed to see if hazardous materials (HAZMAT) will be used and/or stored.

a. HAZMAT includes all items (including medical supply items, but excluding drugs in their finished form and pharmaceuticals in individually- issued items) covered under the Emergency Planning and Community Right-to-Know Act (or other host nation, federal, state, or local) tracking requirement, the Occupational Safety and Health Administration (OSHA) Hazardous Communication (HAZCOM) Standard, all Class I and Class II ODS, lead acid batteries and aerosol products. It does not include munitions or hazardous waste.

b. **Prohibition on Requirements for a Contractor to use a Class I ODS.** Unless the requiring activity has obtained prior Senior Acquisition Official approval, you may not:

   i. Provide any service or product with any specification, standard, drawing, or other document that requires the use of a Class I ODS in the test, operation, or maintenance of any system, subsystem, item, component, or process; or

   ii. Provide any specification, standard, drawing, or other document that establishes a test, operation, or maintenance requirement that can only be met by use of a Class I ODS.

c. **Class II ODS Limitations.** Do not develop or modify any existing weapon or facility system scheduled to remain in the Air Force (AF) inventory beyond 01 January 2020 in any manner that requires or adds requirements for Class II ODS in their operations or maintenance. For additional restrictions on ODS usage on Robins AFB, please see *Base Facility Standards 5B*, *Heating, Ventilation, and Air Conditioning*.

d. The storage and usage of all HAZMAT must be tracked in the AF Standardized Tracking System, which is currently the Hazardous Material Management System (HMMS). If the contractor does not have access to a government-furnished computer and cannot access HMMS, the contractor must coordinate with the Environmental Management HAZMAT Cell.

e. Contractors must submit a "Hazardous Material Purchase Request for Contractors" form to Environmental Management HAZMAT Cell prior to transporting any HAZMAT onto Robins AFB. This form must be completed for all hazardous materials – initial and recurring – purchased by contractors for use on Robins AFB and approval must be granted prior to transportation onto Robins AFB.

f. Contractors must submit for every HAZMAT (or potential HAZMAT) that will be used or stored on Robins AFB to the Environmental Management HAZMAT Cell an AF Form 3952 with the

most current manufacturer's material safety data sheet(s) (MSDS) attached. This must be submitted prior to transportation onto Robins AFB and the HAZMAT may not be used on Robins AFB until the AF Form 3952 has been approved.

11. HAZARDOUS WASTE (Robins AFB Hazardous Waste Management Plan): The project shall be reviewed to determine if any amount of hazardous waste will be generated.

a. Contractors must comply with all applicable hazardous waste compliance requirements (federal, state, and local). The Robins AFB Hazardous Waste Management Plan is the controlling document for hazardous waste management on Robins AFB.

b. Contractors must identify any contamination already present if any type of excavation is required. If unable to identify before excavating, contractor must coordinate container placement and waste sampling needs with Environmental Management before project start.

c. Contractors must identify all types and amounts of hazardous waste expected to be generated from the project.

d. Contractors must provide hazardous waste accumulation and storage needs (satellite or 90-day) to Environmental Management prior to project start. Contractor must coordinate project activities with the Unit Environmental Coordinator (UEC) of the organization with ownership over the affected area prior to requesting services from Environmental Management.

e. Contractors must request the correct types and number of containers required for hazardous waste collection. Container labels will be issued by Environmental Management and tracked in the HMMS. All container labels must be accounted for at the end of the project. Contractors are responsible for transporting all accumulation containers and unused HMMS labels or containers from the project location to the Hazardous Waste Processing Facility for disposal.

f. Contractors must meet all hazardous waste management personnel training requirements prior to project start.

g. Contractors must identify the method of payment for hazardous waste disposal. If waste disposal cost is identified as a contractor responsibility in the contract the contractor must have a valid Department of Defense Activity Address Code (DODAAC) with a valid/ active type of address code for billing (TAC 3) prior to project start. DODAACs can be obtained at: *https://dodaac.wpafb.af.mil/*. The status of a DODAAC can be checked at: *https://www.transactionservices.dla.mil/DAASINQ/warning.asp*.

   (NOTE: The process to obtain a DODAAC can take several weeks or months.)

h. All hazardous waste determinations will be made by Environmental Management.

i. All hazardous waste must be disposed of through the Defense Logistics Agency Disposition Services via Environmental Management. Contractors are not authorized to sign hazardous waste manifests or transport hazardous waste from Robins AFB.

12. SOLID WASTE (Robins AFB Integrated Solid Waste Management Plan): The project shall be reviewed to see if and how solid waste disposal will be affected by the construction of this project. The following items are used to show the status of solid waste.

a. Applicable solid waste handling and disposal system criteria (federal, state, and local).

b. Waste volume generated: include type and characteristics of material to be disposed, while maximizing recycling /reuse of waste material. All recyclable scrap metals, including wiring, shall remain the property of the government and be recycled through the Robins AFB Qualified Recycling Program (QRP).

   i. Diversion (from landfilling) goal is 60% by weight for C&D debris.

   ii. Diversion goal is 50% for non-C&D solid waste.

c. Method of collection, transportation, and disposal. If by landfill: leachate contamination or pollution of groundwater.

d. Possibilities for recycling or use of contaminated fuel.

e. Type of waste involved (inert, construction & demolition (C&D) debris, municipal solid waste (MSW), industrial, profiled special waste, asbestos, universal waste).

f. Permit requirements for solid waste handling and disposal. Project notification to the State of Georgia must be made 10 working days prior to beginning work for all projects that include removal of any load bearing walls, even if asbestos is not present.

13. TOXICS (Robins AFB Integrated Solid Waste Management Plan): The project shall be reviewed to determine if any amount of toxics will be generated.

a. Asbestos Containing Materials (Robins AFB Asbestos Management Plan, Robins AFB Asbestos Operating Plan):

   i. Do not use products containing asbestos.

   ii. Prior to renovation/demolition, an asbestos inspection by a certified asbestos inspector is required. Certain materials must be presumed to contain asbestos in buildings constructed prior to 1981.

   iii. If asbestos is in the area of construction, describe where it is located. There should not be any work done in the area involving asbestos, unless specified.

   iv. If new material is discovered during construction that is suspected to be asbestos, stop all work in that area until directed to proceed.

   v. All asbestos abatement work shall only be performed in the areas shown by the required specifications and shall be in accordance with CE Specs 01568 Asbestos Abatement or 01567 Asbestos Abatement Non-Friable Asbestos Roofing and Transite Wall Panels.

   vi. Asbestos waste shall be handled and disposed in accordance with federal, state, and local requirements.

   vii. Copies of project and completion notifications and payments to the state, manifests, and landfill receipts are required by Environmental Management.

b. Lead Based Paint (LBP) (Robins AFB Lead Based Paint Management Plan):

i. Precautions should be taken to protect employees from exposure to lead dust hazards during C&D projects.

ii. If the project designer has not analyzed suspect painted materials for the presence of lead, all painted surfaces, including painted surfaces covered by other materials such as wall paper, should be assumed to contain varying levels of lead.

iii. If the presence of lead is confirmed, the contractor shall take precautions to protect his workers and government employees from exposure to lead dust hazards during construction/demolition in accordance with OSHA standards.

iv. All LBP abatement work shall only be performed in the areas shown by the required specifications and shall be in accordance with CE Specs 01569 and/or 02065 Lead Based Paint In-Place Management and Abatement for Robins AFB.

v. All work in residential and child occupied facilities constructed before 1978 shall be in compliance with EPA Lead: Renovation, Repair, and Painting Program rules.

vi. HUD Guidelines shall apply to priority facilities as designated by the government.

vii. The disposal of all debris containing lead paint must be treated for collection and disposal purposes as a hazardous waste until a determination is made otherwise based on test results.

c. Polychlorinated Biphenyls (PCBs) (Robins AFB Hazardous Waste Management Plan): Do not use equipment or components containing PCBs. This includes ballasts and capacitors for fluorescent and high-intensity discharge (HID) lighting.

i. Fluorescent lighting ballasts and HID lighting capacitors must be managed and disposed of as toxic waste unless the label states they do not contain PCBs. Ballasts and capacitors with no markings are assumed to contain PCB. Ballasts and capacitors marked as non-PCB or PCB free are handled as standard solid waste.

14. NATURAL RESOURCES (Robins AFB Integrated Natural Resources Management Plan, Robins Air Force Base Instruction (RAFBI) 32-7064). The project shall be reviewed to determine if natural resources will be affected. The conservation of natural resources on Robins AFB includes the protection and management of the following resources:

a. Forest resources: Trees shall not be removed without advance approval from the Environmental Management, and measures shall be implemented to protect trees on construction sites per RAFBI 32-7064.

b. Floodplain: Construction within the 100-year floodplain shall be avoided whenever possible per Executive Order 11988, Floodplain Management.

c. Fish and wildlife management: Most species of wildlife are protected by state or federal law, as are some of the water resources inhabited by fish on Robins AFB. Contact Environmental Management if the project may impact these species or their habitats.

d. Wetlands: Wetlands are protected per Section 404 of the Clean Water Act, and Executive Order 11990, Protection of Wetlands. Contact the Environmental Management if the project will require filling, dredging, or other impacts to wetlands, creeks, or streams. Mitigation measures may be required.

e. Threatened and endangered species (Endangered Species Act): American alligators and the Ocmulgee skullcap can be found on Robins AFB, and other listed species have occurred on base. Do not harm or harass federal or state listed species, and do not damage their habitats.

f. Landscaping and invasive species: Landscaping plans for all construction projects must be reviewed and approved in advance by the Environmental Management per RAFBI 32-7064. Executive Order 13112, Invasive Species, prohibits the introduction of invasive species on federal lands. Guidance for proper landscaping, as well as lists of plants to use and not to use, can be found in the Best Practices for Landscaping at Robins AFB.

15. CULTURAL RESOURCES (Robins AFB Integrated Cultural Resources Management Plan): The project shall be reviewed by the A-E firm prior to construction to determine if cultural resources will be impacted. Cultural resources include but are not limited to archaeological sites and artifacts, as well as historic structures, cemeteries, and buildings.

a. Should it be determined that a cultural resource would be impacted during the course of the contractor's work, then coordination with Environmental Management is required and the base archaeologist may be required to be on site during ground disturbing activities.

b. In the event of an inadvertent discovery of cultural resources, the contractor must contact Environmental Management to determine if any historic structures or archaeological sites are in the area of potential effect (APE) of the project. If Environmental Management determines that there are cultural resources in the APE then the contractor must not continue work on the project until the criteria below are met:

    i. Environmental Management determines that the work required by the project is allowed via the Comprehensive Programmatic Agreement (PA) that Robins AFB has with the Georgia State Historic Preservation Office (GA SHPO). If the work of the project is approved by Environmental Management via the Comprehensive PA, then the contractor must follow the guidelines set forth in the PA.

    ii. Environmental Management consults and coordinates with the state regulators to determine how to minimize, mitigate, or avoid adverse effects to the cultural resources. If the GA SHPO provides guidelines then they must be adhered to by the contractor.

    iii. In the event of an inadvertent discovery that involves human remains, consultation with local officials, the GA SHPO, and 12 federally-recognized Indian tribes is necessary.

16. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA): In accordance with 32 Code of Federal Regulation 989, the A-E firm shall review the AF Form 332 (Base Civil Engineer Work Request), AF Form 813 (Request for Environmental Impact Analysis), or Environmental Assessment associated with the project. The A-E firm shall use these documents to identify special environmental provision that have been outlined by Environmental Management and incorporate these provisions into the scope, design, and implementation of the project.

<<<<< **END OF BFS PART 2** >>>>>

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Revision History

24 Aug 2005 Separated from combined BFS into its own document
19 Jul 2011 Updated per Environmental Management, 78 CEG/CEIE
01 Dec 2011 Updated per Environmental Management, 78 CEG/CEIER

Environmental Requirements Checklist

## PART 1 - GENERAL

### 1.01 GENERAL:

A. General Scope: This Section provides the requirements necessary to ensure that all construction projects are in environmental compliance. Environmental Management, 78 CEG/CEIE, is the organization responsible for management of base environmental concerns. Contact program managers in 78 CEG/CEIE at (478) 327-8104. Major environmental program areas which may be affected include solid and hazardous wastes, toxics, water quality, air quality, natural resources, storage tanks, cultural resources, pollution prevention, hazardous materials and waste, and petroleum, oil, and lubricants. Bioenvironmental Engineering, BIO, 78 AMDS/SGPB (478-327-7555) is the organization responsible for Radiation, drinking water, and OSHA substance specific dust concerns.

B. Contractor Responsibility: Comply with all applicable Federal, State of Georgia, any laws and regulations from other states where disposal might occur, and local laws and regulations concerning environmental compliance and pollution prevention. Ensure all products produced or generated under contract shall meet all stated performance objectives and shall not violate in any manner the Environmental Requirements of any applicable local, state, or federal entity including the Department of Defense (DoD).

1. Environmental Management Systems (EMS) Awareness Training: All contractor personnel working on Robins Air Force Base (AFB) who perform activities on the installation are required to complete Air Force-provided initial EMS Awareness Training. It is the responsibility of the Prime Contractor to ensure that all sub-contractors, vendors, and employees complete this training prior to beginning work on Robins AFB. Failure to provide documentation of EMS Training may result in termination of the contract.

   EMS training is provided by Environmental Management, 78 CEG/CEIE, at (478) 327-8104. Contractors have three options to satisfy the mandatory EMS Awareness Training requirement. Contractors that do not have a Computer Access Card (CAC) must exercise Option 2.

   - Option 1 (Preferred Option): An online version of Robins EMS Awareness Training is available at the following website: https://geobase.robins.af.mil/emstraining/EMSTrainingOptions.aspx. This option is only available to contractors who have a CAC and takes approximately 10 minutes to complete.

   - Option 2: The Air Force version of EMS Awareness Training is available through the Advanced Distributed Learning Service (ADLS) website: https://golearn.csd.disa.mil/kc/login/login.asp?kc_ident=kc0001#. This option is also only available to contractors who have a CAC and takes approximately 10 minutes to complete.

   - Option 3: Contractor requests a copy of the Robins EMS Awareness Training Power Point Presentation from Environmental Management. The request should be sent to the Environment Management Workflow Box at the following email address, 78ceg.cev.FrontOfc@robins.af.mil. Once the presentation is received, the contractor is responsible for ensuring that all his/her employees view the training.

2. Green Procurement Program (GPP): GPP is a mandatory federal acquisition program that focuses on the purchase and use of environmentally preferable and biobased products and services. Biobased products are composed in whole or in part of biological products and are safer for the environment. GPP requirements apply to all acquisitions including services and new requirements. Federal Acquisition Requirement 23.404(b) applies and states that GPP requires 100% of Environmental Protection Agency (EPA) designated product purchases included in the Comprehensive Procurement Guidelines list containing recovered materials, unless the item cannot be acquired competitively within a reasonable timeframe, meet appropriate performance standards, or at a reasonable price.

C. Base Environmental personnel (78 CEG/CEIE) will conduct no-notice inspections to ensure compliance with all Environmental Requirements. Written documentation of any findings from such an inspection will be forwarded to the CO by the inspector. The CO will follow-up with the Contractor on all findings of non-compliance reported by the inspector. A finding of non-compliance with any of the Environmental Requirements may result in the issuance of a work stoppage by the CO until documentation of compliance is submitted and accepted by both, 78 CEG/CEIE and the CO.

**1.02 SUBMITTALS:**

A. General: Provide the following submittals in accordance with instructions found in Section 01300, Submittals and Contractor Furnished Items. The contractor may submit manufacturer's data in lieu of the required certificate of compliance if he/she desires. The Government requires manufacturer's data if an "X" appears under the "Mfg. Data Required" column.

B. Material Submittals: Not required under this section.

C. Other Submittals: Provide the following submittals as required by the contract or as directed by the CO.
*** IMPORTANT >> Designer, edit list below to project requirements***

| Inspector Para # | Description | Date Required | Check Mark |
|---|---|---|---|
| 3.01 B. | Solid Waste Handling Permit or Permit by Rule Letter | Within 3 days of receipt | _____ |
| 3.01 C.3. | Landfill License | Prior to dumping | _____ |
| 3.01 C.3.a) | Special Waste Acceptance Application | 5 days prior to dumping | _____ |
| 3.01 C.3.a) | Waste Shipment Tracking | Monthly by the 5th | _____ |
| 3.01 C.4. | Commencement Notice | Prior to dumping | _____ |
| 3.01 D. | Waste Management Report | Monthly by the 5th and Prior to final payment | _____ |
| 3.01 F.1. | Solid Waste Disposal Plan | 10 days prior pre-con. conf. | _____ |
| 3.01 F.1.f) | Landfill Receipts | Monthly by the 5th | _____ |
| 3.01 F.1.g) | Disposal Certification Letter | Prior to final payment | _____ |
| 3.01 F.2. | Recycling Letter | Prior to final payment | _____ |
| 3.01 F.3. | GA EPD Demolition Notice | 15 days prior to starting work | _____ |
| 3.02 B.2.c) | DRMO Receipts | Within 7 days | _____ |
| 3.02 B.2.d) | DRMO Bill | Within 7 days | _____ |
| 3.02 G.1. | Hazard Communication Program | 14 days after Notice to Proceed | _____ |
| 3.02 G.2. | Hazardous Waste/Hazardous Material List | Prior to starting work | _____ |
| 3.02 G.3. | Asbestos Removal Info | As required | _____ |
| 3.02 G.4. | Lead Compliance/Training/Sampling | Prior to starting work | _____ |
| 3.02 G.5.a) | Refrigerant Technician Certification | Prior to starting work | _____ |
| 3.02 G.5.b) | Refrigerant Appliance List | Within 7 days | _____ |
| 3.02 G.5.c) | Refrigerant Maintenance Repair Log | Within 7 days | _____ |
| 3.02 G.5.d) | Refrigerant Equipment Certification | Within 7 days | _____ |
| 3.02 G.5.e) | Refrigerant Purchase Documentation | Within 7 days | _____ |
| 3.03 E.1 | Air Permit Data | 14 days after Notice to Proceed | _____ |
| 3.05 D.1. | Pesticide List | At end of project | _____ |
| 3.05 D.2. | Pest Control License | Prior to pest control | _____ |
| 3.06 C | Written Request for Radioactive Sources on RAFB | 30 calendar days prior to start of work | _____ |
| 3.07 | UST Removal | 14 days after Notice to Proceed | _____ |

| Para # | Description | Date Required | Inspector Check Mark |
|---|---|---|---|
| 3.11 A.1. | Notify CEIE of Digging | Beginning of project | _____ |
| 3.11 A.1. | Notify CEIE of Digging | 1 week before digging | _____ |
| 3.11 A.1. | Notify CEIE of Digging | 2 hrs before restart dig | _____ |
| 3.11 B | Notify of Find | upon discovery | _____ |
| 3.12 G.1 | Tree Tags | 3 days after removal | _____ |
| 3.12 G.4 | Landscaping Plan | Prior to beginning work | _____ |
| 3.12 I.1.a) | Erosion, Sedimentation, and Pollution Control Plan | 60 percent design package | _____ |
| 3.12 I.1.b) | Notice of Intent – NPDES Permit | 14 days before site work | _____ |
| 3.12 I.1.b) | Permits/Fees Copies – NPDES Permit | 14 days prior to site work | _____ |
| 3.12 I.1.c) | Notice of Termination – NPDES Permit | After final stabilization at site | _____ |
| 3.12 I.2 | Post Construction Stormwater Management Plan and Calculations | 60 percent design package | _____ |
| 3.13 E.1 | Backflow Device Location | Prior to installation | _____ |
| 3.13 E. 2 | BPD Test Report | After BPD installation | _____ |
| 3.13 E. 3 | Use of fire hydrant/penetrate water mains | Prior to start of work | _____ |

**PART 2 - PRODUCTS - OMITTED**

**PART 3 - EXECUTION**

**3.01 DISPOSAL OF WASTE/EXCESS MATERIAL:**

A. General: The Contractor shall take a proactive, responsible role in the management of non-hazardous solid waste and require all subcontractors, vendors, and suppliers to participate in the effort. Non-hazardous Solid Waste, as defined in Code of Federal Regulations (CFR) 261.2, dispositioned for disposal shall be removed from the base in accordance with all Federal, State of Georgia, and local codes and requirements. Every effort shall be made to segregate individual waste streams and divert waste from any landfill by reusing or recycling materials. Direct all non-hazardous solid waste inquiries to 78 CEG/CEIER Solid Waste Program Manager.

B. Solid Waste Handling: All persons engaged in solid waste handling, including solid waste collection and transportation, or operations of solid waste handling facilities or disposal sites shall have a solid waste handling permit or permit by rule letter. The provisions of Georgia Environmental Protection Department (GA EPD) regulations concerning proper handling of solid waste and applicable prohibitions shall govern. All materials must be properly removed by the end of the project. Equipment/material to be removed from the project but not turned in to the Government is the property of the contractor. Revenues or other savings obtained for salvage or recycling may accrue to the Contractor according to the Statement of Work.

C. Solid Waste Disposal: Use one or more of the following methods to divert/dispose of non-hazardous solid waste. All materials to be disposed of in other than a sanitary landfill must be kept segregated at the project site from those materials, which are allowed only in a sanitary landfill.

1. Reuse (diversion): First consideration of waste shall be given to salvage for reuse to be used in the original form. Sale or donation of waste suitable for reuse shall be considered. Salvaged materials, other than those specified in other sections to be salvaged and reinstalled, shall not be used in this project unless approved by the CO. Materials defined as “recovered materials” are excluded from regulation as solid wastes.

2. Recycling (diversion): Recycling of materials is strongly encouraged. Waste materials not suitable for reuse but have value as being recyclable, shall be recycled whenever economically feasible. Materials destined for recycling must meet the definition of non-hazardous wastes under federal/state solid waste regulations. Materials defined as "recovered materials" are excluded from regulation as solid wastes. Recyclable metal materials shall remain the property of the government and be included in the Robins AFB Qualified Recycling Program (QRP). Contact 78 CEG/CEAN QRP Manager for collection of scrap wire and metal.

3. Sanitary Landfill (disposal): All solid waste may be disposed of in a sanitary landfill properly licensed by the State of Georgia. Provide proof that any Georgia municipal solid waste disposal facility receiving Robins AFB waste is operated by someone who has obtained the certification required by the Georgia Solid Waste Management Act, O.C.G.A. 12-8-24.1. If a landfill other than Houston County Landfill is used, provide a copy of the landfill license.

    a) All non-hazardous wastes disposed of in the Houston County Landfill may require a Waste Shipment Tracking Document signed by the Contractor's hauler certifying that no hazardous waste was introduced into the waste while in his custody. The contractor must provide a Waste Shipment Tracking Document with each disposal load when required by Houston County. If required, the contractor may need to collect a representative sample of building demolition material to be tested. The results of the test are to be provided on the Special Waste Acceptance Application (SWAA) form and submitted to 78 CEG/CEIE for approval for acceptance by the Houston County Landfill Engineer and the issuance of a Special Waste Profile Number, which must be used on the Waste Shipment Tracking Document. Attached at the end of this document are copies of both, the Waste Shipment Tracking Document and SWAA. Allow a minimum of three working days for 78 CEG/CEIE to process the SWAA form to obtain the profile number.

Note to Designer: Common concerns for demolition waste include lead based paint and asbestos. If the presence of lead based paint, asbestos, or other hazardous materials are suspected, permission for landfill disposal is required via the SWAA process. DURING THE DESIGN, an analysis of the suspected material shall be performed by a certified lab approved by the State. If the Toxic Characteristic Leaching Procedure (TLCP) results for lead are greater than 5 mg/L, the waste shall be disposed of as hazardous waste in a Subtitle C permitted facility--not a Subtitle D permitted facility such as the Houston County Landfill. If the lab analysis for asbestos is positive, the waste must be dispositioned through the SWAA process. The completed form (top & middle portion) along with a copy of the lab analysis should be forwarded to 78 CEG/CEIER Solid Waste Program Manager for approval. Houston County currently does not require a SWAA if there is no presence of lead based paint, asbestos, or other non-hazardous Special Waste or hazardous materials suspected. In the future, if the landfill authority does require a SWAA, the contractor shall obtain composite samples of the materials likely to be disposed of during the demolition of the project. Submit the samples to the appropriate certified laboratory for testing and complete the SWAA. Attach a copy of the signed lab analysis and submit the SWAA to 78 CEG/CEIE for signature. 78 CEG/CEIE will fax the completed form to the County's landfill consultant for disposal approval and issuance of Special Waste Profile Number. Once it is approved, attach a copy to the specifications during advertisement. 78 CEG/CEIE will also complete the top part of the Waste Shipment Tracking Document with the Profile Number issued at the same time. Include this form in the contract documents as well. 78 CEG/CEIE will be the signing authority as the generator on the SWAA form.

4. Inert Waste Landfill (disposal): Materials not likely to cause production of leachate of environmental concern may be disposed of in an inert waste landfill. Only earth and earth-like products, concrete, cured asphalt concrete, rock, bricks, yard trimmings, and land clearing debris such as stumps, limbs, and leaves are acceptable for disposal in an inert waste landfill. Provide a copy of the written notice of commencement of operation by the landfill as given to the GA EPD and provide a copy of the landfill license or permit by rule letter issued by the GA EPD. Include the weights of material disposed of in this type of landfill in the monthly waste management report.

5. Construction/Demolition Disposal Site (disposal): Only wood, metal, wallboard, paper, cardboard, as well as materials that can go in an inert waste landfill may be disposed of in this facility. Provide a copy of the landfill license if other than Houston County Landfill.

6. Solid Waste Disposal Outside of Georgia: No solid waste can be disposed of outside the state of Georgia without prior written approval of the CO. If the contractor desires this, he shall provide sufficient information as determined by the contracting officer to allow verification of compliance with the law.

D. Reporting of Disposal and Recycling: Robins AFB is required to report to Air Force Headquarters the amount (weight) of solid waste and construction and demolition (C&D) debris which is dispositioned for reuse, recycle, or disposal. Weights shall be cumulative from the start of each month and shall reflect the total amount of material disposed or recycled during the month. Attach copies of any completed Waste Shipment Tracking Documents and Georgia Asbestos Waste Shipment Records with landfill tickets for these materials. A copy of the report shall be turned in to the contract administrator by the 5th of the following month and prior to final payment and immediately forwarded to:

78 CEG/CEANQ

Attn: Solid Waste Program Manager

775 Macon Street, Building 1555
Robins AFB GA 31098-2201

Each month, the Contractor shall record the amounts of reused, recycled, and disposed materials on the Waste Management Report. The report should reflect the method of disposal for the material generated from the project. Weights of material disposed of in a sanitary or C&D landfill shall be based on the weight tickets. Material disposed of in other types of landfills, which do not have weight scales, may be estimated. The weight of materials reused and or recycled may be estimated. Use a good faith effort to obtain the most accurate estimate possible.

E. Building Demolition: The Contractor must provide 10 working day notification to GA EPD prior to the start of demolition activity in accordance with Georgia Solid Waste Regulations. This may also apply to the modification of a building, and is considered demolition when the removal of a load-bearing wall occurs. To start the process, coordinate with 78 CEG/CEIER Toxics Program Manager for guidance and assistance.

F. Submittals, Notifications, and Approvals: The following submittals, notifications, and approvals are required to maintain compliance:

1. Solid Waste Disposal Plan: In accordance with Civil Engineering Specification (CE Spec) 01572 and CE Spec 01560, the Contractor shall provide a solid waste disposal plan stating how all materials leaving Robins AFB shall be disposed of and recycled no later than15 days after notice to proceed and not less than 10 days before the preconstruction meeting prior to starting work.

   a) The plan shall address the disposal of all solid waste and shall include a notarized letter from the contractor stating how all materials leaving Robins AFB shall be disposed of. The letter shall certify that the Contractor shall dispose of all materials in compliance with all Federal, State of Georgia, and local laws. A senior official of the company shall sign this letter. The plan shall address the disposal of each item addressed in Sections 3.01 and 3.02 as applicable. The plan shall designate an employee who shall be responsible for verifying that all materials removed from Robins AFB are disposed of in accordance with the above referenced laws. Non-hazardous solid waste shall be broken down into individual types, i.e., asphalt, concrete, wood, brick, etc. to facilitate recycling of recovered materials.

   b) Provide five copies of the Disposal Plan to the CO to forward to 78 CEG/CEIE prior for review and approval 10 days prior to the Pre-construction Conference or 15 calendar days prior to the start of disposal operations if no pre-construction conference is held.

   c) Identify each landfill and recycler to be used. A copy of all landfill permits shall be provided unless the Houston County landfill is used.

d) Provide a copy of a Solid Waste Handling Permit or permit-by-rule letter, issued by GA EPD, which allows the Contractor to handle solid wastes, including solid waste collection and transportation. A copy of the EPD permit-by-rule letter is required for the inert waste landfill being used.

e) Establish and maintain a Daily Waste Disposal and Recycling Log. Each load of materials that leaves Robins AFB shall be accounted for in the log. The log shall list the load number, bill of sale number/date or other record for recycling, as well as the name of the contract employee who verified that the material was disposed of properly, along with details as to how verification was accomplished.

f) Keep evidence of proper disposal and recycling of construction debris per CE Spec 01572 as well as provide this evidence to the CO. Examples of evidence include dump tickets from a licensed sanitary landfill, copies of current landfill permits from the State of Georgia (unless Houston County landfill is used), manifest, bill of sale, or other record for recycling. The evidence shall be obtained the workday after the load is carried off and provided by the 5th of each monthly Waste Management Report.

g) After contract work is completed and prior to final payment, the Contractor shall submit a notarized letter of certification signed by a senior official of the company certifying that all materials disposed, recycled, and removed from Robins AFB have been dispositioned in compliance with Federal, State of Georgia, and local laws, and 78 CEG/CEIE has received all monthly waste tracking reports. Attach a copy or duplicate of the Waste Shipment Tracking Document for each load transported for disposal and recycling.

2. Recycling: Provide a letter indicating what materials shall be treated as recovered materials under GA EPD regulations and show how the criteria for recovered materials are met. Please note that for C&D Waste, per CE Spec 01572, a minimum of 75 percent by weight of total project solid waste shall be diverted from the landfill.

3. Building Demolition: Submit copies of GA EPD demolition notification to CO and 78 CEG/CEIE Toxics Program Manager 15 days prior to starting work and prior to submittal to the GA EPD for review, and submit final copies with copy of any payment made to GA EPD.

**3.02 SPECIAL WASTES OR HAZARDOUS MATERIALS:**

A. General: The Contractor must comply with all applicable federal, state, and local requirements concerning use of hazardous materials and hazardous waste. If there should be a conflict between environmental regulation/ordinances/statues and the contract's specifications, the contractor shall, in writing, contact the CO for a written determination. Disposal of all non-hazardous Special Wastes, such as asbestos, requires submittal of a SWAA to obtain a Profile Number for use on the Waste Shipment Tracking Document as described in 3.01 C.3. a).

B. Hazardous Waste: Hazardous Waste is defined as waste meeting the requirements of 40 CFR 261.3. 78 CEG/CEIER Hazardous Waste Program Manager makes all hazardous waste determinations for waste generated on Robins AFB. The Contractor must provide all data necessary to determine the regulatory status of waste to 78 CEG/CEIE. The Contractor must ensure personnel have completed hazardous waste training. All hazardous wastes generated on Robins AFB must be disposed of through 78 CEG/CEIE at building 359. Direct all inquiries to the 78 CEG/CEIE Hazardous Waste Program Manager.

1. Paints, sealants, solvents, rags, or any other hazardous material(s) destined for disposal must be managed as a hazardous waste unless they have been determined not to be via Material Safety Data Sheet (MSDS) or laboratory sampling. 78 CEG/CEIE is the only organization authorized to make a hazardous waste determination.

2. Light fixture components: High-intensity discharge (HID) and fluorescent lamps and tubes containing mercury must be recycled as universal waste.

3. Batteries used in emergency and exit lights that contain lead must be recycled and managed as universal waste.

4. Disposal Procedures for Hazardous and Universal Waste :

a) Gather the lamps/tubes and batteries into containers suitable for shipping per Department of Transportation (DOT) guidelines. The lamps/tubes can be placed in the original boxes the new tubes came in or in boxes designed to prevent breakage.

b) Take care not to break any lamps/tubes. If any are broken, they must be treated as spilled hazardous waste.

c) Obtain labels and containers from building 359. Place the provided labels on the boxes, properly filled out and deliver to building 359. Payment for disposal will be made through your Department of Defense Activity Address Code (DODAAC) account.

d) The Defense Reutilization and Marketing Offices (DRMO) contractor will dispose of the items, normally by recycling the lamps, tubes, and batteries.

C. Asbestos Containing Materials:

1. Do not use any products containing asbestos.

2. All asbestos abatement work shall only be performed in the areas shown by the required specifications and shall be in accordance with CE Spec 01568.

3. Prior to the start of any demolition, renovation, or digging, determine if asbestos is in the area of construction. If there is no known asbestos in the project area, proceed as normal. If the contractor discovers any material he/she suspects to be asbestos, bring it to the CO's attention immediately. Stop all work in that area until directed to proceed.

a) Known Asbestos: If asbestos is in the area of construction, describe where it is located. There should not be any work done in the area involving asbestos if it was not written in the contract. If any asbestos is accidentally damaged, notify Base Asbestos Operations Officer, 78 CES/CEOS at (478) 327-4534, Bioenvironmental Engineering, 78 AMDS/SGPB, at (478) 327-7555, and 78 CEG/CEANQ Toxics Program Manager immediately. After they inspect the damage, the contractor shall repair it and remove debris in accordance with the following regulations, at no additional cost to the Government:

- 29 CFR 1910.1001 (1985)
- 40 CFR 61.20 Subpart B (1985)
- 40 CFR 61.145 (1985)
- AFOSH Standard 161-4 (20 Jun 77)
- Georgia Air Quality Rules, Section 391-3-1-02(9)(b)1 (1986)

***Policy: Samples will be taken by the designer during design and routed through 78 CES/CEOS for testing by a certified lab approved by the State to determine the presence of asbestos and results copied to 78 CEG/CEAN. Items that must be sampled include floor tile and mastic, pipe insulation and insulation mastic. Other potential asbestos items include some sprayed on coatings, roofing insulation, and siding.***

D. Lead Paint:

1. General: The contractor shall take precautions to protect his workers and government employees from exposure to lead dust hazards during C&D projects in accordance with 29 CFR 1926.62, Occupational, Safety, and Health Administration (OSHA) Lead in Construction Standard, and Specification 01569. All painted surfaces including painted surfaces covered by other materials such as wall paper may contain varying levels of lead. All lead based paint abatement work shall only be performed in the areas shown by the required specifications and shall be in accordance with CE Spec 01569.

2. Major Abatement Requirements, Housing, Childcare**Designer-not for our normal Operation and Maintenance (O&M) projects**: All painted surfaces including painted surfaces covered by other materials such as wall paper may contain varying levels of lead. The disposal of all debris containing lead paint shall be handled as a hazardous waste until a determination has been made otherwise based on test results.

   ***Policy: Composite samples will be taken by the designer during design and routed through 78 CES/CEOS for TCLP testing by a certified laboratory approved by the State to determine the presence and level of lead in the debris and results copied to 78 CEG/CEAN. Follow guidelines on sampling to ensure the samples are representative of the weight of debris anticipated.***

3. Maintenance, Repair, and Minor Construction Projects: All painted surfaces including painted surfaces covered by other materials such as wall paper in this project contain varying levels of lead. The disposal of all debris containing lead paint is to be treated for collection and disposal purposes as hazardous waste until a determination has been made otherwise based on test results. For hazardous waste, the contractor shall provide DOT approved drums and collect the waste in the drums. The drums shall be sealed, properly labeled, and turned in to the government for disposal.

E. Polychlorinated Biphenyls (PCB): Do not use equipment or components containing PCB's. This includes ballasts and capacitors for fluorescent and HID lighting.

1. Disposal Procedures for Fluorescent lighting ballasts and HID lighting capacitors containing PCB's:

   a) Fluorescent lighting ballasts and HID lighting capacitors must be managed and disposed of as toxic waste unless the label states they do not contain PCB's. Ballasts and capacitors with no markings are assumed to contain PCB. Ballasts and capacitors marked as non-PCB are handled as standard solid waste.

   b) Gather HID capacitors and fluorescent ballasts into separate containers during construction and place them into labeled, suitably sized DOT-approved containers per 49 CFR 173.202. (Typical sizes are 1, 5, 10, 30, and 55 gallons) Labels and containers may be obtained from building 359, 78 CEG/CEANC.

   c) If any are broken, they must be treated as spilled hazardous material. Contact 78 CEG/CEANC at (478) 926-1176 for disposal instructions.

   d) Dispose of sealed non-leaking capacitors through DRMO. Do not keep any of the full or partially full containers at the construction site for more than 30 days. Provide DD Form 1348 obtained from building 359 prior to contacting DRMO for disposal.

   e) DRMO will dispose of PCB containing materials by incineration. DRMO will mail a signed copy of the manifest to 78 CEG/CEAN after transportation to the disposal site. A certificate of destruction should be received in the next month.

F. Ozone Depleting Substances (ODS) and Controlled Substances Restriction:

1. Unless the requiring activity has obtained prior Senior Acquisition Official (SAO) approval, contractors may not:

a) Provide any service or product with any specification, standard, drawing, or other document that requires the use of a Class I ODS in the test, operation, or maintenance of any system, subsystem, item, component, or process; or

b) Provide any specification, standard, drawing, or other document that establishes a test, operation, or maintenance requirement that can only be met by use of a Class I ODS.

[Air Force Federal Acquisition Regulation Supplement (AFFARS) Part 5352.223-9000, Elimination of Use of Class I Ozone Depleting Substances (ODS)]

2. For the purposes of Air Force policy, the following products are Class I ODS:

a) Halons: 1011, 1202, 1211, 1301, and 2402;

b) Chlorofluorocarbons (CFCs): CFC-11, CFC-12, CFC-13, CFC-111, CFC-112, CFC-113, CFC-114, CFC-115, CFC-211, CFC-212, CFC-213, CFC-214, CFC-215, CFC-216, and CFC-217, and the blends R-500, R-501, R-502, and R-502; and

c) Carbon Tetrachloride, Methyl Chloroform, and Methyl Bromide

NOTE: Materials that use one or more of these Class I ODSs as minor constituents do not meet the Air Force definition of a Class I ODS. [AFFARS Part 5352.223-9000, Elimination of Use of Class I ODS]

3. Class II ODS usage requires prior approval through the Air Force (AF) Form 3952 Authorization Process. [Air Force Instruction (AFI) 32-7086, Hazardous Materials Management]

4. Do not develop or modify any existing weapon or facility system scheduled to remain in the AF inventory beyond 01 January 2020 in any manner that requires or adds requirements for Class II ODS in their operations or maintenance.

For exceptions to this Class II ODS policy, the requiring activity must receive SAO approval, using the same process as Class I ODS Contract approvals, or, for installation Real Property air conditioning and refrigeration equipment, the requiring activity must obtain approval authority from the Base Civil Engineer (BCE). [AFI 32-7086, Hazardous Materials Management]

5. For the purposes of Air Force policy, the following products are Class II ODS:

Hydrochlorofluorocarbons (HCFCs): HCFC-21, HCFC-22, HCFC-31, HCFC-121, HCFC-122, HCFC-123, HCFC-124, HCFC-131, HCFC-132, HCFC-133, HCFC-141b, HCFC-142b, HCFC-151, HCFC-221, HCFC-222, HCFC-223, HCFC-224, HCFC-225ca, HCFC-225cb, HCFC-226, HCFC-231, HCFC-232, HCFC-233, HCFC-234, HCFC-235, HCFC-241, HCFC-242, HCFC-243, HCFC-244, HCFC-251, HCFC-252, HCFC-253, HCFC-261, HCFC-262, HCFC-271 [AFI 32-7086, Hazardous Materials Management, Table 4.2]

6. The Contractor shall label products which contain or are manufactured with ozone depleting substances in the manner and to the extent required by 42 United States Code (U.S.C.) 7671j(b), (c), and (d) and 40 CFR Part 82, Subpart E, as follows:

**Warning**

Contains (or manufactured with, if applicable) *_____, a substance(s) which harm(s) public health and environment by destroying ozone in the upper atmosphere.

* The Contractor shall insert the name of the substance(s). [FAR Part 52.223-11, ODS]

7. The Contractor shall comply with the applicable requirements of Sections 608 and 609 of the Clean Air Act (42 U.S.C. 7671g and 7671h) as each or both apply to this contract. [FAR Part 52.223-12, Refrigeration Equipment and Air Conditioners]

G. Hazardous Materials (HAZMAT):

1. HAZMAT Definition: The term HAZMAT includes all items (including medical supply items, but excluding drugs in their finished form and pharmaceuticals in individually-issued items) covered under Emergency Planning and Community Right-to-Know Act (or other federal, state, or local) tracking requirement, the OSHA Hazard Communication (HAZCOM) Standard, and all Class I and Class II ODS. It does not include munitions or hazardous waste.

2. HAZMAT Exemptions: The OSHA HAZCOM Standard [29 CFR 1910.1200(b)(6)(ix)] excludes "Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended." OSHA further states in a 14 April 2005 interpretation letter that office cleaning products utilized with the same frequency and duration as that of a normal consumer would fall under the HAZCOM Standard exemption for consumer products in 29 CFR 1910.1200(b)(6)(ix). Based on the OSHA HAZCOM Standard exemption, consumer products that are used at Robins AFB in such a way that the duration and frequency of use are the same as that of a consumer are not required to be included in the employer's HAZCOM program. If unsure if the item meets the exemption, contact the HAZMAT Cell (78 CEG/CEANQ).

3. Lead Acid Batteries: OSHA determined that lead acid batteries are hazardous chemicals because of their potential chemical exposure risks and physical hazards. As a result, lead acid batteries are classified as HAZMAT and do not fall under the article exemption because they have the potential to leak, spill or break during normal conditions of use.

4. Aerosol Products: All aerosol products are classified as HAZMAT.

5. The storage and usage of all HAZMAT must be tracked in the Air Force Standardized Tracking System, which is currently the Hazardous Material Management System (HMMS). If the contractor does not have access to a

government-furnished computer and cannot access HMMS, the contractor must report data on the HAZMAT stored and used during the performance of the contract at a minimum of weekly to the HAZMAT Cell and in the format specified. The Contractor should coordinate the submittal of HAZMAT data with the HAZMAT Cell prior to the beginning of work.

6. Each HAZMAT container must have a HMMS bar code tracking label affixed, with the exception of kits. The tracking label must be for the same manufacturer, same product and same size item. Substitutions are not allowed. (Note: Items with Hazard Code of B, C and M are considered HAZMAT and must have an HMMS bar code tracking label affixed.) HAZMAT that has been broken down into smaller "child" containers from the original "parent" container must have a packaging label affixed in addition to the HMMS bar code tracking label. If the contractor does not have access to a government-furnished computer and cannot access HMMS, the contractor must coordinate with the HAZMAT Cell the printing of HMMS labels for all HAZMAT items.

7. All HAZMAT with a Hazard Code of C or M must be licensed to the user prior to use. The material is licensed by stock number for specific zones for the using organization or contractor. Licenses are good for 24 months. At the end of the 24 months, the user must re-new the license. Hazard Code C and M items cannot be issued in HMMS to an employee without an active, valid license. The contractor must submit an AF Form 3952 for the license to use the HAZMAT.

8. Contractors must submit a "Hazardous Material Purchase Request for Contractors" form prior to transporting any hazardous material onto Robins AFB. This form must be completed for all hazardous materials purchased by contractors for use on Robins AFB and approval must be granted prior to transportation onto Robins AFB. The purpose of this form is to ensure compliance with AFI 32-7086 and OSHA HAZCOM, ensuring that hazardous materials are approved for use prior to transportation onto Robins AFB and a current MSDS is available in HMMS. Once approval is given, the contractor is permitted to transport hazardous materials onto Robins AFB. The contractor must track the hazardous materials in HMMS and must send the HMMS serial numbers to the HAZMAT Cell to close the request.

9. Contractors must maintain compliance with the Robins AFB Hazardous Material Management Plan and AFI 32-7086. A copy of the plan can be obtained by contacting the Hazardous Material Cell (HAZMAT Cell).

10. Contractors should contact the HAZMAT Cell (78ceg.cev.hazmat@robins.af.mil) with specific HAZMAT questions.

H. Submittals, Notifications, and Approvals: The following submittals, notifications, and approvals are required to maintain compliance:

1. Hazard Communication (HAZCOM) Program: The Contractor must submit a written HAZCOM program to the CO when hazardous materials or chemicals are to be used or demolished. This HAZCOM plan must include the following information:

a) List of each work activity/process required to use/demolish hazardous materials/chemicals.

b) List of hazardous materials/chemicals used.

c) MSDS for each hazardous material/chemical used. The MSDS must be the most current MSDS available from the

manufacturer. MSDSs from third party MSDS sites are not allowed.

d) Hazardous Material Listing and AF Form 3952 for each Hazardous Material: Provide the CO with MSDS and the list of hazardous materials/chemicals prior to starting work. Each MSDS must be accompanied with a completed AF Form 3952, detailing the intended use of the hazardous material. The same procedure should be followed for additional hazardous material brought on base during the performance of the contract. The CO will forward the list of hazardous materials, AF Form 3952s and MSDSs to the HAZMAT Cell, 78 CEG/CEANQ, for review and approval. Hazardous materials are not permitted for transportation onto Robins AFB or use on Robins AFB until approval is given by 78 CEG/CEANQ. A completed, signed, approved AF Form 3952 is required for every hazardous material used on Robins AFB.

e) Written procedures for handling of any hazardous waste generated.

2. Asbestos Work/Removal: The Contractor shall provide 15 working day notification to the CO and 78 CEG/CEANQ Toxics Program Manager and 10 working day notification to GA EPD prior to the start of any work involving asbestos. Copies of all notifications, GA EPD approval, and landfill disposal receipts and waste shipment tracking forms must be provided to the CO and 78 CEG/CEANQ Toxics Program Manager.

3. Lead Based Paint: For maintenance, repair, and minor construction projects. Provide a written compliance program as required by OSHA Standard 29 CFR 1926.62 to the CO and the 78 CEG/CEANQ Toxics Program Manager. Provide certification that contractor personnel involved in removal and handling of lead based paint has received training in accordance with OSHA Lead Standards. Provide results of air sample testing to demonstrate worker safety. For abatement projects only, provide submittals as specified in Section 01569 of the specifications.

4. ODS and Controlled Substances Restriction:

a) The Contractor shall provide the name, address, telephone number, and technician certification of each person who will service, repair, maintain and/or dispose of any equipment containing and/or using a refrigerant (Class I ODS, Class II ODS, or non-ozone depleting substance) to 78 CEG/CEAN.

b) The Contractor shall provide a list of appliances located on base that have a capacity of 50 pounds or more of a Class I or Class II refrigerant to 78 CEG/CEAN. Include the following information for each appliance:

(1) The type of appliance, i.e., commercial refrigeration appliance, industrial process refrigeration appliance, comfort cooling appliance, or other type of refrigeration appliance;

(2) The location of each appliance;

(3) The manufacturer, serial number, or other method of identification;

(4) The amount of the full charge of refrigerant, the type of refrigerant used, and the date full charge was determined.

c) For maintenance, service, repair, and/or disposal of base appliances containing 50 pounds or more of a Class I or Class II refrigerant, provide records, work logs, service tickets, invoices, and supporting documentation to 78 CEG/CEAN. The documentation required should contain the following:

(1) The date and type of service performed, i.e., repair, maintenance and/or disposal;

(2) The date any leak was discovered;

(3) A complete, detailed description of any service performed;

(4) The amount of refrigerant added at the completion of each service performed;

(5) Dates and results of the initial and follow-up verification tests; and

(6) The name of the technician who performed the work.

d) For any equipment used to recover or recycle refrigerants on base, provide the following information to 78 CEG/CEAN:

(1) A copy of any invoice or other record documenting the purchase or rental of such equipment, including the type of equipment, the manufacturer's name, the equipment model number, year manufactured, and any associated serial number; and

(2) A copy of the equipment certification sent to EPA.

e) For any purchases or acquisitions of refrigerant used for any service on base, provide copies of records, including, but not limited to, receipts, invoices, purchase orders, or bills of lading to 78 CEG/CEAN. The information should include the name, address and telephone number of each person, agent, or business entity from whom the facility purchased refrigerant.

5. DODAAC Account: After the Preconstruction Conference, the Contractor must have a valid DODAAC or work with the COR to obtain a DODAAC account number to pay DRMO for disposals.

a) After contract award, work with the 78 CEG/CEANC Point of Contact (POC) to discuss how to obtain containers and container labels. The Contracting Official Technical Representative must apply or update a DODAAC through the AF DODAAC manager at https://dodaac.wpafb.af.mil/.

b) Wait until the DODAAC account number is validated to begin generating regulated waste items to avoid long-term storage issues.

**3.03 AIR QUALITY:**

A. The contractor will perform value engineering for each project requiring specification or installation of equipment for control of regulated air pollutants. These analyses will ensure that the proposed control technology meets air quality compliance requirements. New sources require utilization of Maximum Achievable Control Technology to reduce emissions of hazardous air pollutants.

B. Open Burning: Open burning operations are prohibited on base and shall not be used. Open burning is any outdoor fire which emits products of combustion directly into the open air without passing through a stack, chimney, or duct.

C. Ozone depleting substances are restricted from use. Comply with paragraph 3.02.F. above.

D. Projects which will put generators into operation will require certification from the manufacturer of the unit that all Federal Standards for the performance of Stationary Compression Ignition Internal Combustion Engines are met. This certification must be submitted and approved by the CO prior to ordering and delivery of the unit.

E. Submittals, Notifications, and Approvals: The following submittals, notifications, and approvals are required to maintain compliance:

1. Air Permit – Emission Sources: According to GA EPD Rules for Air Quality Control, Chapter 391-3-1-.03, any person prior to beginning the construction or modification of any facility which may result in air pollution shall obtain a permit for the construction or modification of such facility. The contractor shall submit the required data to complete the permit application form as early in the planning process as possible. Since an approved permit to construct is mandatory prior to start of construction, the contractor shall not install the equipment until the permit has been approved and Government approval of the contractor's submittal has been obtained. Contractor shall anticipate nine months to one year from air source data submittal for this to occur. Direct all inquiries to the 78 CEG/CEANQ Air Program Manager.

**3.04 DUST CONTROL:**

A. General: The Contractor must maintain all excavations, embankments, stockpiles, haul roads, permanent access roads, plant sites, waste areas, borrow areas, and all other work within or without the project boundaries free from dust which could cause a hazard or nuisance to others. Dust is considered minute solid particles caused to be suspended by natural forces or by mechanical processes such as, but not limited to, crushing, grinding, milling, drilling, demolishing, shoveling, conveying, covering, bagging, mixing, and sweeping.

B. Dust Control Measures: Perform dust control as the work proceeds and whenever a dust nuisance or hazard occurs. Approved temporary methods of stabilization consisting of sprinkling, chemical treatment, light bituminous treatment, or similar methods are permitted to control dust. To be approved, sprinkling must be repeated at such intervals as to keep all parts of the disturbed area damp at all times. If sprinkling is used, keep sufficient equipment on the job site at all times.

C. OSHA Substance Specific Dusts: The Contractor shall comply with safety and health requirements under Federal, State of Georgia, and Robins local regulations/policies; examples include, but are not limited to, determining and providing suitable PPE (such as disposable coveralls and nitrile gloves), personnel air monitoring, etc. Do not dry sweep or use shop vacuums when handling these dusts; use HEPA vacuums or wet methods for cleaning before any demolition activities and as needed during construction. For specific lead-only projects, consult Specification 02065, Lead-Based Paint-In Place Management. (Also, see Attachment – OSHA Substance Specific Dust Performance Requirements)

**3.05 PESTICIDES (INSECTICIDES, FUNGICIDES, HERBICIDES, ETC.):**

A. The Contractor shall use only EPA approved pesticides, insecticides, fungicides, herbicides, etc., and report pounds of active ingredient used for each pesticide to the 78 CEG/CEANR Natural Resources Program Manager at the end of the project. The Contractor shall abide by the principles of Integrated Pest Management, implementing physical methods to control pests as the primary strategy. Chemical methods of control should only be used as a last resort, and the chemicals used should be the most environmentally benign available. The contractor shall contact 78 CEG/CEANR before using pesticides, herbicides, etc., in order to ensure that the chemical they plan to use is on the list of products that have been approved for use on Robins AFB.

B. The Contractor must possess a pest control operator’s license and a list of all chemicals to be used. Use only a pest control operator licensed in the State of Georgia to apply these chemicals.

C. The Contractor must ensure proper delivery, storage, handling, and disposal of all chemicals.

D. Submittals, Notifications, and Approvals: The following submittals, notifications, and approvals are required to maintain compliance:

1. The Contractor must submit a list of all pesticides to be used and amount (pounds) of active ingredients used to 78

CEG/CEANR so that coordination of all pesticide usage can be coordinated with Base Entomology Shop, 78 CES/CEOSV.

2. Proof of License: The contractor must submit a copy of the pest control operator's license to the CO and 78 CEG/CEANR.

**3.06 RADIOACTIVE MATERIALS:**

A. Radioactive materials are not permitted on base without the prior approval of the CO in coordination with 78 AMDS/SGPB. Common items to be aware of include equipment for roof moisture testing, soil moisture/compaction testing, and radiographic testing of welds.

B. Dispose of radioactive waste in accordance with Technical Order 00-110N-2, Radioactive Waste Disposal.

C. Comply with Attachment – "Non-Air Force Use of Radiation Sources Application Requirements"

3.07 UNDERGROUND STORAGE TANKS (UST): **The Contractor shall provide information to the CO so that 78 CEG/CEAN can submit notification to the GA EPD about the project. Allow at least 45 days after the Notice to Proceed before starting the removal process for tanks. The removal process must be completed within 90 days to comply with GA EPD regulations. Direct all inquiries to the 78 CEG/CEANQ Tanks Program Manager.**

***3.08 THREATENED AND ENDANGERED SPECIES OF PLANTS AND WILDLIFE:*** *Two state-protected species of plants occur on Robins AFB, as well as eight other species considered to be rare. The Contractor shall not clear vegetation on project sites without prior approval from 78 CEG/CEANR. Rare wildlife species such as Bald Eagles and Wood Storks are occasionally seen on base. The Contractor shall not harm wildlife of any kind. Most wildlife species found on base are protected by law, including birds, bats, land turtles, non-venomous snakes, and game species such as deer. If the Contractor encounters problems with wildlife, notify the CO. The CO shall contact the 78 CEG/CEANR Natural Resources Program Manager to determine the best solution for each problem. The CO will ensure that the Contractor's actions do not injure rare species and/or their habitats.*

**3.09 WETLANDS:** Wetlands delineation has been completed on base and wetland boundaries are currently identified with markers. However, markers can, in some instances, be missing or not readily visible, and wetlands often do not contain water throughout the year, so they may not be apparent. When in doubt, verify that the site in question is or is not a wetland by contacting 78 CEG/CEANR. These areas shall not be filled, dredged, or disturbed in any way. Comply with water and land protection sections outlined in this Specification to prevent construction site sediments and runoff from entering wetlands.

**3.10 GREEN PROCUREMENT PROGRAM (GPP):** The Contractor must follow the guidelines provided in 01540 Green Procurement Specification to comply with GPP requirements. Direct all inquiries to the 78 CEG/CEANQ Green Procurement Program Manager.

**3.11 PRESERVING HISTORICAL AND ARCHAEOLOGICAL RESOURCES:**

A. General: When a building or archaeological site determined eligible for the National Register of Historic Places is within a project area, the Contractor shall take adequate measures to prevent adverse impact to the cultural resource. This may include the development of a mitigation plan, consultation with the Georgia State Historic Preservation Office, the Advisory Council on Historic Preservation, and 12 culturally affiliated Native American tribes.

1. The Contractor shall provide 78 CEG/CEAN with all the project information to prevent adverse impacts to the building or archaeological site. The Contractor shall contact Cultural Resources Program Manager at the beginning of the project, one week before excavation starts and at least two hours before excavation resumes during the construction period.

2. When cultural resources are inadvertently discovered during construction, project personnel are directed to avoid the site of discovery and immediately contact the Cultural Resources Program Manager. All work in the area of discovery must stop until it can be investigated. 78 CEG/CEAN will send a qualified representative to the site and the resource will need to be recorded and evaluated and the effects mitigated as necessary.

B. Archaeological Finds: All archaeological finds are the property of Robins AFB. Do not remove or disturb finds without the CO's written authorization. Archaeological Finds are artifacts, ecofacts, or modifications to the landscape that are associated with past human activity and are a minimum of 50 years old.

**3.12 PROTECTION OF LAND RESOURCES:**

A. General: The Contractor shall not take any action that will adversely affect the existing Water Quality Standards classification of any streams, rivers, lakes, wetlands, or reservoirs within or adjacent to the project site or which would otherwise contribute to the pollution of these water resources. No fuel, oils, bituminous, calcium chloride, acids, construction waste, or otherwise harmful materials shall be permitted to enter these water resources. Land resources shall be preserved in their present condition or restored to a condition that appears natural and does not detract from the appearance of the surrounding area. If restoration is to be accomplished, the Contractor shall submit an appropriate restoration plan and receive base approval from 78 CEG/CEAN on the proposed mitigation procedures.

B. Stormwater Management during Construction: All land disturbances shall be conducted in accordance with the Georgia Erosion and Sediment Control Act. Additionally, the Contractor shall implement procedures and practices to eliminate or minimize stormwater pollution during construction activities in accordance with the *Engineering Technical Letter (ETL) 03-1: Stormwater Construction Standards*. The Contractor shall not allow any debris to get into the storm drainage system. Chemicals, fuels, oils, lubricants, greases, or scrap metal stored on construction sites shall have containment and/or cover to prevent stormwater contact. Also, no materials shall be discharged into a drain, ditch, or ground surface that could result in pollution of stormwater runoff. Minimum control measures must be implemented to prevent degradation of water quality downstream resulting from any construction activity. Activities such as concrete truck washing, cleaning of painting equipment, equipment fueling, and general site housekeeping will require implementation of specific best management practices (BMP) to prevent stormwater contamination. For information on BMPs contact 78 CEG/CEANP or the 78 CEG/CEANQ Water Quality Program Manager.

   If the project will disturb one (1.0) acre or more of land surface, coverage under National Pollutant Discharge Elimination System (NPDES) General Permit GAR100001, GAR100002, or GAR100003 shall be obtained through the submission of a Notice of Intent (NOI) to the GA EPD district office. Additionally, the Contractor shall submit an Erosion, Sedimentation, and Pollution Control (ESPC) Plan to 78 CEG/CEAN for review and approval prior to submitting the NOI to GA EPD. The ESPC Plan shall be developed using the Robins AFB template and meet or exceed the requirements of the respective applicable permit and the current edition of the *Manual for Erosion and Sediment Control in Georgia*. Inquiries shall be directed to the 78 CEG/CEAN Water Quality Program Manager.

C. Post Construction Stormwater Management Plan: The Contractor shall implement minimum control measures for stormwater runoff from new development and redevelopment projects that includes the creation or addition of 5,000 square feet or greater of new impervious surface area, or that involves land disturbing area activity of 5,000 square feet of land or greater in accordance with the: (i) *Stormwater Local Design Manual for Houston County, Georgia* (LDM)*;* (ii) *Georgia Stormwater Management Manual* (GSMM); and (iii) Section 438 of the 2007 Energy Independence and Security Act (EISA) as specified in the 2010 Department of Defense Memorandum. Documentation of conformity will consist of inclusion of a Post Construction Stormwater Management Plan (i.e., Hydraulics and Hydrology Report, EISA 438 Design Narrative, etc., including required associated calculations). The Plan shall be submitted through the established design review process.

   The Contractor shall use the following guidance when developing post construction stormwater management systems: (i) *Unified Facilities Criteria (UFC) 3-210-10, Low Impact Development Manual*; (ii) *US EPA 841-B-09-001: Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act;* (iii) LDM*;* (iv) GSMM*;* and (v) *ETL 08-6: Design of Surface Drainage Facilities*.

D. Prohibition of Illegal Discharges: The Contractor shall not discharge or cause to be discharged into the municipal storm drain system or watercourses any materials, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than stormwater.

   The commencement, conduct, or continuance of any illegal discharge to the storm drain system is prohibited except as described below:

   1. The following discharges are exempt from discharge prohibitions established by this requirement: water line flushing or other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising groundwater, groundwater infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, non-commercial washing of vehicles, natural riparian habitat or wetland flows, swimming pools (if dechlorinated - typically less than one part per million chlorine), fire fighting activities, and any other water source not containing pollutants.

   2. Discharges specified in writing by Environmental Management, 78 CEG/CEAN as being necessary to protect public health and safety.

3. Dye testing is an allowable discharge, but requires a written notification to and approval from Environmental Management, 78 CEG/CEAN prior to the time of the test.

4. The prohibition shall not apply to any non-stormwater discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the storm drain system.

E. Prohibition of Illicit Connections:

1. The construction, use, maintenance or continued existence of illicit connections to the storm drain system is prohibited.

2. This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.

3. The Contractor is considered to be in violation of this requirement if the Contractor connects a line conveying non-stormwater discharges to the stormwater conveyance system, or allows such a connection to continue.

F. Spills: Prevent the spill of chemicals, fuels, oils, grease, bituminous materials, waste washings, herbicides, cement drainage, or any other hazardous materials, including breaking fluorescent or HID lamps and tubes. Immediately report all spills to the Base Fire Department, 778 CES/CEF, and emergency number 911. Ensure to report all emergency information, including name, telephone number, location of spill, and type and amount of material spilled. Notify the CO of the spill immediately following initial reporting to the Fire Department and 911. Take containment action against any hazardous spills, which threaten storm drains and other environmental areas. Ensure clean up of materials spilled.

The Contractor is responsible for the cleanup of material(s) spilled. No spill residue shall be transported off Robins AFB without specific approval from the CO. Spills involving large quantities and/or requiring special protective clothing and/or breathing devices to facilitate clean up may require action by the Base Spill Response Team. When the Base Spill Response Team is utilized, the Contractor shall provide support, as appropriate, for containment and clean up of spills. If the spill exceeds reportable quantity limits, coordinate notification to the National Response Center with 78 CEG/CEAN through the CO.

G. Tree Protection and New Landscaping:

1. Trees marked for removal on approved plans and drawings shall have existing identification tags removed (if present) and forwarded to the CO. Except in areas marked on the plans to be cleared, do not deface, injure, destroy, remove, or cut trees or shrubs without authority from the CO and 78 CEG/CEANR Natural Resources Program Manager. In cases where construction necessitates the removal of a large number of trees, 78 CEG/CEANR will need to first evaluate whether or not a logging contract is warranted (to be arranged by CEANR), as per AFI 32-7064 it is inappropriate to give away forest resources which have significant value.

2. In general, trees shall be protected from either excavation or filling within the root zone closer than the normal drip line of the tree. No ropes, cables, or guys shall be fastened to, or attached to any existing trees for anchorage unless specifically authorized by the CO. The contractor shall not allow vehicles to be routinely parked within the drip zone of trees which are designated for protection, nor will equipment be staged under these trees. The Contractor shall in any event be responsible for any damage resulting from such use.

3. Where, in the opinion of the CO, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment, blasting, dumping, or other operations, the CO may direct the Contractor to adequately protect such trees by placing boards, planks, plastic fence, or poles around them. When directed by the CO, construct barriers to protect trees from earthwork operations. Rocks that are displaced into uncleared areas shall be removed. Monuments, markers, and works of art shall be similarly protected before beginning operations near them.

4. The Contractor shall submit all landscaping plans to the 78 CEG/CEANR Natural Resources Program Manager for review and approval before implementation. Plans shall emphasize the use of native plant and tree species whenever possible, and shall include provisions for conserving water use and minimizing the need for pesticide and herbicide use. Brown Top Millet is not authorized for use at Robins AFB.

H. Restoration of Landscape Damage: Surface Drainage: Surface drainage from cuts and fills within the construction limits and from borrow and waste disposal areas, shall be held in suitable sedimentation ponds or shall be graded to control erosion. Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, shall be provided and maintained until permanent drainage and erosion control measures are completed and operating. The area of bare soil exposed by construction operations at any time shall be held to a minimum. Stream crossings by fording with equipment shall be limited to control turbidity. Fills and waste areas shall be constructed by select placement to eliminate adjacent streams.

Stabilization of permanent steep slopes shall be accomplished as soon as possible to establish vegetation. Apply mulch (no more than 2-3 inches in depth) immediately after finished grading is completed, regardless of season, and delay seeding and fertilizing until the season most favorable for germination.

I. Submittals, Notifications, and Approvals: The following submittals, notifications, and approvals are required to maintain compliance:

1. Permit for Stormwater Management during Construction: If the project will disturb one (1.0) acre or more of land surface, coverage under NPDES General Permit GAR 100001, GAR 100002, or GAR 100003 shall be obtained through the submission of a NOI to the GA EPD district office. Provide the following as a minimum in complying with all applicable local, state, and federal laws:

a) The Contractor shall submit an ESPC Plan signed and stamped by a Georgia Professional Engineer with Level 2 Certification from the Georgia Soil and Water Conservation Commission to 78 CEG/CEAN for review and approval prior to submitting the NOI to GA EPD. The ESPC Plan shall be developed using the Robins AFB ESPC Plan Template and meet or exceed the requirements of the respective applicable permit and the current edition of the *Manual for Erosion and Sediment Control in Georgia.*

b) The Contractor shall submit a completed NOI to be covered by a NPDES Permit for stormwater discharge associated with construction activity to 78 CEG/CEAN for review and approval prior to submitting the NOI to GA EPD. After 78 CEG/CEAN approval of the ESPC Plan, the Contractor shall submit the NOI form and pay permit fees to both GA EPD and Houston County Public Works Department, at least 14 days prior to any site work.

c) The Contractor is responsible for compliance with the NPDES Permit and shall perform all permit-required tasks, including inspections, monitoring, and recordkeeping until such time the site achieves final stabilization. Final payment shall not be performed until the site achieves final stabilization as defined by the NPDES Permit. Special attention must be provided to consider the timing of project completion to ensure permanent vegetation is established (i.e., projects may require over-wintering with temporary grass until the spring growing season, when permanent grass (Bermuda/Centipede) shall be applied to the site after raking and fertilization. The Contractor shall submit a 78 CEG/CEAN reviewed and approved Notice of Termination (NOT) to the GA EPD after final stabilization is achieved and there is no discharge associated with construction activities. All records shall be maintained for a period of three years from the date the NOT is submitted. All NPDES Permit-required records shall be provided to 78 CEG/CEAN Water Quality Program Manager.

2. Plans for Post Construction Stormwater Management: Post Construction Stormwater Management Plan narrative and calculations for sizing of all post construction BMPs shall be submitted for all new development or redevelopment greater than 5,000 $ft^2$ (of impervious area or land disturbance). This Plan typically includes a Hydraulic and Hydrology Report and EISA Compliance requirements, as well as related narrative, figures, and drawings. The design shall meet the minimum stormwater management standards of the GSMM and Section 438 of EISA. The Plan shall be submitted as part of the project design documents for the 60 percent design (i.e., intermediate design) submittal.

**3.13 BACKFLOW PREVENTION DEVICES (BPDs):**

A. General: All BPDs must be installed in accordance with current Uniform Plumbing Code (Section 603.3.4) and AFI 32-1066. BPDs must be selected to address the level of hazard and installed in locations that are readily accessible for inspection and maintenance. All BPDs must be installed by Georgia-certified BPD technicians. Direct all inquiries to Bioenvironmental Engineering, 78 AMDS/SGPB, 478-327-7555.

B. The Contractor shall coordinate with Government Project Manager to ensure Bioenvironmental Engineering has assigned the level of hazard and identified the appropriate BPD for the application prior to purchase of BPDs.

C. The Contractor shall coordinate the BPD installation location with the Government Project Manager to ensure the installation location is accessible and meets space requirements for inspection and maintenance.

D. The Contractor shall provide an inspection/testing of the BPD(s) in accordance with the manufacturer's instructions for the particular device or using procedures recognized by the tester's certifying agency. At a minimum, all devices shall be tested after installation, cleaning, repair, or relocation.

E. Submittals, Notifications, and Approvals: The following submittals, notifications, and approvals are required to maintain compliance:

1. The Contractor must coordinate location of BPDs with the Backflow Prevention Program Manager prior to installation.

2. The Contractor must submit a copy of BPD Test Report to the Backflow Prevention Program Manager.

3. The Contractor must obtain approval to use fire hydrants or to penetrate water mains from SGPB, Bioenvironmental Engineering at 478-327-7555 and Civil Engineering Plumbing Shop (478-468-2399 or 478-327-8969). Use only lead free materials with the drinking water system, for solder no more than 0.2% and for pipes/fittings no more than 8% per 40 CFR 141.43.

---- END OF NARRATIVE SECTION ----

**NOTE:** Copies of the SWAA form, its tracking document, and monthly waste management report form follow.

Houston County MSW Landfill
2018 Kings Chapel Road
Perry, Georgia 31069
**Telephone: (478) 987-0089**
Fax: (478) 987-0102

**Profile No. _____**
(Assigned by Houston County)

SPECIAL WASTE ACCEPTANCE APPLICATION (SWAA)

Generator Name: _____ Contact: _____
Address: _____
Telephone: _____ Fax: _____
Description of Waste: _____
Source / Location of Waste: _____
Waste Quantity: _____ Cubic Yards ☐ Tons ☐
Frequency of Disposal: Daily ☐ Weekly ☐ Monthly ☐ One Time ☐ Other _____

LABORATORY DATA (Please attach a hard copy of laboratory test data)

Physical Properties: Physical State: _____ Solid ☐ Semisolid ☐ Liquid ☐ Color: _____
Halogenated Organics: mg/kg Flash Point: _____ ☐F Odor: Yes ☐ No ☐
Water Content: _____ % by Weight Paint Filter Test Passed ☐ Failed ☐
Reactive: No ☐ Yes ☐ With H2S ____ mg/kg HCN _____ mg/kg Others _____ mg/kg
pH Value: _____(S.U.) Infectious: Yes ☐ No: ☐

Chemical Properties (TCLP): (Concentrations in mg/l)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Arsenic | ___ | m-Cresol | ___ | Hexachlorobenzene | ___ | Pyridine | ___ |
| Barium | ___ | p-Cresol | ___ | Hexacholorobutadiene | ___ | Selenium | ___ |
| Benzene | ___ | Total Cresol | ___ | Hexachloroethane | ___ | Silver | ___ |
| Cadmium | ___ | 2,4-D | ___ | Lead | ___ | Tetrachloroethene | ___ |
| Carbon Tetrachloride | ___ | 1,4 Dichlorobenzene | ___ | Lindane | ___ | Toxaphene | ___ |
| Chlordane | ___ | 1,2 Dichloroethane | ___ | Mercury | ___ | Trichloroethene | ___ |
| Chlorobenzene | ___ | 1,1 Dichloroethylene | ___ | Methoxychlor | ___ | 2,4,5 Trichlorophenol | ___ |
| Chloroform | ___ | 2,4 Dinitrotoluene | ___ | Methyl Ethyl Ketone | ___ | 2,4,6 Trichlorophenol | ___ |
| Chromium | ___ | Endrin | ___ | Nitrobenzene | ___ | 2,4,5TP (Silvex) | ___ |
| o-Cresol | ___ | Heptachlor (a hydroxide) | ___ | Pentachlorophenol | ___ | Vinyl Chloride | ___ |

None of the above constituents exceed TCLP disposal limits _____

Others (List) _____
Other Information: Delivery method: Bulk ☐ Other_____
Regulatory Agency Approval Received: Yes ☐ No ☐ Permit Number_____
Material Safety Data Sheet Provided: Yes ☐ No ☐

Generator's Certification Statement

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. To the best of my knowledge, the material described above is not classified as hazardous waste under current regulations, and I agree to notify Houston County MSW Landfill if such classification changes. The attached information provided is true and accurate to the best of my knowledge."

Signature of Authorizing Agent_____ Date_____

Name of Agent (Typed or Printed) _____ Title_____

**Houston County MSW Landfill** **Profile No.** _____
**2018 Kings Chapel Road (Assigned to SWAA)**
**Perry, Georgia 31069**
**Telephone: (912) 987-0089**

# WASTE SHIPMENT TRACKING DOCUMENT

Generator Name:_____ Contact: _____
Address: _____
Telephone: _____ Fax: _____
Description of Waste: _____
Location of Waste: _____

Date Shipped: _____ Quantity Shipped: _____

Certification: I certify the waste described above is the waste represented by the Special Waste Acceptance Application (SWAA) of the same Profile Number and no regulated hazardous waste has been introduced into the waste.

Generator's Signature: _____ Date: _____

---

Transporter: _____ Contact: _____
Address: _____
Telephone: _____

Certification: I certify no regulated hazardous waste was introduced into the waste while in my custody:

Hauler's Signature: _____ Date: _____

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Waste Disposal Site: Houston County MSW Landfill

Quantity Received: _____

Certification: I certify receipt and proper disposal of the Special Waste Profiled materials covered by this manifest.

Operator’s Printed Name: _____

Operator’s Signature: _____ Date: _____

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# Waste Management Report (Monthly)

Contract Number: _____
Contractor: _____
Contractor POC: _____
Phone No: _____

Government Inspector: _____
Project # Title: _____
Date: _____

**I. MSW Landfill Disposal**

Quantity (tons): _____
Landfill Site: _____
Tip fee/ton ($/ton): _____
*Total cost of disposal ($): _____
*Total cost/ton ($/ton): _____

**II. C&D Landfill Disposal**

Quantity (tons): _____
Landfill Site: _____
Tip fee/ton ($/ton): _____
*Total cost of disposal ($): _____
*Total cost/ton ($/ton): _____

**III. Inert Landfill Disposal**

Quantity (tons): _____
Landfill Site: _____
Tip fee/ton ($/ton): _____
*Total cost of disposal ($): _____
*Total cost/ton ($/ton): _____

**IV. Alternatives to Landfilling (Recycling Strongly Encouraged)**

| Type of Material | Quantity (pounds or tons) | Destination | * Handling & Transportation Cost ($) | *Expected Revenue & Tip Fee Earnings ($) | * Net Cost ($) | *Cost if Landfilled ($) | * Comparison Cost (+)/Savings (-) |
|---|---|---|---|---|---|---|---|
| Cardboard | | | | | | | |
| Dimensional wood | | | | | | | |
| Beverage containers | | | | | | | |
| Land debris | | | | | | | |
| Concrete | | | | | | | |
| CMU | | | | | | | |
| Asphalt | | | | | | | |
| Metals - all types | | | | | | | |
| Gypsum board | | | | | | | |
| Paint | | | | | | | |
| Carpet | | | | | | | |
| Insulation | | | | | | | |
| Glass | | | | | | | |
| Cast stone | | | | | | | |
| Wood materials | | | | | | | |
| Electric cable | | | | | | | |
| PVC piping | | | | | | | |
| Rubber flooring | | | | | | | |
| Raised flooring | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**IV. Total net cost (+) or savings (-) from all alternatives to landfilling all project waste**

**V. Means of keeping recyclables free of contamination**
All similar materials will be grouped together based on the requirements of the recycling center. All dissimilar materials will be kept in separate containers/bins in order to avoid contamination.

**VI. Meetings to be held to address waste management**
At regularly scheduled job site coordination/progress meetings and at job safety meetings, waste management requirements will be discussed to clarify any confusion with craftspeople.

* Optional

**NON-AIR FORCE USE OF RADIATION SOURCES APPLICATION REQUIREMENTS**

**A2.1.USE OF RADIOACTIVE MATERIALS (RAM):**

A2.1.1. Air Force Instruction 40-201, Managing Radioactive Materials in the US Air Force, sets Air Force policy for using radioactive material. It applies to all civilian, civilian contractor, Department of Defense, Department of Energy (DOE), and DOE prime contractor personnel bringing radioactive materials onto Air Force installations.

A2.1.2. Non-Air Force organizations that bring radioactive materials onto Air Force installations, or conduct operations involving radioactive material on Air Force installations, obtain the approval in writing of the Installation Commander or his designee. To obtain this approval, the contractor must forward an application to the base RSO, 78 AMDS/SGPB, building 207, 655 7th Street, Robins AFB GA 31098; (478) 327-7555, with a courtesy copy to the contracting officer at least 30 calendar days before the planned date for commencement of activities on the installation. Non-Air Force organizations possessing Agreement State Licenses must also submit an NRC Form 241, Report of Proposed Activities in Non-Agreement States, to the NRC in compliance with 10 CFR 150.20. Organizations requiring more than 180 days of operation per calendar year on the installation must possess a NRC license. Requests must include:

A2.1.2.1. A description of the proposed activities on NRC Form 241 (the 180-day limitation on the form does not apply to organizations holding an NRC license).

A2.1.2.2. The procedures established to ensure radiological health and safety of Air Force personnel and the public while on Air Force installations; the name, local address, and telephone number for the responsible local representative; and the name, address, and telephone number of the RSO named on their license.

A2.1.2.3. A current copy of the applicable NRC, or Agreement State License. Expired licenses are unacceptable. To be valid at the installation, the license must either specifically state the installation by name on the license or state approval for work at temporary job sites anywhere in the United States where the NRC or Agreement State maintains jurisdiction. DOE or DOE prime contractors must provide, in lieu of a license, written certification of their exemption from NRC licensing requirements and cite the applicable exemption of 10 CFR.

A2.1.2.4. The part of the Air Force contract describing work to be done at the base and the inclusive dates of such work. A2.1.2.5.An acknowledgement that the Base RSO can make periodic checks to ensure the con-tractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Air Force personnel and prevent potential contamination of government property. The base RSO must identify deficiencies to the contracting officer for corrective actions. In addi-tion, the installation RSO has authority to suspend contractor operations believed to be unsafe. A2.1.2.6.Copies of the most recent leak test results (not over 180 days old) for sealed sources. A2.1.2.7.Copies of training certificates for authorized users.

A2.2. Contractors will adhere to 10 CFR and 49 CFR sections pertaining to transportation of radioactive material.

A2.3. Contractors must notify the base RSO when RAM arrives on base, and when the RAM is removed from the base.

**A2.4. USE OF LASERS:**

A2.4.1. Non-Air Force organizations required to use lasers on Robins AFB must submit awritten request for approval at least 30 calendar days before commencement of activities which require the use of a laser.

A2.4.2. Contractors must submit their request to 78 AMDS/SGPB, building 207, 655 7th Street, Rob-ins AFB GA 31098, (478) 327-7555, with a courtesy copy to the contracting officer, and will include:

A2.4.2.1.Description/Characteristics:
- Manufacturer.
- Model.
- Number of same units.
- Serial numbers.
- Laser medium.
- Mod14484122e14484122 of operation (i.e. continuous wave (CW), single pulse, multiple pulse). Maximum exposure time (train length).
- Time (sec) & wave length.

- Energy/pulse (J) or CW power (W).
- Pulse repetition frequency.
- Pulse width.
- Beam diameter (at 1/e point).
- Beam divergence (at 1/e point).

A2.4.2.2. The part of the Air Force contract describing work to be done at the base and the inclusive dates of such work. Additional information required to be included: where the laser will be used (location, indoors, outdoors, enclosures, etc.), and the safety features of the device.

A2.4.2.3. An acknowledgement that the base RSO can make initial and periodic checks to ensure the contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Air Force personnel.

**A2.5. USE OF RADIO FREQUENCY RADIATION (RFR):**

A2.5.1. Non Air Force organizations required to use equipment generating RFR in excess of 7 watts peak power and a frequency of 100 Mhz or greater on Robins AFB must submit a written request for approval at least 30 calendar days before commencement of activities which require the use of the RF generating device.

A2.5.2. Contractors must submit their request to 78 AMDS/SGPB, building 207, 655 7th Street, Rob-ins AFB GA 31098, (478) 327-7555, with a courtesy copy to the contracting officer; and will include:

A2.5.2.1. Description/Characteristics:
•Description.
•Nomenclature.
•Location of emitters.
•Quantity.
•Frequency (Mhz).
•Pulse width (microsec.).
•Pulse repetition freq. (pps).
•Peak power (kW).
•Antenna size (feet--horizontal/vertical).
•Antenna band width (degrees--horizontal/vertical).
•Antenna gain (dB).
•Scan rate (rpm).

A2.5.2.2. The part of the Air Force contract describing work to be done at the base and the inclusive dates of such work. Additional information required to be included where the RFR generating device will be used (location, indoors, outdoors, enclosures, etc.), and the safety features of the device.

A2.5.2.3. An acknowledgement the the base RSO can make initial and periodic checks to ensure the contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Air Force personnel.

**A2.6. USE OF IONIZING RADIATION:**

A2.6.1. Non-Air Force organizations required to use ionizing radiation generating devices (for RAM, see section 1) on Robins AFB must submit a written request for approval at least 30 calendar days before commencement of activities which require the use of ionizing radiation generating devices.

A2.6.2. Contractors must submit their request to 78 AMDS/SGPB, building 207, 655 7th Street, Rob-ins AFB GA 31098, (478) 327-7555, with a courtesy copy to the contracting officer; and will include:

A2.6.2.1. Description/Characteristics:
•X-ray unit manufacturer.
•Model number.
•Serial number. •Maximum kVp, mA, Sec.
•Ionizing radiation source/emitter (electron tube).

A2.6.2.2. The part of the Air Force contract describing work to be done at the base and the inclu-sive dates of such work. Additional

information required to be included: where the ionizing radiation producing device will be used (location, indoors, outdoors, enclosures, etc.), and the safety features of the device.

A2.6.2.3. An acknowledgement that the base RSO can make initial and periodic checks to ensure the the contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Air Force personnel.

**A2.7. USE OF ULTRAVIOLET (UV) RADIATION:**

A2.7.1. Non-Air Force organizations required to use UV generating devices on Robins AFB must submit a written request for approval at least 30 calendar days before commencement of activities which require the use of UV generating devices.

A2.7.2. Contractors must submit their request to 78 AMDS/SGPB, building 207, 655 7th Street, Rob-ins AFB GA 31098, (478) 327-7555, with a courtesy copy to the contracting officer; and will include:

A2.7.2.1. Description/Characteristics:
•Description.
•Nomenclature.
•Location of devices.
•Quantity.
•Wavelength.
•Effective Irradiance.

A2.7.2.2. The part of the Air Force contract describing work to be done at the base and the inclusive dates of such work. Additional information required to be included: where the UV generating device will be used (location, indoors, outdoors, enclosures, etc.), and the safety features of the device.

A2.7.2.3. An acknowledgement that the base RSO can make initial and periodic checks to ensure the contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Air Force personnel.

OSHA Substance Specific Dust Performance Requirements

1. OSHA Substance Specific Dusts:

a. Operations in many buildings have potential to produce varying levels of dusts potentially containing lead, hexavalent chromium, cadmium, beryllium and similar heavy metals. While airborne samples generally do not indicate an airborne hazard, some dusts may have settled on various surfaces over the years and any work may disturb these dusts and create both an inhalation and subsequent contact hazard. The Contractor shall comply with safety and health requirements under Federal, State of Georgia, and Robins local regulations/policies; examples include, but are not limited to, determining and providing suitable PPE (such as disposable coveralls and nitrile gloves), personnel air monitoring, etc. Do not dry sweep or use shop vacuums when handling these dusts; use HEPA vacuums or wet methods for cleaning before any demolition activities and as needed during construction. Comply with applicable separate Environmental Management (EM) requirements for disposal of hazardous waste which is found in a separate specification. For specific lead-only projects, consult Specification 02065, Lead-Based Paint-In Place Management.

b. The Contractor shall take its own dust samples for certified laboratory analysis (pre-work and post-cleaning). The Contractor shall determine its own needs, but the Government requires a minimum of 3 samples in each separate phase of the work if more than one work area is necessary.

c. The Contractor is responsible for determining the method of cleaning, the appropriate PPE for cleaning, and any PPE required after cleaning. The Contractor is explicitly cautioned that these heavy metal dusts are of concern to OSHA/EPA/GA-EPD and compliance to all regulatory standards is required.

d. It is preferable that the Contractor conduct all work when no Government employees are present. Daily Contractor clean up is necessary prior to start of Government duty day. Daily visual inspections will be performed to determine cleanliness of areas where Contractors have worked.

e. Any wipe or swipe samples collected to determine effectiveness of cleaning will use the following as guidance for limits to achieve:
For cadmium, hexavalent chromium, lead - achieve either a 90% reduction of pre-cleaning results or below detection limit (see definition below).

2. Analytical Laboratory Capabilities:

a. As evidenced from the OSHA standards for cadmium, lead, and hexavalent chromium, there is no specified method of swipe sampling and analysis that has been required. The laboratory at Robins AFB has conducted an in-house study to develop sampling and analytical procedures with satisfactory precision that enable BIO (SGPB) to determine a level of cleanliness. The sampling and analytical method is based on ASTM D6966 (Standard Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Determination of Metals) and Method 6020A (Inductively Coupled Plasma-Mass Spectrometry) as documented by NIOSH and CDC, Kevin Ashley, Ph.D. Results indicate recoveries are within the ASTM D6966 requirements.

b. **Definition of Detection limits** for the heavy metals are as follows:

Cadmium - 1 µg; Chromium - 0.3 µg; Lead - 0.5 µg.

c. XRF direct reading devices, instant reading and/or color change heavy metal test kits are generally not acceptable for negative determination of heavy metals due to their detection limits being above RAFB's OSHA requirements. If applicable, these testing devices may be used for positive determination screening purposes. No quantitative values will be recognized resulting from the use of these test methods.

# Robins Air Force Base
# Base Facility Standards

**Title: Structural**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

**PART 3A– STRUCTURAL**

**CRITERIA REFERENCE DOCUMENTS:**

ASCE 7, Minimum Design Loads for Buildings and Other Structures (Latest Edition)
ASCE 37, Design Loads on Structures During Construction
International Building Code (Latest Edition)
UFC 1-200-01, General Building Requirements
UFC 3-301--01, Structural Engineering
UFC 3-310-04, Seismic Design for Buildings
UFC 3-310--08, Non-Expeditionary Bridge Inspection, Maintenance & Repair.
UFC 3- 320-03A Structural Considerations for Metal Roofing
UFC-3-320-06A Concrete Floor Slabs on Grade Subjected to Heavy Loads
UFC 3-320-7N Weight Handling Equipment
UFC 3-330-02A Commentary on Roofing Systems
UFC 3-340-01 Design & Analysis of Hardened Structures to Conventional Weapons Effects (FOUD)
UFC 3-340-02, Structures to Resist the Effects of Accidental Explosions
UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings
UFC 4-023-03, Design of Buildings to Resist Progressive Collapse
ACI 318, Building Code Requirements for Structural Concrete (Latest Edition)
ACI 530/ASCE 5/TMS 402, Building Code Requirements for Masonry Structures (Latest Edn)
AF&PA NDS, Natl Design Specification for Wood Construction and Supplement (Latest Edn)
AISC 303, Code of Standard Practice for Steel Buildings and Bridges (Latest Edition)
AISC/ANSI 360, Specs for Structural Steel Bldgs, Allow Stress Design & Plastic Design (Latest Edn)
AISC/ANSI 341, Seismic Provisions for Structural Steel Buildings (Latest Edition)
AISI/COS/NASPEC, North American Specs for the Design of Cold-Formed Stl Structures(Latest Edn)
AWS D1.1, Structural Welding Code - Steel
AWS D1.3, Structural Welding Code - Sheet Steel
AWS D1.4, Structural Welding Code - Reinforcing Steel
Building Construction and Safety Code, (Latest Edition)
MBMA, Low Rise Building Systems Manual, (Latest Revision)
Metal Building Systems Manual, (Latest Edition)
SDI 30, Design Manual for Composite Decks, Form Decks, and Roof Decks
SDI DDM02, Diaphragm Design Manual

1. STRUCTURAL DESIGN REQUIREMENTS:

All Designs, A-E and others, shall incorporate all structural design work necessary to construct a new facility, or to repair or modify an existing facility, as appropriate.

Structural design shall comply with the following Relevant Codes and Standards in addition to those listed above.

2. STRUCTURAL CALCULATIONS:

The A-E designs shall provide all applicable structural calculations at each design submittal level, especially at the pre-final & 100% submittals.

All other designs shall provide all structural calculations at 100% submittal.

The structural calculations shall include the following items:

a. Structural Analysis and Design of the Facility including all Structural Elements, Anchorage and Foundations.

b. The Structure/s & parts thereof shall be analyzed & designed to support safely, all the applicable loads and load combinations, required in Sec. 1.

c. The Analysis and Design shall meet the serviceability requirements of all the applicable loads and load combinations, required in Sec. 1.

3. SPECIAL STRUCTURAL REQUIREMENTS:

a. Unusual floor loads: The designer shall review the project for floor-loading conditions not normally encountered, such as safes, industrial equipment, etc.

b. Mezzanines: The project shall be designed for any special floor loading requirements planned for all mezzanine areas.

c. Fall Protection: The designer shall ensure Fall Protection requirements are included as applicable.

d. Clearances: Minimum clearances shall be allowed in design & construction of walkways, roads and accessories.

4. FOUNDATIONS:

No foundation shall be constructed over existing or new water, sewer, steam, natural gas, Chilled-water, industrial waste, communications, computer, and foundation drain lines. All foundations shall be stepped down to an elevation below the bottom of pipe invert elevation, or the pipe relocated.

5. ANTENNAS AND OTHER EXTERIOR USER EQUIPMENT:

a. No antennas or other user equipment shall be mounted on the roof or walls, unless the mounting was analyzed prior to the installation and design standards or calculations Indicate a safe installation.

b. Exceptions may be granted only for small items approved on a case-by-case basis by the Structural Engineer in 778 CES/CEPD or CEPG. Request and approval must be in writing.

**<<<<< END OF BFS STRUCTURAL >>>>>**

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Reviewer: Jeff Hooper, 778 CEG/CENMP, 478-468-5923

Approval: _____
Stefanie Dawson, 78 CEG/CENMP, 478-327-2948

Revision History
24-Aug05 Separated from combined BFS into its own document
6-Jun-11 Revised the structural module 3A in its entirety.
12-Jul-11 Updated Robins AFB Office Symbols

# Robins Air Force Base
# Base Facility Standards

**Title: Civil, General & Site Plan**

**Date : 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 3B – CIVIL, GENERAL & SITE PLAN

**CRITERIA REFERENCE DOCUMENTS:**

NAD 1983 State Plan Georgia West FIPS 1002

Manual for Erosion and Sediment Control in Georgia

UFC 3-250-04FA, Standard Practice for Concrete Pavements (16 Jan 2004)

UFC 3 –250-03, Bituminous Pavements Standard Practice (May 2001)

UFC 3-230-17FA, Drainage in Areas other than Airfields (Jan 2004)

UFC 3-210-10, Low Impact Development

Georgia Stormwater Management Manual

ETL 04-2 with Change 1, Standard Airfield Pavement Marking Scheme with Change 1

American Association of State Highway and Transportation Officials (AASHTO).

AFI 32-7064 Integrated Natural Resources Management

UFC 3-260-01, Airfield and Heliport Planning and Design

AFMAN 91-201, Explosive Safety Standards

USEPA 841-B-09-001, Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act

Georgia Construction General Permits GAR100001, 100002, 100003

BFS Part 2 - Environmental

BFS Part 3G - Stormwater

BFS Part 4B - Architectural Compatibility Plan

BFS Part 7A – Energy Conservation

CIVIL - SITE,

1. GENERAL: This is one part of the Robins AFB Base Facility Standards. Refer questions or exception requests to the Design Chief in 78 CEN/CENMP. Any exceptions granted to these requirements shall be noted clearly in the project design analysis by using a Deviation Request.

2. LOCATION PLAN: (Scale 1" = 400'):

a. Facility/project location: The project will be located at Robins AFB, GA.

b. Site access: All commercial construction traffic must enter at Gate 4. Construction projects on the Flightline may be permitted to use Gate 1 only when approved by the Base. The peak traffic flows at the site are from 0700 to 0830 and from 1530 to 1700.

c. Construction material storage areas: The proposed construction storage areas shall be shown on the site plan and shall be available for storage of construction materials throughout the construction contract. The Contractor will be responsible for security measures.

3. SITE PLAN: (Scale 1" = 50').

a. Existing grades and contours shall be shown on the site plan. Use a minimum of one foot contour line intervals.

b. The facility orientation shall be shown on the site plan. All coordinates shall be in NAD 1983 State Plan Georgia West FIPS 1002. All elevations shall be in measurements of feet only. This ensures that when the final drawings are provided to GIS that the ".dwg" or ".shp" files can be inserted into the data base and will be instantly usable with no alterations.

c. Show construction contractor lay-down area adjacent to the site. Coordinate with the specific Construction Office COR to determine whether the contractor will be allowed to have a trailer at the site, or whether it must be located elsewhere on the base, then show or describe the trailer location.

d. Erosion Control: The "Manual for Erosion and Sediment Control in Georgia" shall be used to design all erosion control measures. Details shall be included in the plans.

e. Pavements: Existing and proposed pavements shall be shown on the site plan. Describe pavements in detail.

(1) Streets, parking lots, and sidewalks:

(a) Sidewalks shall be constructed of rigid pavement (concrete), or permeable pavement, or consider other approved LID approaches. Rigid pavement shall be designed in accordance with UFC 3-250-04FA, Standard Practice for Concrete Pavements (Jan 2011- Under Review), and flexible pavements (such as asphalt) shall be designed in accordance with UFC 3 –250-03 Bituminous Pavements Standard Practice (May 2001), and UFC 3-210-10, Low Impact Development Structures.

(b) Striping parking spaces: Use larger than minimum space widths and aisle widths in commercial areas such as the Base Exchange and Commissary. Many patrons have SUV's, so the widths must allow for wider and deeper vehicles, as well as greater turning radii. In low turnover

areas, the parking stalls shall be 9' wide by 18.5' long. On high turnover areas, the parking stall shall be 9.5' wide by 18.5' long. The parking stripe shall be one stripe only (not doubled) and 4" wide. Reference: Architectural Graphic Standards, Eleventh Edition, American Institute of Architects

(c) Road cuts: Road cuts have to be approved by the Base Civil Engineer. If asphalt road is cut, replacement pavement required will be a minimum of 8" of concrete and 1 1/2" of asphalt. If concrete road is cut, replacement pavement required will be a minimum of 8" of concrete or the thickness of the existing pavement, whichever is greater. The replacement shall rest on no less than 12" of undisturbed soil on each side

(2) Curbs, gutters, culverts, and pads: Provide sufficient curbs, gutters, culverts and other facilities to insure adequate drainage to meet overall stormwater management goals for the respective site. See BFS Stormwater Section for design criteria. No pipe smaller than 18" will be allowed for any culvert under roadways. Do not paint curbs.

(3) Runways, taxiways, aprons, overruns, and shoulders: If the project involves construction of new, or alteration of existing, airfield pavement (including runways, taxiways, aprons, overruns, and shoulders), then the design must be reviewed for technical adequacy by the Base Pavements Engineer. For airfield pavement marking schemes see ETL 04-2 with Change 1.

f. Bridges and fences: If the project involves construction of bridges, the design shall be in accordance with the latest edition of American Association of State Highway and Transportation Officials (AASHTO). If the project involves construction of fences, such fences shall be constructed in accordance with latest AF guidance in AFI's and ETL's. Also see Base Architectural Compatibility Plan criteria for fences.

g. Structures and existing trees over three inches diameter shall be shown on the site plan. Remove only those trees necessary for the construction of the building. The designer shall incorporate as many of the remaining trees as possible into an effective landscaping plan in conjunction with a parking lot plan to accommodate the maximum number of vehicles. Specifically, show these on the site plan:

1) Existing railroads. No new railroads are required or anticipated.

2) Existing industrial and sanitary wastewater piping, manholes, valves, and lift stations.

3) Existing storm piping and structures, drainage ditches/swales, headwalls, and ponds.

4) Existing gas distribution and service lines.

5) Existing water lines and valves.

6) Existing communication lines.

7) Existing UMCS lines.

8) Existing electrical lines.

9) Existing cathodic protection cables and equipment.

10) Existing heat service/steam lines.

11) Existing chilled water lines.

12) Existing POL facilities, including pipelines, valves, etc.

13) Existing fire hydrants.

14) Contractor construction limits for the project.

15) Groundwater monitoring wells/locations.

16) Existing State Waters and Stream Buffers.

4. NARRATIVE DESCRIPTION:

a. Site restrictions: If the project site is in a restricted area, or the type of construction requires some site restrictions, then identify them in accordance with Air Force Standards.

b. Subsoil conditions: The soil in the area generally consists of poorly graded mixtures of sand clays and silty sands with the exception of the Flightline East Area where the soil generally consists of organic gray silty clay. The design Agent shall arrange for soil borings, plate-bearing tests, and CBR tests as required for a thorough subsoil investigation prior to final design. The water table varies basewide but is generally within 15-20 feet of the existing ground surface, with the exception of the Flightline East Area where the water table is generally within 0-5 feet of the existing ground surface.

c. Flood hazard evaluation: The existing elevation of the project site shall determine if is above or below the 100 year flood plain, which is at 258 feet above mean sea level. (In prior years, the level had been 257 feet.)

d. AICUZ (Air Installation Compatible Use Zone) noise level criteria: The project site shall be evaluated for AICUZ noise level criteria to determine if any noise reduction will be required for this project.

e. Erosion/dust control requirements: Erosion control measures shall be designed in accordance with the latest edition of the "Manual for Erosion and Sediment Control in Georgia." Disturbed areas, including trenches, shall receive erosion control in the form of permanent turf established by seeding or installation of sod. Grasses and seeds shall be suitable for the area and season it is to be planted. Seeds shall be either Centipede or Bermuda if planted between April and August and Penntine or Falcon fescue if planted between September and March. Projects involving the disturbance of greater than 5000 square feet of land may be applicable to Energy Independence and Security Act of 2007, Section 438 requirements; and if disturbing greater than one acre of land projects will require coverage under the Georgia Construction General Permit. See BFS Part 3G (Stormwater) ~~Section~~ for further details on these requirements.

f. Base Comprehensive Plan (BCP) coordination: Describe conformance or nonconformance with BCP, such as future land use conflicts, etc.

g. Relationship of proposed siting to identified Installation Restoration Program sites. The project site location shall be identified by distance and direction (North, South etc.) from the IRP sites.

h. The use of cranes by construction personnel within the area around the airfield and runway requires formal crane permits. Contact 78 CEG/CENPL for assistance and information on the amount of advance notice required.

i. Digging Permits are required to do any excavation or earthwork. The weekly meetings are chaired by 78 CES and are usually held Monday mornings in Bldg. 1555.

5. WETLANDS (AFI 32-7064): The project site shall be evaluated for the requirements of EO 11990.

6. FLOODPLAINS (AFI 32-7064): The project site shall be evaluated for the requirements of EO 11988.

7. ARCHAEOLOGICAL AND HISTORICAL SITES (LEE LTR, 4 JAN 82, PARA 1d): Consultation with State Historic Preservation Officer (SHPO) is required to determine if survey or evaluation indicates the project will or will not affect eligible property.

8. EO 12372, COORDINATION (AFI 32-7064): The project shall be coordinated with all intergovernmental departments as applicable.

9. FAA (AFI 32-7064): The project shall be reviewed for clearance requirements from the regional FAA.

10. NOISE SITING COMPLIANCE (AFI 32-7064): The project shall be reviewed for noise reduction requirements of AFM 19-10. If noise reductions apply, they shall be incorporated into the design and construction.

11. AIRFIELD CLEARANCE CRITERIA COMPLIANCE (UFC 3-260-01, Nov 2008): The project shall be reviewed for compliance with airfield clearance criteria including clear zone and accident potential zones (UFC 3-260-01, Nov 2008).

12. EXPLOSIVE QUANTITY/DISTANCE (Q/D) SITING AND SAFETY CRITERIA (AFMAN 91-201, Explosive Safety Standards) If a project involves munitions storage and explosives or other related facilities, it shall be reviewed for explosive *quantity/distance siting and safety criteria* (AFMAN 91-201, Explosive Safety Standards*). If project* does not involve explosives, it shall be reviewed for Q/D clear zone criteria from any explosives facilities.

13.SOLAR APPLICATIONS: The designer shall review for energy conservation measures. (See Mechanical Considerations) Site lay-out should include consideration for optimum orientation of facility for maximum solar gain during the winter months and minimum solar gain during the summer months.

15. CIVIL CALCULATIONS: Provide all civil design calculations not later than the preliminary design submittal.

<<<<<< **END OF SECTION** >>>>>

Author: Jeff Hooper, 78 CEG/CENMP, 478-926-5923

Reviewer: Jeff Hooper, 78 CEG/CENMP, 478-926-5923

Approval: _____
Stefanie Dawson, 78 CEG/CENMP, 478-327-2948

# Robins Air Force Base
# Base Facility Standards

**Title: Water Supply**

**Date:** ***22 November 2013***

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 3C – WATER SUPPLY

**CRITERIA REFERENCE DOCUMENTS:**

UFC 3-230-02 O&M Water Supply Systems

UFC 3-230-03A Water Supply

UFC 3-230-04A Water Distribution

UFC 3-230-08A Water Supply Treatment

UFC 3-230-09A Water Supply Water Storage

UFC 3-230-10A Water Supply Water Distribution

AFI 32-1065, Grounding Systems

AFI 32-1066, Backflow Prevention

AFI 32-1067, Water Systems

AFI 48-144, Drinking Water Surveillance Programs

AFMAN 32-1072, Water Well Drilling Operations

ETL 08-10, Alternate Water Sources – Use of non-potable water

ETL 04-5, Design recommendations for Potable Water System Security (FOUO)

Minimum Standards for Public Water Supply Systems (GA EPD)

BFS 5C – Plumbing

BFS 7A – Energy Conservation

Senate Bill 370, Water Stewardship Act June 2010

WATER SUPPLY:

a. The existing rated fire flow will be analyzed under a separate design section. See Fire Protection Standards.

b. All potable water on Robins AFB has been treated. The designer shall review to see if any additional treatment is required for the consumptive use.

c. If the proposed project discharges any mixture of chemicals or solid waste into the industrial or sanitary waste water systems, the project shall be reviewed to determine if any additional chemical analysis of water is required to meet the Robins AFB, State of Georgia, and US EPA requirements for industrial or sanitary waste water treatment.

d. The existing Base water storage and distribution system will provide the water for the facility. The system consists of 6 wells with a pumping capacity of 6252 gpm. Typical system pressure is 55 psig. The designer shall design the facilities to ensure adequate water for potable, industrial, and fire fighting requirements. All meters must be commercial/industrial grade and certified for accuracy

e. The designer shall review to see if there will be any unusual peak demand requirements, i.e. filling industrial process tanks, continuous wash processes, etc. A formal hydraulic study shall be provided if a high water demand is expected in an area that marginally meets pipe size and pressure requirements.

f. Cathodic protection shall be provided on all new underground steel systems and piping. Insulating devices shall be used as necessary to isolate dissimilar metal common to an electrolyte (soil, water, etc). All underground steel systems shall be coated and/or wrapped to minimize cathodic protection current requirements. See Corrosion Control Standards. All water service lines and water mains constructed using nonmetallic materials shall be installed using locating tape and locating wire. The wire will be accessible where the service turns up into the facility and in valve boxes.

g. All water lines serving a facility shall be equipped with a water meter. All water meters shall have the capacity to be read remotely and compatible with the existing system.

h. All service lines to new construction or for major facility renovation in which a new service lateral is installed:

1. The backflow prevention device (BPD) shall be accessible for testing, not higher than 5 feet off the floor with ample room to access the test cocks.
2. All BPD installation locations shall be approved prior to installation to ensure ease of access for routine inspection and maintenance.
3. In the case of facilities with a service connection to the Robins AFB public water system, these facilities shall be protected against backflow from the facility by installing an approved BPD in the service line appropriate to the degree of hazard as follows:

A. In the case of any premises where there is an approved auxiliary water supply and it is not subject to any of the rules set out in subsections h.3.B through D of this section, the public water system shall be protected by an approved air gap separation or an approved reduced pressure principle backflow prevention device.

B. Deleted.

C. In the case of any premises where there is any material dangerous to health which is handled in such a fashion as to create an actual or potential hazard to the public water system, the public water system shall be protected by an approved air gap separation or an approved reduced pressure principle backflow prevention device. Examples of facilities where these conditions exist include sewage treatment plants, boiler/steam plants, production or manufacturing processes using chemicals and rinse systems, aircraft/equipment depainting, plating/anodizing operations, and hospitals.

D. In the case of any premises where there are uncontrolled cross connections, either actual or potential, the public water system shall be protected by an approved air gap separation or an approved reduced pressure principle backflow prevention device at the service connection.

E. In the case of any premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make a complete in-plant cross connection survey, the public water system shall be protected against backflow from the premises by either an approved air gap separation or an approved reduced pressure principle backflow prevention device on each

service to the premises.

i. Adequate controls shall be established to provide for wellhead protection from pollution. An area 25 ft in diameter minimum around the well called a control zone shall be fenced and the gate locked. No sources of pollution shall be allowed within this area including generator storage tanks and electrical transformers. However, electrical generators may be allowed within the area. Inner Management Zones of 100 ft. diameter shall also be established around each well. This area shall be maintained in such a way as to preclude pollution sources wherever possible.

j. Any underground potable water system installed in declared environmental hot zones, close or inside POL areas shall be metallic. PVC is resistant to some chemicals but is not resistant to petroleum products.

k. Any new water main construction shall be chlorinated using AWWA standards before it is connected to the base distribution system. Contractor shall obtain lab tests of water quality after testing and flushing is accomplished and provide test results to Bioenvironmental Engineering and the 78th Civil Engineer Industrial Utilities Shop prior to connecting new water lines to the existing system. Fittings and tools used in hot tapping or connecting to existing system shall be cleaned using a 5% sodium hypochlorite solution.

l. There shall be no potable water line installed in a manner which enters a storm sewer manhole or catch basin, or a wastewater manhole. Any such instances discovered during construction or demolition shall be amended by relocating the potable water piping outside a manhole or catch basin.

m. Any construction project which includes a modification (additions, extensions, repairs) to the Robins AFB potable water system shall prepare and submit an engineering design package. The system modifications shall be designed in accordance with the Minimum Standards for Drinking Water (GA EPD). The design package shall include the (GA EPD) Drinking Water Project Submittal Form and drawings for review and approval through the Environmental Management Branch of the 78th Civil Engineer Group and by GA EPD. This package shall include information and drawings signed and stamped by a Georgia Professional Engineer as follows: a description of modification to public water system, disinfection procedures, as-built utility drawing, proposed changes drawings, and notes and details of all connections and appurtenances. Drawings must be completed at a scale that provides for ease of viewing and understanding.

<<<<< **END OF SECTION** >>>>>

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# Robins Air Force Base
# Base Facility Standards

**Title: Waste Water Treatment**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 3D – WASTEWATER TREATMENT

**CRITERIA REFERENCE DOCUMENTS:**

UFC 4-240-04A, Wastewater Collection (Jan 2004)

UFC 3-240-09A, Domestic Wastewater Treatment (Jan 2004)

UFC 3-220-05, Dewatering and Groundwater Control

UFC 3-240-02N Wastewater Treatment System Augmenting Handbook

UFC 3-240-03N Wastewater Treatment System Augmenting Handbook Operation and Maintenance

UFC 3-240-04A Wastewater Collection

UFC 3-240-06A Wastewater Collection and Pumping

UFC 3-240-07FA Sanitary and Industrial Wastewater Collection: Gravity Sewers and Appurtenances

UFC 3-240-08FA Sanitary and Industrial Wastewater Collection: Pumping Stations and Force Mains

UFC 3-240-09FA Domestic Wastewater Treatment

UFC 3-240-13FN Industrial Water Treatment Operation and Maintenance

UFC 4-832-01N Design: Industrial and Oily Wastewater Control

AFI 32-1061, Providing Utilities to US Air Force Installations

AFI 32-1066, Water Systems

AFI 32-7041, Water Quality Compliance

ETL 08-10, Alternative Water Sources – Use of Non-Potable Water

ETL 86-8, Aqueous Film Forming Foam Waste Discharge Retention and Disposal

ETL 99-1, Treatment and Disposal of Aircraft Washwater Effluent

ETL 89-2, Standard Guidelines for Submission of Facility Operation and Maintenance Manuals

1. WASTEWATER TREATMENT:

a. The designer shall calculate and provide in a Design Analysis the projected industrial and/or functional wastewater discharge for each project being designed. The quantity and quality of wastewater discharged shall be evaluated to see if it can be adequately handled by the existing Base wastewater treatment system. All efforts to incorporate recycling/reuse of wastewater shall be included.

b. All existing sewer lines shall be shown on the site plan. Calculations, sewer profiles, and related hydraulic information for proposed wastewater connections are to be included in design documents. All design drawings for wastewater treatment systems, components, and facilities shall be certified by a State of Georgia Licensed Professional Engineer.

c. Existing flow capacity shall be determined and the type of treatment required. The project shall evaluate the existing wastewater flow and available design capacity for treatment. Adequate capacity shall be assessed for all downstream lift stations. High-volume (>50,000 gallons per day), or large-batch discharges (>5000 gallons) shall consider modeling of the sewer flow characteristics to determine capacity of downstream systems.

d. The existing systems limitations such as wastewater compatibility and required wastewater pretreatment and segregation shall be determined for each project. Wastewater pretreatment systems are required for certain industrial wastewaters, based on contaminant loading and chemical constituents, and will be determined through the design review process. Proposed new process discharges of industrial wastewater that may affect the quality of the effluent shall be listed in the design narrative, and shall include an evaluation of the strength and mass loading of the wastewater constituents. Specifically, the Chemical Oxygen Demand, Solids (including Oil and Grease), metals, nutrients, and toxic pollutants or any other chemical which could affect effluent quality shall be evaluated.

e. The project designer shall determine if any wastewater sludge/solids will be accumulated as part of the project. The designer shall determine how the sludge will be collected, removed, and accumulated.

f. The project designer shall determine if the treatment system requires any improvements in the following areas: treatment plants, pre-treatment systems, trunk mains, manholes, lift stations, fuel/oil-water separator, or storage and bypass restrictions. All new lift stations shall be constructed using a duplex pump system, level controls, visible and audible alarms, lockable perimeter fence where specified, shall connect to the Robins AFB SCADA system (See sub-paragraph 1 below), and shall include all appropriate appurtenances. The existing sewer lines shown on the site plan that will be under the proposed new facility shall be removed and relocated. No interruption of sewage flow shall occur during construction.

1. Provide a Remote Transmitting Unit (RTU) at the lift station for the base SCADA System. The RTU shall be compatible and capable of interfacing with the base SCADA system manufactured and programmed by ACS/EFACEC of Atlanta, Georgia. The RTU unit shall be a battery back-up radio controlled, and transmit the following points to the central base monitoring system: pump status(s); water levels; power status for lift station.

Provide a Remote Transmitting Unit (RTU) at the generator set for the base SCADA System. The RTU shall be compatible and capable of interfacing with the base SCADA system manufactured and programmed by Advanced Control Systems of Atlanta (ACS/EFACEC), Georgia. The RTU unit shall be radio controlled, and transmit the following points to the central base monitoring system: pump status(s); water level; power status for lift station.

g. For all new wastewater pretreatment systems, lift stations, or wastewater treatment facility systems, an Operation and Maintenance manual shall be provided by the construction contractor.

h. Laboratory: The designer shall investigate to see if any new laboratory requirements will require modifications or additions to the existing Base Wastewater Treatment laboratory facilities.

<<<<< **END OF SECTION** >>>>>

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# Robins Air Force Base
# Base Facility Standards

**Title: Civil – Sub-Soil Investigation**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 3E – SUB-SURFACE INVESTIGATION

Revised : 22 November 2013

**CRITERIA REFERENCE DOCUMENTS**

UFC 3-220-10 Soil Mechanics

**1.Purpose**

1.a. Application of engineering principles by experienced engineers of soil mechanics in the design of foundations and earth structures for Robins AFB facilities. These contents include identification and classification of soil and rock, field exploration, testing, instrumentation, laboratory testing, distribution of stresses including pressures on buried structures, analysis of settlement and volume expansion, seepage and drainage, and slope stability and protection.

**2. Safety**

2.a. All DoD facilities must comply with DODINST 6055.1 and applicable Occupational Safety and Health Administration OSHA) safety and health standards.

**3. General Building Requirements**

3.a. All DoD facilities must comply with UFC 1-200-01, *Design: General Building Requirements.* If any conflict occurs between this UFC and UFC 1-200-01, the requirements of UFC 1-200-01 takes precedence.

**4. Special Concerns**

4.a.1. DIGGING/EXCAVATION REQUIREMENTS: The Drawings show underground utilities and structures as presently shown on the best available record drawings of the site, and these may have some inaccuracies. The information is provided for general bidding purposes only. Actual locations and quantities must be determined at the site while obtaining the form below.

Digging/Excavation Permit (Obtained on Base): Digging permits are obtained at 0800 Monday mornings, only, in Building 1555. The Contractor, along with the technical representative, shall meet with Civil Engineering utility personnel at this time to make all necessary arrangements for the excavation permit before any digging. The Contractor will be given instructions on how to prepare and properly complete Digging/Excavation Permit. This includes coordination before beginning any work involving digging/excavation and location of buried structures and utility lines. Before getting signatures, provide a drawing indicating the full extent of digging/excavation (width/depth/length of trench or hole). Civil Engineering utility personnel will meet with the Contractor at the site and locate their underground utility lines and buried structures that might be affected by any digging/excavation. Do not do any digging until all parties have approved the permit (three day maximum). The

digging/excavation permit shall be effective only for the time period indicated by the final signature authority.

4.a.2. Recoordination of the Digging/Excavation Permit with all organizations and the technical representative shall be required for any additional time required after expiration of the original time period. No digging/excavation shall be done after l600 hours on weekdays or anytime on weekends unless prior approval is obtained.

4.a.3 Location of Buried Structures and Utility Lines: Accurately locate and stake buried structures and utility lines indicated.

4.a.4. Excavation, trenching, and backfilling: Excavate to the required depth by hand digging within three (3) feet either side of the buried structures or utility line. Do not use motorized equipment within these parameters. Only open those trenches for which material is ready for replacement. As soon as approved by the technical representative, backfill trenches as required by the drawings or specifications. As a minimum, replace topsoil and grass the disturbed area by seeding and watering.

4.a.5 Damage: The contractor is responsible for any damage to underground structures and utility lines identified on the drawings and any identified and marked in the field as a result of obtaining the digging/excavation permit. If any underground utility is damaged, notify the technical representative immediately.

4.b. PRESERVING HISTORICAL AND ARCHAEOLOGICAL RESOURCES:

4.b.1. Requirements:

1. When a building or archaeological site determined eligible for the National Register of Historic Places is within a project area, the contractor shall provide 78 CEG/CEV with full project information so adequate measures can be taken to prevent an adverse impact to the cultural resource. This may include the development of a mitigation plan, consultation with the Georgia State Historic Preservation Office, the Advisory Council on Historic Preservation and 12 culturally affiliated Native American tribes.

2. When cultural resources are inadvertently discovered during construction, project personnel are directed to avoid the site of discovery and immediately contact 78 CEG/CEV. All work in the area of discovery must stop until it can be investigated. 78 CEG/CEV will send a qualified representative to the site and the resource will need to be recorded and evaluated and the effects mitigated as necessary.

3. The contractor shall contact 78 CEG/CEVOS at the beginning of the project, one week before excavation starts and at least 2 hours before excavation resumes during the construction period.

4.b.2. Removal of Finds: All finds are the property of Robins Air Force Base. Do not remove or disturb finds without the CO's written authorization.

**<<<<< END OF SECTION >>>>>**

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# Robins Air Force Base
# Base Facility Standards

**Title: Civil – Termite Pre-Treatment**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 3F – TERMITE PRE-TREATMENT

**CRITERIA REFERENCE DOCUMENTS**:

USC Section 136 Federal Insecticide, Fungicide, and Rodentices

## 1. SAFETY REQUIREMENTS

1.a. Formulate, treat, and dispose of termiticides and their containers in accordance with label directions. Secure pesticides and related materials under lock and key when unattended. Ensure that proper protective clothing and equipment are worn and used during all phases of termiticide application. Dispose of used pesticide containers off Government property.

## 2. DELIVERY, STORAGE, AND HANDLING

### 2.1 Delivery

2.1.a Deliver termiticide material to the site in the original unopened containers bearing legible labels indicating the EPA registration number and manufacturer's registered uses. All other materials, to be used on site for the purpose of termite control, shall be delivered in new or otherwise good condition as supplied by the manufacturer or formulator.

### 2.2 Inspection

2.2.a Inspect termiticides upon arrival at the job site for conformity to type and quality in accordance with paragraph TERMITICIDES. Each label shall bear evidence of registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended or under appropriate regulations of the host county. Other materials shall be inspected for conformance with specified requirements. Remove unacceptable materials from the job site.

### 2.3 Storage

2.3.a Store materials in designated areas and in accordance with manufacturer's labels. Termiticides and related materials shall be kept under lock and key when unattended.

### 2.4 Handling

2.4.a Observe manufacturer's warnings and precautions. Termiticides shall be handled in accordance with manufacturer's labels, preventing contamination by dirt, water, and organic material.

## 3. LOCATIONS

All exposed soil locations where slabs and footings, excluding sidewalks, both interior and exterior sides shall receive termite pre-treatment as stated above.

<<<<< END OF SECTION >>>>>

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# Robins Air Force Base
# Base Facility Standards

**Title: Civil - Stormwater**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 3G – CIVIL – STORMWATER

**CRITERIA REFERENCE DOCUMENTS:**

Air Force Sustainable Design and Development Policy Memorandum (SSD MEMO)

ETL 03-1 – Stormwater Construction Standards

ETL 08-6 – Design of Surface Drainage Facilities

ETL 08-13 – Incorporating Sustainable Design and Development and Facility Energy Attributes in the Air Force Construction Program

Georgia Stormwater Management Manual (GSMM)

Georgia Construction General Permits GAR100001, GAR100002, GAR100003

FAA AC 150/5320-5C Surface Drainage Design (FAA AC)

Manual for Erosion and Sediment Control in Georgia

Manual LEED for New Construction & Major Renovations, Version 2.2 (LEED)

Stormwater Local Design Manual for Houston County, Georgia (LDM)

UFC 3-210-10 – Low Impact Development (LID)

UFC 4-030-01 – Sustainable Development

USEPA 841-B-09-001, Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act (EISA)

CIVIL - STORMWATER

1. GENERAL: This is one part of the Robins AFB Base Facility Standards. The majority of this part refers to post-construction stormwater design standards and requirements; the final section of this part describes construction activity-related stormwater requirements. Refer questions or exception requests to the Water Quality Program Manager in 78 CEG/CEIER.

2. DESIGN CONSIDERATIONS: Post-construction stormwater design shall comply with the following design standards:

a. Robins AFB: Base Facility Standard (BFS) Part 4C – Landscape Design

b. Local: Stormwater Local Design Manual for Houston County, Georgia (LDM)

c. State: Georgia Stormwater Management Manual, Volume 2 (GSMM)

d. Federal:

(1) Energy Independence and Security Act of 2007 Technical Guidance (EISA)

(2) ETL 08-13 – Incorporating Sustainable Design and Development and Facility Energy Attributes in the Air Force Construction Program [which references the Air Force Sustainable Design and Development Policy Memorandum (SSD MEMO) and the Manual LEED for New Construction & Major Renovations, Version 2.2 (LEED)]

(3) ETL 08-6 – Design of Surface Drainage Facilities [which references FAA AC 150/5320-5C Surface Drainage Design (FAA AC)]

(4) UFC 3-210-10 – Low Impact Development (LID)

(5) UFC 4-030-01 – Sustainable Development

3. WATER QUANTITY REQUIREMENTS FOR ALL PROJECTS: All projects shall comply with the following requirements, based on land use type:

a. DoD Airfields and Heliports [FAA AC 2-2.4.1]

(1) For the 2-year storm event, no encroachment of runoff on taxiway and runway pavements (include paved shoulder) is permitted and ponding around apron inlets is limited to 4-inches. Computations shall be made to determine the critical duration required to produce the maximum runoff rate. [FAA AC 2-2.4.1]

(2) For the 10-year storm event, the center 50% of runways and taxiways, as well as helipad surfaces along the centerline shall be free from ponding. [FAA AC 2-2.5]

b. Areas other than Airfields (e.g., roadways; industrial, administrative, and housing projects) [FAA AC 2-2.4.3 and 2-2.5 (check with appropriate local regulatory agency for guidance)]

(1) The post-development discharge rate shall not exceed pre-developed discharge rates for the 2-, 5-, 10-, 25-, 50-, and 100-year, 24-hour storm events. [LDM 2.1.1 and 2.1.2]

(a) For new development, pre-developed conditions shall be wooded and undisturbed. [LDM 2.1.1]

(2) A **downstream analysis** shall be provided to demonstrate the capacity of downstream stormwater features to the "10% point" to accommodate the stormwater runoff from the proposed development. The "10% point" is defined as the point on the stormwater conveyance system downstream of the project area in which the contributing area of the project represents at least 10% of the total drainage basin to that point. [LDM 6.5; Minimum Standard #6, GSMM 1.2.2.2 ¶8; GSMM 1.2.2.3 ¶16; GSMM 2.1.9]

(3) **Detention** is required if analysis indicates a potentially adverse impact prior to the implementation of the stormwater management system [LDM 2.1.1]. Potentially adverse impact is defined as:

(a) An increase in runoff rates for the design storms listed above;

(b) Downstream conditions indicate the conveyance or storage capacity of existing infrastructure could be inundated by the post-developed conditions; or

(c) Existing structures could be impacted by the post-developed condition.

(4) **Culverts** and **Pipe Systems** shall be designed as follows:

(a) Based on the following design storms for the appropriate classification/use, with headwater depth for the appropriate storm event not to exceed 1.25-feet or the local requirement [FAA AC 4-3.1]:

| Roadway Classification/Use | Design Storm |
|---|---|
| Arterial/Emergency Evacuation Roadway | 100-Year |
| Collector Roads | 50-Year |
| Neighborhood Roads | 25-Year |
| Roads with No Other Outlet | 100-Year |
| Parking Lots/Material Storage Areas/Landscape Areas | 10-Year |

[LDM 2.2.2]

(b) For headwalls/flared end sections of culverts, the maximum flooding depth shall not result in a bypass of the inlet. [LDM 2.2.4]

(c) For inlets to a closed pipe system, the maximum flooding depth is as follows for the appropriate classification/use [LDM 2.2.3]:

| Roadway Classification/Use | Flooding Depth |
|---|---|
| Arterial/Emergency Evacuation Roadway | 8.0 ft Maximum Gutter Spread |
| Collector Roads | 8.0 ft Maximum Gutter Spread |
| Neighborhood Roads | 8.0 ft Lane Width Open |
| Roads with No Other Outlet | One Lane Width Open |
| Parking Lots | Maximum 0.2 ft Depth* |
| Detention Areas utilized for other purposes (i.e., parking lot detention, etc.) with flood warning sign | Maximum 1.5 ft Depth |
| Material Storage Areas/Landscape Areas with flood warning signs if area is utilized by the public | Maximum 2.0 ft Depth |

[LDM 2.2.3] - *Note that the flooding depth for parking lots has been adjusted to be more stringent that the LDM criterion.

(d) Sag points in inlet/pipe systems shall be designed such that runoff generated by the 50-year storm event can be conveyed. [FAA AC 6-2.4.1.2]

(e) Bridges shall be designed for the 100-year, 24-hour storm event with no overtopping. [LDM 2.2.1]

(5) **Channels and Ditches** shall be designed as follows:

(a) Roadside and median drainage channels shall be designed to carry the 10-year storm event flow [FAA AC 5-2.1], or specific storm as stated below based on classification/use:

| Roadway Classification/Use | Design Storm |
|---|---|
| Arterial/Emergency Evacuation Roadway | 100-Year |
| Collector Roads | 50-Year |
| Neighborhood Roads | 25-Year |
| Roads with No Other Outlet | 100-Year |

[LDM 2.2.5]

(b) Channels discharging to a culvert or pipe system shall be designed for the storm event specified for the pipe system. [LDM 2.2.6]

(c) Channels conveying runoff to detention ponds shall be sized to accommodate the 100-year storm event. [LDM 2.2.6]

(d) Temporary channel linings shall be designed for the 2-year storm event. [FAA AC 5-2.1]

(e) Freeboard in drainage channels shall be designed as 0.5-feet for permanent channels, or freeboard height equal to the flow depth to compensate for large variations in flow caused by waves/splashing/surging for steep gradient channels. [FAA AC 5-2.4]

(6) **Energy Dissipation** shall be required when velocities exceed 5 feet per second (ft/s) or the erosion velocity of the downstream area, whichever is less. [LDM 2.5]

(7) Analysis shall be performed for the 100-year storm event as a "check storm". [FAA AC 3-2.1.5; FAA AC 6-2.4.1.3]

4. SPECIAL WATER QUANTITY REQUIREMENTS FOR PROJECTS:

a. EISA – Projects constructing or redeveloping a **building** (defined as a roofed and floored facility enclosed by exterior walls and consisting of one or more levels that is suitable for single or multiple functions), **with a total disturbed land area >= 5,000 square feet (sq ft)** shall comply with the following additional requirement [LID 1-3; EISA p.1 ¶1; EISA I.C (p.9-11)]:

(1) The 95th percentile storm event shall be retained, to the maximum extent technically feasible [EISA I.D Option 1 (p.5); EISA p. 17 ¶1]; or

(2) Site specific hydrologic analysis, which estimates the volume of infiltration, evapotranspiration, or on-site stormwater harvesting and use based on site-specific hydrologic conditions shall be performed. [EISA p.17 ¶2]

b. GSMM – For the following project types (with the exception of airfield and heliport projects), design and analysis shall comply with the requirements below.

(1) **New development disturbing >= 5,000 sq ft or adding 5,000 sq ft of impervious surface;** [GSMM 1.2.2.1(1)]

(2) **Redevelopment adding 5,000 sq ft of impervious surface or disturbing >= 1 acre;** [GSMM 1.2.2.1(2)]

(3) **Commercial or industrial new development that falls under the NPDES Industrial Stormwater Permit Program or hot spot land use.** [GSMM 1.2.2.1(3)] Hot spot land use defined as "land use or activity on a site that produces higher concentrations of trace metals, hydrocarbons or other priority pollutants than are normally found in stormwater runoff. Examples include gas station, vehicle service and maintenance areas, salvage yards, material storage sites, garbage transfer facilities, and commercial parking lots with high-intensity use". [GSMM 1.2.2.1 Definitions]

(4) **Requirements:**

(a) Stream Channel Protection (CPv) for downstream and on-site channels [Minimum Standard #3, GSMM 1.3.2.2; GSMM 1.2.2.3 ¶6]:

a. Extended detention of 1-year 24-hour storm event for 24 hours using structural stormwater controls [GSMM 1.2.2.3 ¶7] (not required for post-development discharge rates < 2 cfs) [GSMM 1.3.2.2];

b. Implement velocity control, energy dissipation, streambank stabilization, and erosion prevention practices and structures as necessary to prevent downstream erosion and streambank damage [GSMM 1.2.2.3 ¶8]; or

c. Establish riparian stream buffers on the site [GSMM 1.2.2.3 ¶9].

(b) Downstream Overbank Flood Protection – Prevent post-development 25-year, 24 hour storm peak discharge rate (Qp25) from exceeding pre-development discharge rate [if CPv not provided, than peak flow attenuation of post-development 2-year, 24 hour storm (Qp2) through Qp25 must be provided]. Criteria may be adjusted on local basis for areas where downstream conveyances are designed to handle runoff from the full build-out 25-year storm, or where it can be demonstrated that no downstream flooding will occur as a result of a proposed development. Local jurisdiction can waive criteria in lieu of provision of safe and effective conveyance to a major river system, lake, wetland, estuary, or tidal waters that have capacity to handle flow increase at the 25-year level. [Minimum Standard #4, GSMM 1.2.2.3 ¶10-13; GSMM 1.3.2.3]

(c) Extreme Flood Protection – Control and/or safely convey the 100-year 24 hour storm event (Qf) through structural stormwater controls or size the on-site conveyance system to safely pass and discharge into a receiving water whose protected floodplain is sufficiently sized to account for extreme flow increases without causing damage. [Minimum Standard #5, GSMM 1.2.2.3 ¶14; GSMM 1.3.2.4]

(d) Groundwater Recharge – Implement recharge to groundwater to extent practicable to attempt to match pre-development conditions. For hot spot areas, pretreatment is required prior to recharge [Minimum Standard #7, GSMM 1.2.2.3 ¶17]. Conflict exists with Chapter 391-3-16-.02(3)(n) of the Rules of the State of Georgia, in which "Permanent stormwater infiltration basins shall not be constructed in areas having high pollution susceptibility." Certain areas of the Base may be considered to have high pollution susceptibility; at this time, infiltration should be considered on a site-by-site basis.

5. WATER QUALITY REQUIREMENTS FOR ALL PROJECTS: All projects shall comply with the following requirement: Treat 85% of storms that occur in an average year to remove at least 80% of calculated average annual post-development Total Suspended Solids (TSS) loading from the site. This quantity of runoff is defined as the WQv, calculated as the runoff generated by 1.2 inches of rainfall. [GSMM Table 1.3.1-1] [GSMM 1.3.2.1]

a. Preferred Best Management Practices (BMPs) to accomplish this requirement are stormwater ponds, bioretention, sand filters, enhanced swales, filter strips, grass channels, organic filters, sand filters, and submerged gravel wetlands [LDM 3.3.1] [LDM 3.3.2]. BMPs implemented on airfield projects shall not result in loose surface soils or standing water for greater than 24 hours. Based on these criteria, preferred BMPs for airfield projects are: (i) enhanced dry swales, filter strips, and grassed channels, due to the densely vegetated surface cover and function of conveyance; and (ii) perimeter sand filters, due to the below ground design for filtration.

b. BMPs shall be designed, constructed, and maintained in accordance with criteria in the GSMM. [LDM 3.3.1, 3.3.2]

6. SPECIAL REQUIREMENTS FOR PROJECTS SEEKING LEED STORMWATER DESIGN CREDITS 6.1 OR 6.2: The Air Force Sustainable Design and Development (SSD) Policy requires that MAJCOM's MILCON vertical construction projects with climate control shall be designed so that they are capable of achieving LEED silver certification [MEMOSSD p.1 ¶2]. Additionally, for horizontal, utility, and industrial projects, guidance has been provided to assist in determining which credits appropriate to the project type are applicable for successful incorporation of the policy. [SSD MEMO p.1 ¶3] Stormwater requirements related to SSD policy include:

a. Stormwater Design Credit 6.1 – Stormwater Design Quantity Control [LEED p.18]:

(1) For site with an existing imperviousness of <50%, the post-development flow rate and quantity shall not exceed pre-development conditions for the 1- and 2-year, 24-hour storm events; or protect receiving stream channels from excessive erosion.

(2) For sites with existing imperviousness >50%, the stormwater management system shall be designed for a 25% decrease in volume of stormwater runoff from the 2-year 24-hour storm event.

b. Stormwater Design Credit 6.2 – Stormwater Design Quality Control: Acceptable BMPs (capable of removing 80% of average annual post-development TSS load) shall be designed to treat stormwater runoff from 90% of the average annual rainfall. [LEED p.19]

7. DESIGN GUIDANCE: Guidance for the design of stormwater management system components and material types is provided in Chapter 4 of the GSMM, the LDM, FAA AC 150/5320-5C; Appendix A of the Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the EISA, and UFC 3-210-10.

8. CALCULATIONS/DOCUMENTATION TO PROVIDE: A Post Construction Stormwater Management Plan shall be submitted. **A checklist for this Plan is provided at Appendix A** of this BFS Part. The Table of Contents for the Plan shall be as follows:

a. Certification – "I, (Name of Professional), a Registered (Professional Engineer / Land Surveyor) in the State of Georgia, hereby certify that the grading and drainage plans for the project known as (Project Name), lying in Land Lot (XXX), of the (XX) District, Houston County, Georgia, have been prepared under my supervision, and, state that in my opinion, the construction of said project will not produce storm drainage conditions that will cause damage or adversely affect the surrounding properties. This (day) day of (Month), (Year)." [LDM 6.1]

b. Project Description

c. Existing Conditions Hydrologic Analysis and Site Condition Narrative [LDM 6.2] [GSMM 1.5.2.6 (1)]

d. Post-Development Hydrologic Analysis and Site Condition Narrative [LDM 6.3] [GSMM 1.5.2.6 (2)]

e. Stormwater Management System Design – This section shall also address the water quality requirements and provide design calculations for selected BMPs. [LDM 6.4] [GSMM 1.5.2.6 (3)]

f. Downstream Analysis [LDM 6.5] [GSMM 1.5.2.6 (4)]

g. EISA Compliance (if applicable) – EISA compliance calculations can be included as a stand alone package or as part of the existing and post-development hydrologic analysis sections, and referenced accordingly. The U.S. Air Force has developed a Microsoft Excel tool, "EISA 2007 Section 438 Compliance Documentation" to assist with documenting compliance with Section 438 of the EISA. Contact the Water Quality Manager for the version of the tool Robins AFB maintains to distribute to contractors. To document infeasibility of EISA compliance, indicate the strategies used to the maximum extent technically feasible, and that full employment is infeasible due to site constraints. The USEPA Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the EISA document describes the information to be included in this section as well as acceptable reasons for infeasibility. [EISA p.17 ¶3; EISA p.20]

h. SSD Compliance (if applicable) – LEED compliance shall be documented on checklists available through the U.S. Green Building Council, or include supporting documentation reporting LEED credits. [SSD MEMO p.1 ¶1]

i. Evidence of Acquisition of Local and Non-local Permits (as applicable) [GSMM 1.5.2.7 (4)]

j. Waiver Requests – This section is intended to be a summary of design criteria that will not be met, with rationale, including but not limited to EISA compliance, SSD compliance, Downstream Analysis, etc. [GSMM 1.5.2.7 (5)]

k. Planting/Landscaping Plan [BFS Part 4C] [LDM 6.7] [GSMM 1.5.2.7 (2)]

l. Operations and Maintenance Plan [LDM 6.8] [GSMM 1.5.2.7 (3)]

9. CONSTRUCTION-RELATED STORMWATER REQUIREMENTS **(Projects Equal to or Greater than 1 Acre)** [NPDES General Permit I.C.1.a and b)]: Land disturbance includes the disturbance of soils associated with clearing, grading, excavation, filling of land, or other similar activities which may result in soil erosion [NPDES General Permit I.B see definition for "Construction Activity"].

a. Construction stormwater design shall comply with the following design standards:

(1) General Permit Nos. GAR100001, GAR100002, and GAR100003, Authorization to Discharge Under the NPDES Stormwater Discharges Associated with Construction Activity for Stand Alone Construction Projects, Infrastructure Construction Projects, and Common Developments, respectively (NPDES General Permit) [ETL 03-1]

(2) ETL 03-1 – Stormwater Construction Standards

b. Requirements include:

(1) Inspections as described in the NPDES General Permit [NPDES General Permit IV.D.4];

(2) Monitoring as described in the NPDES General Permit [NPDES General Permit IV.D.6];

(3) Development of an Erosion, Sedimentation and Pollution Control Plan (ESPCP) [NPDES General Permit IV]. Obtain the Robins AFB template from the Water Quality Program Manager; and

(4) BMPs designed and implemented in accordance with design specifications contained within the "Manual for Erosion and Sediment Control in Georgia" [NPDES General Permit I.B.1 and V.D]. Robins AFB requires that all construction sites be stabilized using permanent stabilization measures at the earliest time possible. Construction sites shall be managed to ensure appropriate timing of seed/sod application to ensure successful germination and growth of permanent grass. Seeding between March and August shall consist of hulled Bermuda or Centipede; seeding between September and February shall consist of a mixture of Winter Rye and un-hulled Bermuda. Sod shall consist of Bermuda and shall not be installed between September and February. Brown Top Millet is not authorized for use at Robins AFB.

(5) In accordance with Georgia Code, Title 12, Chapter 7 (O.C.G.A. Section 12-7-1), Control of Soil Erosion and Sedimentation, 12-7-19 (a) (2), a minimum of one person who is in responsible charge of erosion and sedimentation control activities on behalf of the primary permittee and meets the applicable education or training certification requirements developed by the Georgia Soil and Water Conservation Commission (i.e., Level 1A certification) will be present on site whenever land-disturbing activities are conducted on that site, and will conduct required inspections.

c. Permit Compliance Documentation – The following documents shall be completed and submitted to the appropriate government agencies, as well as Robins AFB:

(1) ESPCP. [ETL 03-1 6.2.3; NPDES General Permit IV]

(2) Notice of Intent, with return receipt submittal to the Georgia Environmental Protection Division (GA EPD). [ETL 03-1 6.2.2; NPDES General Permit II and II.C]

**Notice to Proceed (NTP) to occur no sooner than fourteen (14) days after NOI postage mark. ESPCP, approved by Robins AFB, and NOI return receipt postage is required to be submitted to Robins AFB to obtain NTP.**

(3) GA EPD Fee Form [NPDES General Permit II.D]

(4) Fee, payable to Houston County [NPDES General Permit II.D]

(5) Inspection Reports [NPDES General Permit IV.D.4.a(5)]

(6) Monitoring Results, with return receipt for submittal to GA EPD [NPDES General Permit IV.E.1 and 3]

(7) Notice of Termination (NOT), with return receipt for submittal to GA EPD [NPDES General Permit VI] – The NOT shall not be prepared and final payment shall not be performed until the site achieves final stabilization as defined by the NPDES Permit [NPDES General Permit I.B, see definition for "Final Stabilization"]. Special attention must be provided to consider the timing of project completion and the soil conditions to ensure permanent vegetation is established [e.g., projects may require over-wintering with temporary grass until the spring growing season, when permanent grass (Bermuda/Centipede) shall be applied to the site after raking and fertilization]. The Contractor shall have approval from the Water Quality Program Manager to submit the NOT to the GA EPD.

10. CONSTRUCTION-RELATED STORMWATER REQUIREMENTS **(Project Less than 1 Acre)**: All minor construction project involving less than one acre of land disturbance shall design, install, and maintain appropriate BMPs specific to the site to minimize erosion and sedimentation. Minimum standard BMPs, include, but are not limited to: inlet protection, sediment storage, minimizing tracking onto roadways, appropriate material storage and spill response equipment and controls, appropriate waste disposal practices, a concrete washout area, and temporary and permanent stabilization. Permanent stabilization shall meet the requirements discussed in Part 9.c.7 of this BFS.

# APPENDIX A

# Post Construction Stormwater Plan Checklist

## Post Construction Stormwater Plan Checklist

| Section Number | Section Title | Contents | Additional Guidance |
|---|---|---|---|
| 1 | Certification | □ Official certification statement found in LDM 6.1. | LDM 6.1 |
| 2 | Project Description | □ Narrative summarizing the project and briefly explaining each project aspect. Include official project name and contracting mechanism/information including Base contact person.<br>□ Location description and location map. | N/A |
| 3 | Existing Conditions Hydrologic Analysis and Site Condition Narrative | □ Existing Conditions Map depicting (but not limited to) surface water features, topography, drainage area (sub-basin) delineation, direction of flow, and existing stormwater features (e.g., channels, pipes, inlets).<br>□ Existing Conditions Table including acreage, soil type, and land cover information; sub-basin hydrologic data (e.g., peak runoff rates and total runoff volumes for the required design storms); upstream drainage area hydrologic data, and an analysis of existing detention facilities.<br>□ Narratives addressing existing site conditions, name(s) of receiving waters, upstream runoff analysis, methodologies, assumptions, site parameters, and design calculations used in hydrologic analyses. | LDM 6.2, GSMM 1.5.2.6(1) |
| 4 | Post-Development Conditions Hydrologic Analysis and Site Condition Narrative | □ Post-development Conditions Map depicting (but not limited to) surface water features, topography, drainage area delineation, direction of flow, and proposed stormwater features.<br>□ Post-development Conditions Table including acreage, soil type, impervious surface area, and land cover information; sub-basin hydrologic data; and an analysis of existing and proposed detention facilities.<br>□ Calculations for the WQv, CPv, and required detention for each sub-basin.<br>□ Narratives addressing post-development site conditions, methodologies, assumptions, site parameters, and design calculations used in hydrologic analyses. | LDM 6.3, GSMM 1.5.2.6(2) |
| 5 | Stormwater Management System Design | □ Maps depicting stormwater features (existing to remain and proposed conveyance, detention, inlets and pipes)<br>□ Tables presenting storage information (maximum water surface elevation, depth, and storage volume for design storms) for impoundment-type controls and inlets<br>□ Design calculations demonstrating how selected BMPs meet WQv requirements, and how design of features comply with appropriate design criteria<br>□ Narratives addressing stormwater feature selections, applicable design calculations, and drawings (profile and cross-section for all elements). | LDM 6.4, GSMM 1.5.2.6(3) |

| Section Number | Section Title | Contents | Additional Guidance |
|---|---|---|---|
| 6 | Downstream Analysis | □ Map depicting drainage basin delineation to the point at which the contributing area of the project represents 10% of the total drainage basin area ("the 10% point"), and culverts, channels and other controls that runoff flows through prior to the 10% point.<br>□ Narratives addressing supporting calculations associated with the 10% rule. | LDM 6.5, GSMM 1.5.2.6(4) |
| 7 | EISA Compliance (as applicable) | □ EISA compliance calculations using the "EISA 2007 Section 438 Compliance Documentation" Microsoft Excel tool (obtain from WQ PM).<br>□ **OR** Documentation of infeasibility of EISA compliance (as applicable). | EISA p. 17 ¶3, EISA p. 20 |
| 8 | SSD Compliance (as applicable) | □ Checklists documenting LEED compliance (obtain from U.S. Green Building Council website).<br>□ **OR** Supporting documentation reporting LEED credits as necessary. | SSD MEMO p. 1 ¶1 |
| 9 | Evidence of Acquisition of Local and Non-local Permits (as applicable) | □ Narratives explaining other applicable permits required for the project (e.g., 404 wetlands permit, 401 water quality certification, stream buffer variance).<br>□ Status or copies of permits (as applicable). | GSMM 1.5.2.7(4) |
| 10 | Waiver Requests | □ Narrative summarizing design criteria that are not met, with rationale, including, but not limited to, EISA compliance, SSD compliance, downstream analysis, CPv, etc. | GSMM 1.5.2.7(5) |
| 11 | Planting/Landscaping Plan | □ Map showing arrangement of planted, natural, and landscaped areas.<br>□ Narrative describing the planting plan, materials, schedule, and vegetation to be used, highlighting plan for BMPs that use vegetation as a pollutant removal mechanism. | LDM 6.7, GSMM 1.5.2.7(2), BFS Part 4C |
| 12 | Operations and Maintenance Plan | □ Description of maintenance tasks, responsible parties for maintenance, funding, access, and safety issues | LDM 6.8, GSMM 1.5.2.7(3) |

**Guidance Documents**:

- BFS Part 4C: BaseFacility Standard Part 4C – Landscape Design. September 2011.
- EISA: Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act. EPA. December 2009.
- GSMM: Georgia Stormwater Management Manual. Volume 2 (Technical Handbook). First Edition, August 2001.
- LDM: Stormwater Local Design Manual for Houston County, Georgia. November 15, 2005.
- SDD MEMO: Air Force Sustainable Design and Development Policy Memorandum. July 2007.

**Acronyms:**

- BMP: Best Management Practice
- CPv: Channel Protection Volume
- EISA: Energy Independence and Security Act
- LEED: Leadership in Energy and Environmental Design
- N/A: Not Applicable
- SSD: Sustainable Design and Development
- WQ PM: Water Quality Program Manager
- WQv: Water Quality Volume

<<<< **END OF SECTION** >>>>>

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# Robins Air Force Base
# Base Facility Standards

**Title: Lawn Sprinkler System**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 3H – LAWN SPRINKLER SYSTEM

**CRITERIA REFERENCE DOCUMENTS:**

ETL 09-13 Irrigation of Installation Turf-grass and Landscaping

UFC 3-210-06A Site Planning and Design

UFC 3-230-10A Water Supply: Water Distribution

UFGS 32 83 24 Irrigation Sprinkler System

1. LAWN SPRINKLER SYSTEM:

a. General: Provide an underground sprinkler irrigation system as required to irrigate turf and planted areas associated with new facilities or projects that affect the building exterior landscaping. The design shall concentrate on ease of maintenance and durability of the working parts.

b. Modify standard specifications and drawings as needed to incorporate these requirements.

c. The water supply for the sprinkler system shall be the Base potable water system. The design of the system shall provide adequate pressure to all sprinkler heads and not adversely affect the pressure required by the facility.

d. Submittals: All material submittals shall be coordinated with 78 CEG/CEOE for review.

(1) Electronic Drawings: The contractor shall provide three disk sets of electronic drawings in Auto-CADD 2010 format, compatible with the Robins AFB GeoBase system, and three (3) paper drawings that include a complete list of equipment and materials, and manufacturer's descriptive and technical literature, and installation instructions. Drawings shall show proposed system layout, type and number of heads and emitters, zone valves, drain pockets, backflow devices, controllers, and mounting details of controllers. Design(s) shall be in strict accordance with published manufacturer's design guidance.

(2) The contractor shall install laminated (40-mil plastic) "as-built" drawings in the building mechanical room indicating all underground lines and the location of heads and valves.

(3) Operating manuals shall detail the step-by-step procedures required for system startup, operation, and shutdown. Operating manuals shall include the manufacturer's name, model number, parts list, and brief description of all equipment and their basic operating features. Maintenance manuals shall list routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. Maintenance manuals shall include piping and equipment layout, simplified wiring and control diagrams of the system as installed, and system programming schedule.

e. Components: The components listed here have been proven to provide reliable and maintainable irrigation systems at Robins AFB.

(1) System shall operate with a minimum water pressure of 50 psi at connection to main backflow prevention device. All systems shall be automatic and shall be installed with a rain sensor

and rain shut off valve.

(2) Sprinklers – The base standard (design basis) is Hunter I-20 Stainless Steel, Hunter I-25 Stainless Steel, Hunter Pop-Up Mist Heads 10A nozzle, 12A nozzle, 15A nozzle, 17A nozzle spraying capabilities, and Hunter Spray Heads in the following specifications: PS0410A, PS0412A, PS0415A, or PS0417A, Hunter SS nozzle, Hunter PS045SS Spray Head, Hunter SRS 12 spray head spraying capabilities, whichever is applicable, and Irritrol Drip Irrigation Products or equivalent.

(3) Emitter Heads: Emitter heads shall be self-cleaning with pressure compensating diaphragm with one or six self-piercing barbed outlets. Each shall be capable of emitting from ¼ to 2 gallons per hour flow. Emitter body shall be ultraviolet stabilized, algae, and heat resistant plastic construction.

(4) Remote Control Valves – The base standard (design basis) is Hunter HPV series, Hunter ICV with filter sentry in the applicable size, Rain Bird PGA and PEB series in the applicable size, and Weathermatic in applicable size.

(5) Automatic Controllers – The base standard (design basis) is Hunter ICC Commercial Controller 8 or equivalent.

(6) Control Wire – The base standard is 12-gauge single or multi-strand, whichever is applicable, UF type designed for direct burial. Wires shall be buried beside pipe in same trench and shall be attached to the piping in increments of every 15-20 feet. Rigid conduit shall be provided where wires run under paving. Each zone shall use different color wire, to facilitate zone identification. Zone wire color shall be continuous for the entire length of the circuit. One control circuit shall be provided for each zone and a circuit to control sprinkler system. A minimum loop of 24 inches shall be left at each valve, at each splice, at each change in direction, at every 500 feet of straight run, and at each controller for expansion and servicing. Splices and connections shall be watertight and leak-proof; and shall be indicated on the "as built" plan. Wire shall be within a protective sleeve for bridge or water crossings, and where other conditions make it necessary.

(7) Pipe and Fittings – Pipe shall conform to the requirements of ASTM D 1785, PVC 1120 Schedule 40 (solvent welded) or Schedule 80 (threaded), as applicable. All joints shall be primed with a purple colored primer (for inspection purposes) and cleaned before final assembly. All above ground pipe shall be coated galvanized steel. Solvent welded socket type fittings shall conform to requirements of ASTM D 2466, Schedule 40. Threaded type fitting shall conform to requirements of ASTM D2464, Schedule 80.

(8) Backflow Prevention Equipment: Use double check valve and pressure reducing assembly in the appropriate size, to be placed above ground on a concrete pad, 12 to 36 inches above grade. The assembly shall be covered by an insulated enclosure. Backflow preventer shall conform to the requirements of ASSE 1015 and shall be of brass construction, with two check valves, field test cocks, and two resilient seat full port ball valves. Install so that maintenance and service can be performed. Include freeze protection. The backflow preventer shall be tested in accordance with Backflow Device Test Report, the Double Check Valve Assembly portion (obtained from the base Civil Engineer Plumbing Shop). A Certified Backflow Prevent Assembly Tester shall accomplish these tests. The tests results shall be provided to the Civil Engineer Plumbing Shop backflow prevention monitor.

(9) Pressure Regulating Master Valve: Pressure regulating master valve shall be automatic mechanical self-cleaning; self-purging control system having an adjustable pressure setting operated by a solenoid on alternating current with 0.70 amperes at 24 volts. Valve shall close slowly and be free of chatter in each diaphragm position, have manual flow stem to adjust closing speed and internal flushing, and one inlet tapping capable of being installed as straight pattern valve. Body shall be cast bronze or brass with removable brass seat serviceable from top without removing valve body from system. Valve shall operate at 150 psi working pressure and pilot range from 10 to 125 psi.

f. Extra Stock: The following extra stock shall be provided to the government at the time of acceptance of the system.

(1) Two sprinkler heads of each size and type.

(2) Two valve keys for operating manual valves.

(3) Two wrenches for removing and installing each type of head.

(4) Two quick coupler keys and hose swivels.

(5) Four irrigation controller housing keys.

g. Installation: The irrigation system design shall meet the manufacturer's requirements and incorporate the following:

(1) Minimum depth of cover shall be at least 24" for pressure main piping and 12" for lateral discharge piping, or at a sufficient depth to accommodate valves and other equipment, whichever is greater.

(2) In turf areas where grass has not yet been established, sprinklers shall be initially installed on risers above grade level. When grass is established, the contractor shall lower sprinkler head to their permanent positions flush with the finished grade. This elevation is critical and care shall be taken to set them exactly at, or slightly above the finished grade, never below.

h. Warranty – Additional Requirements: The contractor shall maintain the system for a period of one year after acceptance by the government. At the end of the one-year maintenance period, the contractor shall prove that system is fully functional and free from all defects, and shall schedule a 100% walk-thru inspection with 78 CES/CEOS. The contractor shall continue to maintain the system, at no additional cost to the Government, until all defects found at the one-year inspection are corrected and repaired.

<<<<< **END OF BFS PART 3H** >>>>>

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# Part 4A
# Appendix B

## BFS Supplemental Requirements for Section 13 34 19 Pre-engineered Metal Buildings

1. System Components and Design Requirements

   A. Metal Building Manufacturer Accreditation: Manufacturer shall be accredited by the International Accreditation Service Inspection (IAS) Programs for the Manufacturers of Metal Building Systems, AC472. Provide copy of the current accreditation.

   B. Structural Frame Configuration

      (1) Buildings not containing finished spaces – tapered columns

      (2) Buildings containing finished spaces – straight columns

   C. Minimum Structural Component Thicknesses: Component thicknesses shall be as required to conform to design requirements but not less than the following:

| Items | Minimum Thickness (Uncoated) |
|---|---|
| Wall Panels | 26 MFG STD gauge, 0.0179 inch |
| Gable and Eave Trim, Fascia Closure Strips, Rake Flashings, Copings, and Liner Panels | 24 MFG STD gauge, 0.0230 inch |
| Roof Panels | 24 MFG STD gauge, 0.0230 inch |
| Eave Gutters and Downspouts | 24 MFG STD gauge, 0.0230 inch Steel<br>0.032 inch Aluminum |
| Purlins and Girts | 14 MFG STD gauge minimum, 0.078 inch |
| Coiling Door Opening | 11 MFG STD gauge, 0.125 inch |
| Steel Structural Members Other than those | 18 Manufacturer's Standard (MFG STD) gauge, shown above 0.0478 inch |

   D. Deflection – For building panels and structural members, deflection shall not exceed the following criteria:

      (1) Purlins and Rafters: Vertical deflection of $1/180^{th}$ of the span for fully open shelters, $1/240^{th}$ of the span for partially or fully enclosed structures.

      (2) Girts: Horizontal deflection of $1/180^{th}$ of the span for fully open shelters, $1/240^{th}$ of the span for partially or fully enclosed structures (i.e. fascia).

(3) Metal Roof Panels: Vertical deflection of 1/180$^{th}$ of the span.

(4) Metal Wall Panels: Vertical deflection of 1/180$^{th}$ of the span.

(5) Rigid Frames: Vertical and horizontal deflection of l/240$^{th}$ of the span for fully open shelters, l/360$^{th}$ of the span for partially or fully enclosed structures.

E. Roof Panel Configuration:

(1) New Industrial and Simple Commercial Roofs (no valleys): 3" minimum height trapezoidal mechanically seamed standing seam roof panels, 360° seam (90°/180° seams not allowed). Maximum width – 24". Panels shall have intermediate low profile ribs, flat pans not allowed.

(2) New Commercial Architectural Roofs (may contain valleys) – 2" minimum height vertical leg mechanically seamed standing seam roof panels, 360° seam (90°/180° seams not allowed). Maximum width – 16". Panels shall have intermediate low profile ribs, flat pans not allowed.

F. Insulation

(1) Minimum Thickness: Thickness shall be as required to conform to UFC 3-400-01, Energy Conservation. Where insulation is used in unconditioned buildings, provide a minimum of 3.5 inches (R = 13) of insulation in walls, fascia (if applicable) and roof.

(2) Scrim: Facing on insulation (referred to as Vapor Retarder) shall consist of white polypropylene film, fiberglass and polyester scrim, kraft and metalized polyester (PSKP). Facing shall have a tensile strength of not less than 60 pounds per inch machine direction and 60 pounds per inch cross machine direction when tested in accordance with ASTM D828. Facing shall also have a permeability of 0.02 perm or less when tested in accordance with ASTM E96 and shall be factory applied. Basis of design – Lamtec WMP-50.

(3) Configuration: Insulation/scrim system shall be installed as a 100% vapor barrier with a 6" single side tab. Seal tabs as required to maintain the barrier in accordance with FM requirements.

G. Finishes

(1) Structural Steel Frames and Columns/Posts: Primed and painted for exposed conditions, shop primed only for concealed locations.

(2) Girts and Purlins: Primed and painted for exposed conditions, primed only for concealed locations. As an alternate for primed and painted, hot-dipped galvanized finish may be substituted.

(3) Panels: Kynar 500 or Hylar 5000 polyvinylidene fluoride (PVDF) meeting the required finish warranty requirements.

2. Fall Protection: All projects unless specified otherwise within the contract or individual delivery order shall incorporate certified fall protection systems as required by OSHA unless noted otherwise in the DO. If specified in the DO, the system shall be certified for use by the contractor and left in place for Govt. use after the project is complete (certification shall extend to Govt. use). These include perimeter systems for each applicable roof section and roof access penetrations (i.e. access hatches).

3. Warranties:

   A. Manufacturer's labor and material warranty for roof weather-tightness system – 20 yr. NDL. Warranty shall cover roof weather tightness up to required design wind speed. Repairs that become necessary because of defective materials and workmanship while roof panel system is under warranty are to be performed within 48 hours after notification. Failure to perform repairs within 48 hours of notification will constitute grounds for having emergency repairs performed by others and will not void the warranty. Follow-up and completion of repairs must be performed within 14 calendar days from date of notification.

   B. Manufacturer's labor and material warranty for roof and wall panel finish system – 20 yr. NDL. Repairs that become necessary because of defective materials and workmanship while roof and wall panel system is under warranty are to be performed within 48 hours after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within 48 hours of notification will constitute grounds for having emergency repairs performed by others and will not void the warranty. Follow-up and completion of repairs must be performed within 14 calendar days from date of notification.

   C. All warranties shall be from a single source manufacturer.

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# Robins Air Force Base
# Base Facility Standards

**Title: Architectural - General**

**Date:** ***12 May 2014***

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES & CONSTRUCTION FOR ROBINS AFB

## PART 4A – Architectural - General

**CRITERIA REFERENCE DOCUMENTS:**

| | | | |
|---|---|---|---|
| AFI 32-1001 Operations Management | 09-01-2005 | 386 KB | |
| AFI 32-1002 Snow and Ice Control | 10-01-1999 | 284 KB | |
| AFI 32-1012 Reserve Component Facilities Program | 07-22-1994 | 91 KB | |
| AFI 32-1021 Planning and Programming Military Construction (MILCON) Projects | 06-14-2010 | 456 KB | |
| AFI 32-1022 Planning and Programming Non-Appropriated Fund Facility Construction Projects | 05-20-2009 | 502 KB | |
| AFI 32-1023 Design and Constructing Military Construction Projects | 04-21-2010 | 332 KB | |
| AFI 32-1024 Standard Facility Requirements | 05-31-1994 | 115 KB | |
| AFI 32-1032 Planning and Programming Appropriated Funded Maintenance, Repair, and Construction Projects | 10-15-2003 | 522 KB | |
| AFI 32-1051 Roof Systems Management | 05-13-1994 | 181 KB | |
| AFI 32-1052 Facility Asbestos Management | 03-22-1994 | 77 KB | |
| AFI 32-1053 Integrated Pest Management Program | 06-23-2009 | 256 KB | |
| AFI 32-1054 Corrosion Control | 03-01-2000 | 120 KB | |
| AFI 32-1061 Providing Utilities to U.S. Air Force Installations **NEW** | 02-23-2011 | 701 KB | |
| AFI 32-6001 Family Housing Management, with Changes 1-2 incorporated and Interim Change 3 | 08-21-2006 | 602 KB | |
| AFI 32-6002 Family Housing Planning, Programming, Design, and Construction | 01-15-2008 | 1.5 MB | |
| AFI 33-118 Electromagnetic Sprectrum Management | 07-18-2005 | | |
| Engineer Technical Letters (ETL) Index **NEW** | 04-26-2011 | 77 KB | |
| ETL 08-13 Incorporating Sustainable Design and Development (SDD) and Facility Energy Attributes in the Air Force Construction Program | 08-14-2008 | | |
| ETL 07-4 Air Force Carpet Standard | 03-28-2007 | 121 KB | |
| ETL 04-3 Design Criteria for Prevention of Mold in Air Force Facilities, with Change 1 | 04-06-2004 | 123 KB | |
| ETL 02-9 Construction Signs | 05-12-2002 | 65 KB | |
| ETL 01-1 Reliability and Maintainability (R&M) Design Checklist | 10-11-2001 | 381 KB | |
| ETL 97-22 Competing Facility Keying Systems, with Change 1 | 12-05-1997 | 20 KB | |
| ETL 96-5 Hangar Concrete Floor Reflective Coating Criteria, with Change 1 | 08-26-1996 | 78 KB | |
| ETL 89-2 Standard Guidelines for Submission of Facility | 05-23-1989 | 61 KB | |

| | | | |
|---|---|---|---|
| Operating and Maintenance Manuals | | | |

| | | | |
|---|---|---|---|
| **UFC'S** | | | |
| UFC 1-200-01 General Building Requirements | 08-16-2010 | 135 KB | |
| **SERIES 1-300: PROCEDURES AND GUIDANCE** | | | |
| UFC 1-300-01 Criteria Format Standard, with Change 2 | 02-28-2006 | 290 KB | |
| UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard, with Changes 1-4 | 09-01-2004 | 116 KB | |
| UFC 1-300-07A Design Build Technical Requirements | 03-01-2005 | 210 KB | |
| UFC 1-300-08 Criteria for Transfer and Acceptance of DoD Real Property, with Change 1 | 04-16-2009 | 536 KB | |
| UFC 1-300-09N Design Procedures, with Change 8 | 05-25-2005 | 454 KB | |
| **SERIES 1-900: MISCELLANEOUS** | | | |
| UFC 1-900-01 Selection of Methods for the Reduction, Reuse and Recycling of Demolition Waste | 12-01-2002 | 319 KB | |
| **SERIES 2: MASTER PLANNING** | | | |
| UFC 2-000-02AN Installation Master Planning | 03-01-2005 | 1.4 MB | |
| UFC 2-000-05N (P-80) Facility Planning Criteria for Navy/Marine Corps Shore Installations | 01-31-2005 | | |
| **SERIES 3: DISCIPLINE-SPECIFIC CRITERIA** | | | |
| **SERIES 3-100: ARCHITECTURE AND INTERIOR DESIGN** | | | |
| UFC 3-110-03 Roofing | 09-26-2006 | 646 KB | |
| UFC 3-110-04 Roofing Maintenance and Repair | 01-11-2007 | 88 KB | |
| ~~UFC 3-120-01 Air Force Sign Standard~~ SEE 2014 | ~~02-06-2003~~ | ~~8.4 MB~~ | |
| UFC 3-120-10 Interior Design, with Change 1 | 06-15-2006 | 644 KB | |
| UFC 3-190-06 Protective Coatings and Paints | 01-16-2004 | 953 KB | |
| UFC 3-450-01 Noise and Vibration Control | 05-15-2003 | 1.8 MB | |
| **SERIES 3-700: COST ENGINEERING** | | | |
| UFC 3-701-01 DoD Facilities Pricing Guide for FY2011, with Change 1; see also Supplemental Documentation (zip, 100MB) | 03-2011 | 958 KB | |
| UFC 3-710-01A Code 3 Design with Parametric Estimating | 03-01-2005 | 356 KB | |
| UFC 3-730-01 Programming Cost Estimates for Military Construction **NEW** | 06-06-2011 | 1.8 MB | |
| UFC 3-740-05 Handbook: Construction Cost Estimating, with Change 1 | 11-08-2010 | 1.1 MB | |
| **SERIES 4: MULTI-DISCIPLINARY AND FACILITY-SPECIFIC DESIGN** | | | |
| UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings, includes Change 1 | 10-08-2003 | 277 KB | |

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| UFC 4-010-02 DoD Minimum Antiterrorism Standoff Distances for Buildings (FOUO), includes Change 1 | 10-08-2003 | 53 KB | |
| UFC 4-022-02 Selection and Application of Vehicle Barriers, with Change 1 | 06-08-2009 | 1.4 MB | |
| UFC 4-023-03 Design of Buildings to Resist Progressive Collapse with Change 1 | 07-14-2009 | 3.7 MB | |
| UFC 4-023-07 Design to Resist Direct Fire Weapons Effects | 07-07-2008 | 1.4 MB | |
| UFC 4-030-01 Sustainable Development | 12-21-2007 | 1.3 MB | |
| **SERIES 4-100: OPERATIONAL AND TRAINING FACILITIES** | | | |
| UFC 4-121-10N Design: Aircraft Fixed Point Utility Systems | 01-16-2004 | 520 KB | |
| UFC 4-141-04 Emergency Operations Center Planning and Design, with Change 1 | 07-15-2008 | 546 KB | |
| UFC 4-141-10N Design: Aviation Operation and Support Facilities | 01-16-2004 | 1.4 MB | |
| UFC 4-171-01N Design: Aviation Training Facilities | 01-16-2004 | 1.6 MB | |
| UFC 4-171-04AN Band Training Facilities | 03-01-2005 | 6.6 MB | |
| **SERIES 4-200: MAINTENANCE AND PRODUCTION FACILITIES** | | | |
| UFC 4-211-01N Aircraft Maintenance Hangars: Type I, Type II and Type III, with Change 3; also see the Supplement ITG FY10-01 | 10-25-2004 | 1.7 MB | |
| UFC 4-211-02NF Corrosion Control and Paint Finishing Hangars, with Changes 1-4 | 01-10-2005 | 1.3 MB | |
| UFC 4-214-03 Central Vehicle Wash Facilities | 01-16-2004 | 871 KB | |
| **SERIES 4-300: RESEARCH, DEVELOPMENT, TEST AND EVALUATION FACILITIES** | | | |
| UFC 4-310-02N Design: Clean Rooms | 01-16-2004 | 2.6 MB | |
| UFC 4-390-01 O&M: Unmanned Pressure Test Facilities Safety Certification Manual | 07-23-2003 | 928 KB | |
| **SERIES 4-400: SUPPLY FACILITIES** | | | |
| UFC 4-440-01A Storage Depots | 03-01-2005 | 891 KB | |
| UFC 4-442-01N Design: Covered Storage | 01-16-2004 | 2.5 MB | |
| UFC 4-451-10N Design: Hazardous Waste Storage | 01-16-2004 | 149 KB | |
| **SERIES 4-500: HOSPITAL AND MEDICAL FACILITIES** | | | |
| UFC 4-510-01 Design: Medical Military Facilities, with Change 3 | 02-18-2009 | 3.8 MB | |
| **SERIES 4-600: ADMINISTRATIVE FACILITIES** | | | |

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|---|---|---|---|
| UFC 4-610-01 Administrative Facilities | 05-06-2008 | 481 KB | |
| **SERIES 4-700: HOUSING AND COMMUNITY FACILITIES** | | | |
| UFC 4-711-01 Family Housing; see also Unified Facilities Spreadsheet | 07-13-2006 | 700 KB | |
| UFC 4-722-01 Dining Facilities | 07-02-2007 | 202 KB | |
| UFC 4-730-01 Family Service Centers, with Change 1; see also Unified Facilities Spreadsheet | 04-07-2006 | 782 KB | |
| UFC 4-730-04AN Military Police Facilities | 03-01-2005 | 3 MB | |
| UFC 4-730-10 Fire Stations; see also Unified Facilities Spreadsheet | 06-15-2006 | 1.8 MB | |
| UFC 4-740-01NF Design: Bowling Centers | 04-16-2004 | 4 MB | |
| UFC 4-740-02 Fitness Centers; see also Unified Facilities Spreadsheets | 09-26-2006 | 2.3 MB | |
| UFC 4-740-06 Youth Centers; see also Unified Facilities Spreadsheet | 01-12-2006 | 1.3 MB | |
| UFC 4-740-14 Design: Child Development Centers | 08-01-2002 | 1.9 MB | |
| UFC 4-740-15 Continuous Child Care Facilities; see also Unified Facilities Spreadsheet **NEW** | 04-14-2011 | 580 KB | |
| UFC 4-740-16 Design: Military Recreation Centers; see also Unified Facilities Spreadsheet | 05-25-2005 | 618 KB | |
| UFC 4-740-20 Libraries | 05-01-2006 | 2.2 MB | |
| UFC 4-750-01NF Design: Golf Clubhouses | 04-16-2004 | 4.7 MB | |
| UFC 4-750-02N Design: Outdoor Sports and Recreational Facilities | 12-04-2003 | 5.4 MB | |
| **SERIES 4-800: UTILITIES AND GROUND IMPROVEMENTS** | | | |
| UFC 4-860-01FA Railroad Design and Rehabilitation | 01-16-2004 | 1 MB | |
| UFC 4-860-03 Railroad Track Maintenance and Safety Standards | 02-13-2008 | 2.1 MB | |
| **ENGINEERING TECHNICAL LETTERS (ETLs)** | | | |
| ETL 07-4 Air Force Carpet Standard | 28 Mar 07 | | |
| **ROBINS AFB SPECIFICATION STANDARDS** | | | |
| Section 13 34 19 PreEngineered Metal Buildings | | | |

1. GENERAL:

a. This is one part of the Robins AFB Base Facility Standards. Refer questions or exception requests to the BFS Coordinator in 78 CEG/CENP. Any exceptions granted to these requirements shall be noted clearly in the project design analysis by using a Deviation Request.

b. All design shall be in accordance with applicable UFC's, AFI's, ETL's, and all other applicable codes and regulations as referenced herein. Also conform to NFPA 101 - Life Safety Code and the current International Building Code (IBC). If there is a conflict, normally use the more stringent requirement. The specifications shall require all materials and equipment to be current production items.

c. The facility shall be barrier-free and designed to meet the ABA Accessibility Standard for Department of Defense Facilities.

d. In addition to this part of Robins AFB Base Facility Standards, all facilities shall be coordinated and meet the requirements all parts of the Base Facility Standards.

e. Utilize requirements of the Unified Facilities Guide Specifications (UFGS) for additional requirements for each specification division.

f. The architectural aspects of the overall facility should take into account all energy saving opportunities. Exterior elements should closely follow the design guidelines for energy efficiency and USGBC guidelines for Silver certification. Orient facility for optimum efficiency with relation to solar gains during summer and winter months. Exterior lighting should be kept to a minimum, without hindering safety and aesthetics, with day light sensors installed on all fixtures. Windows should be a minimum of double pain and placed to allow maximum day light to penetrate the interior areas. Optimum utilization of prevailing winds with operable windows and vents with screens were applicable. Energy efficient roofing materials are mandatory. Interior design should capitalize on, space utilization for optimum air flow, mechanical efficiency, lighting effectiveness and water fixture types. These measures should follow the USGBC guidelines for Silver Certification. *See BFS Part 7A, Energy Conservation and Part 7C, Sustainable Design & Development.*

2. EXTERIOR DESIGN STANDARDS:

Refer to the Base Facility Standard on Architectural Compatibility for the aesthetic requirements for the exterior buildings on Robins AFB. Components chosen to meet the Architectural Compatibility Standards must also meet the Architectural – General Standard for material types and installation requirements. *See BFS Part 4B, RAFB Architectural Compatibility Plan.*

3. INTERIOR DESIGN STANDARDS:

a. GENERAL:

(1) Interior finishes and furnishings are an important and integral part of facility construction, upgrade, and maintenance programs. While we often have design guidelines and budget limitations, we still expect quality professional design that does not have a "military" look. For instance, the use of dark wood paneling is no longer a required status symbol for executive offices. Dark blue or black doorframes are also outdated. If we are to achieve a clean, efficient "corporate look," we do not wish to perpetuate the mistakes of the past. We want to exceed the "minimum needs of the government" by addressing physical and psychological needs and providing a comfortable work or living environment. Function, maintainability, energy efficiency, and a pleasing general atmosphere are all-important elements of the design.

(2) Interior structural materials and finishes are part of the design of all buildings. This includes anything attached to the building such as wall covering, wall bases, flooring, door and window trim, millwork and cabinetwork, hardware, interior signage, and all items with colors, patterns, or textures. Projects that contain only interior finishes are referred to as a Structural Interior Design (SID). Note: On exterior walls, use only interior wall finishes that allow water vapor within the wall to escape into the conditioned space. Vinyl wall coverings, oil-based paint, and other vapor-resistant materials **will not be used** as interior finishes for exterior walls."

(3) A project with furnishings is identified as a Comprehensive Interior Design (CID). Furnishings must include systems furniture or conventional office furniture, artwork, plants, window treatment, bedspreads, waste receptacles, and other decorative or functional accessories.

(4) Systems furniture (Prewired workstations) shall be included as part of the construction requirements for all new administrative facilities and all administrative areas of any new facility when the administrative area contains at least 1,000 square feet of contiguous net office area. Refer to Engineering Technical Letters (ETL's) 90-2, 88-10, and 90-04 for systems furniture guidelines.

(5) Furniture shall be durable, easily maintained, and ***selected from AF approved manufacturers: Knoll, All-steel, Haworth, and Teknion***. Upholstery shall be selected from manufacturer's standard fabrics. Avoid using Customer's Own Material (C.O.M.) except in unique situations.

(6) Equipment and furniture catalog cuts and price, presentation color/material boards, and interior perspectives shall be submitted for approval as part of the CID package.

(7) The following Air Force publications are applicable to interior design and can be obtained from the applicable Design Section in 78 CEN/CENMP:

| | |
|---|---|
| ------- | AF Carpet Selection Handbook |
| ------- | AF Interior Design Presentation Format |

| | |
|---|---|
| ETL 07-4 | Air Force Carpet Standard |
| UFC 3-120-01 | Sign Standards |
| AFP 88-41 | Interior Design Guidance |
| ETL 90-7 | AF General Interior Design Policy |
| ~~ETL 90-2~~ | ~~General Policy for Prewired Workstations and Systems Furniture~~ CANCELED |
| ETL 90-4? | Systems Furniture Guide Specifications |
| ~~ETL 89-10~~ | ~~Pre-Wired Workstations Guide Specifications~~ CANCELED |

(8) Lighting solutions need to be explored to avoid boring uniformity and glare. Combinations of natural light, indirect lighting, general and task lighting can produce a more flexible and efficient plan. Fixtures shall be easily maintained and have easily obtainable replacement bulbs (or lamps). Consider the color rendition of lamp selection for its appropriateness to the area and function.

(9) Furnishings shall reflect the general style of the building but shall not be so trendy that they will be outdated in four or five years. Upholstery fabrics shall be durable and soil-hiding with brighter colors and patterns allowed. GSA vendors offer a wide variety of styles and upholstery options. Avoid using COM (customer's own material) because of expense and complication of ordering process.

(10) Artwork and plants are finishing touches that shall be included if the budget allows. Landscapes or local themes are appropriate for public areas. Frames shall harmonize with other furnishings. Artificial plants soften formal arrangements and fill awkward corners.

b. DORMITORIES:

(1) Well-coordinated, neutral color schemes hold up over longer periods. Good design extends beyond aesthetics to provide durability, acoustical, and energy-saving value, as well as morale enhancement for the inhabitants.

(2) Finishes, Materials, and Colors: All permanent finishes shall be neutral colors. Medium range accent colors may be used only in small areas. Select neutral colors for surfaces that will have a long life, such as ceramic tile, mosaic, solid-surface, laminates, window blinds, etc., to facilitate future finish material upgrades. Provide a pleasing color scheme in durable finish materials. Use color in non-permanent finishes to add interest and vitality, but do not allow color to dominate the environment. Coordinate materials, finishes, color, and texture selection to compliment the overall building design and image.

(3) Carpet: Removal of carpet to be replaced (if applicable) should be handled according to pre-approved plan for recycling. Carpet must be capable of recycling by down-cycling, waste-to-energy-conversion or another disposal strategy that keeps the carpet out of a landfill. Carpet shall comply with Carpet and Rug Institute's Green Label Indoor Air Quality. Carpet must comply with guidelines of Presidential Executive Order

13101 and meet the intent of Section 6002 of the resource and Recovery Act (RCRA). Carpet with a small pattern, tweed design, or random design is preferred for its appearance retention. Solid color carpet is not authorized. Level-loop or combination or loop and cut pile carpet is recommended for corridors. Select a pattern that will not accentuate the length of corridor. A cut pile is recommended for living unit. Provide a solid walk-off area if the living unit opens to the exterior. Heavy-duty commercial quality carpet cushion may be used in the living units, but cannot be used in the corridors. Living /bedroom areas have a heavy wear classification for carpet, and public areas (corridors, television and game rooms, etc.) have a severe wear classification.

(4) Walk Off: Provide hard surface walk-off areas at exterior entrances to type B or C modules.

(5) Hard Surface Flooring: Use commercial quality vinyl composition tile (VCT) with a full depth pattern in the walk off area, vanity area, and the kitchen. Avoid white as a predominant color, "No wax" surfaces are not recommended, due to low durability.

(6) Walls:

(a) Use vinyl wall covering as over smooth walls. Accent walls are optional, but must not be so bright or so dark as to shorten the room or negatively affect the interior lighting. Consider a texture wall covering as an accent instead of dramatic contrasting colors. Accent colors can also be used as textiles such as draperies and upholstery fabrics.

(b) Paint may be substituted for vinyl wall covering (VWC), but VWC is preferred. Where paint is used, multi-colored, speckled paint systems are preferred.

(7) Ceiling: Paint ceilings off-white in a flat or eggshell finish.

(8) Bathrooms: Use slip resistant ceramic floor tiles in bathrooms. Specify a mottled or shaded tile to hide discoloration from detergents, etc. Use ceramic wall tiles from floor to ceiling around bathtubs and showers. Colored grout is recommended for low maintenance and good appearance. Other areas may be at wainscot height. Install shower curtain rod instead of glass shower doors for ease in maintenance. Specify rod at proper height for conventional shower curtains 1800 mm x 11800 mm (72"x 72").

(9) Window Treatment: Mini blinds, vertical blinds, draperies or combination are authorized. All window treatments must pass NFPA 701-1/702-2 Standard Method Fire Test for Flame Resistant Textiles and Films.

(10) Furnishings. Furnishings shall reflect the general style of the building but shall not be so trendy that they will be outdated in four or five years. Upholstery fabrics shall be durable and soil-hiding with brighter colors and patterns allowed. GSA vendors offer a wide variety of styles and upholstery options. Avoid using COM (customer's own material) because of expense and complication of ordering process. Refer to

Unaccompanied Housing Design Guide and QIP (Quarters Improvement Plan) for additional guidance on standards.

4. MATERIALS: The following requirements govern the design and use of various materials and components used as a part of the facility construction. It is the designer's responsibility to thoroughly evaluate each material and component used with respect to the overall design and sustainability of the facility. These are Robins AFB specific requirements for specific components. All materials and components, whether listed or not, are still subject to the appropriate applicable codes and standards

a. DIVISION 4 – MASONRY

(1) GENERAL: Typical masonry units utilized in facilities include CMU (concrete masonry units) and brick. CMU provides a durable surface with structural properties suited for high abuse areas. Brick is typically used on the exterior only for facilities requiring enhanced aesthetics.

(2) WYTHES: Single wythe (layer) exterior walls should be constructed of CMU and be limited to industrial/storage facilities as follows: full height - <3,000 sf; partial height – larger facilities (CMU is typically 4 to 10 ft. high). Do not use single wythe exterior walls for fully conditioned facilities or interior walls separating conditioned/unconditioned spaces – use double wythe appropriately insulated.

(3) CAVITIES: Double wythe exterior walls shall have a cavity with a minimum **free air space** of 1". Cavity insulation shall not decrease this requirement. Provide cavity ventilation at both the bottom and top of the cavity and drainage weeps at the bottom (exterior walls). Provide waterproofing/damproofing on exterior face of the inner wythe for exterior walls. Provide mortar nets at the bottom of cavities.

(4) FLASHING: Provide continuous flashing from the interior wythe to the exterior face of the exterior wythe. Coordinate with roof flashing to provide continuous watertight membrane protection at high/low roof conditions and prevent moisture intrusion into lower interior walls.

b. DIVISION 5 – METALS

(1) GENERAL: *Reference BFS Part 3A Structural* for all structural design requirements. This includes all metals whether used for building structural, architectural or other engineering.

(2) COLD FORMED METAL FRAMING: Framing in this division refers to load bearing metal framing (vertical and/or horizontal loading), 20 ga. or thicker. Light gauge interior partitions are covered in Division 09.

(3) METAL STAIRS: Stairs shall have solid risers with concrete-filled steel pan treads. Grating and/or checkered plate treads and risers may be used for equipment platforms (confirm with Proj. Mgr.). Provide sufficient bracing to limit stringer deflection due

to side loads on attached railings. Design shall limit deflection to 1/4" measured at the top of the handrail based on required design loads (l/180).

(4) METAL GRATINGS AND FLOOR PLATES: Provide with appropriate coatings compatible with corrosive conditions expected to be encountered.

c. DIVISION 6 – WOOD, PLASTICS AND COMPOSITES

(1) WOOD - General: Reference BFS Part 3A Structural for all structural design requirements. This includes all wood whether used for building structural, architectural or other engineering.

(2) WOOD CONSTRUCTION: Wood construction has limited usage on Robins AFB. Obtain approval from 778 CES prior to allowing new wood construction.

(3) WOOD FRAMING, SHEATHING AND DECKING: Materials to be exposed to moisture will require pressure treating. Note EPA restrictions on use of CCA pressure treatment. Provide fire retardant wood where required by codes. Design shall take into consideration the protection of fasteners and attachments (including allowable load reduction factors) with respect to the treating chemicals used.

(4) ARCHITECTURAL CASEWORK: Casework shall be Custom Grade as defined by AWI. Countertops and vanity tops shall be solid surface for durability. Finishes will be either plastic laminate or stained/clear coated depending on usage (verify with Project Manager based on individual usage). Cabinets and countertops for lab will be lab grade materials and construction compatible with the intended usage (durability, chemical resistance, etc.).

d. DIVISION 7 – THERMAL AND MOISTURE PROTECTION

(1) DAMPPROOFING AND WATERPROOFING: Under slabs, at a minimum provide minimum 10 mil vapor barrier (except exterior slabs). Provide membrane products compatible with conditions to be encountered to prevent moisture intrusion into the building. Install waterstops as required for hydrostatic conditions in concrete and masonry joints

(2) ROOF DRAINAGE: Utilize sloped system draining to the perimeter of building in lieu of internal drains. Internal drains must be approved by 78 CEG/CEN before utilized in a building design.

(3) ROOFING: Roofing, roof accessories and roofing design shall meet the requirements of UFC 3-110-03. Design shall meet the requirements of UFC 3-200-01, IBC 2009 (International Building Code) and ASCE 7 (2010 Edition). Use Exposure Category C per ASCE 7 for the roof design requirements for all buildings.

(a) FEDERAL REQUIREMENT LINKS: Unified Facility Guide Specifications (UFGS) – http://www.wbdg.org/ccb/browse_cat.php?c=3; Unified Facilities Criteria (UFC) – http://www.wbdg.org/ccb/browse_cat.php?o=29&c=4

(b) ALLOWABLE ROOF TYPES: Acceptable roof types will be Standing Seam Metal and PVC. Modified Bitumen roofing may be allowed if specifically stated within the individual Delivery Order. If Modified Bitumen roofing is allowed, it shall be hot mopped SBS polymer (torch applied is not allowed due to higher hazard and potential of combustible decks/blocking). Unless stated within the DO SOW otherwise, all roofing systems must be certified and labeled according to the Cool Roof Rating Council (CRRC).

(4) ROOF ACCESSORIES:

(a) GENERAL: All roof accessory components and component installation requirements shall be compatible with and acceptable by the roofing manufacturer for the issuance of the required warranties.

(b) FALL PROTECTION: All reroofing projects shall incorporate certified fall protection systems as required by OSHA unless noted otherwise in the DO. The system shall be certified for use by the contractor and left in place for Govt. use after the project is complete (certification shall extend to Govt. use). These include perimeter systems for each applicable roof section and roof access penetrations (i.e. access hatches). Repair projects shall define the extent for installing fall protection systems within the individual DO SOW.

(c) LIGHTNING PROTECTION: All reroofing projects shall incorporate new Franklin type lightning protection systems unless exempted within the individual DO SOW. Repair projects shall define the extent for installing fall protection systems within the individual DO SOW.

(d) ROOF DRAINAGE SYSTEM: All reroofing projects shall incorporate modifications and/or complete replacement of roof drainage system to meet the roof drainage requirements. Underground stormwater systems and retention/quality systems may also be required based on individual DO SOW.

(e) OTHER ACCESSORIES: Provide roof accessories as required within individual DO SOWs.

(f) DESIGN ANALYSIS: Provide a Design Analysis for all reroofing projects and where required within the DO SOW for repair projects.

(g) QUALITY CONTROL:

(i.) SUPERINTENDENT: Provide superintendent as required by FAR. Superintendent shall not have a workload greater than 3 projects to adequately provide supervision for each DO.

(ii.) FOREMAN: Provide a foreman certified by the roofing manufacturer on-site at all times work is being performed. Provide credentials documenting the individual's certification with each DO.

(h.) SAFETY: Perform all work activities in a safe manner in conformance with current OSHA, AFOSH and USACE requirements (EM 385, Latest edition). All workers shall wear fluorescent reflective vests with the general contractor's name at all times.

(i.) LIQUIDATED DAMAGES: Damages will be assessed per the FAR in accordance with attached Form 820.

(j.) METAL ROOFS:

(i.) MANUFACTURER: Shall be accredited by the International Accreditation Service Inspection (IAS) Programs for the Manufacturers of Metal Building Systems, AC472. Provide copy of the current accreditation.

(ii.) REQUIREMENTS: Comply with additional requirements of UFGS Section 07 41 13. Where reroofing involves structural modifications as in a retrofit/re-sloping application, also comply with structural requirements of UFGS Section 13 34 19 Metal Building Systems. Provide testing, including vacuum testing of fasteners, as required to ensure a weathertight system.

Refer to the individual DO to determine whether retrofit systems will be allowed for that particular project.

(iii.) CONFIGURATION:

(aa.) NEW INDUSTRIAL AND SIMPLE COMMERCIAL ROOFS (no valleys): 3" minimum height trapezoidal mechanically seamed standing seam roof panels, 360° seam (90°/180° seams not allowed). Maximum width – 24". Panels shall have intermediate low profile ribs, flat pans not allowed. Panels shall be structural not requiring a substrate.

(bb.) NEW COMMERCIAL ARCHITECTURAL ROOFS (may contain valleys): 2" minimum height vertical leg mechanically seamed standing seam roof panels, 360° seam (90°/180° seams not allowed). Maximum width – 16". Panels shall have intermediate low profile ribs, flat pans not allowed. Panels shall be structural not requiring a substrate.

(cc.) ROOF REPAIR PROJECTS: Profile shall be defined in each Delivery Order as either new (with the appropriate transition between roof profile types), matching existing or a special profile (also with the appropriate transition).

(iv.) MINIMUM ROOF PANEL THICKNESS: Minimum bare metal thickness of 24 gauge

(v.) FINISH:

(aa.) NEW ROOFS: Kynar 500 or Hylar 5000 polyvinylidene fluoride (PVDF) meeting the required finish warranty requirements.

(bb.) ROOF REPAIR PROJECTS: Where practical, use same finish as new roofs with a new roof finish warranty. Refer to each Delivery Order for specifics on finish.

(vi.) MANUFACTURER'S WARRANTY

(aa.) NEW ROOF PROJECTS: Shall be a 20 year single source NDL (no dollar limit) material and labor warranty. Warranty shall cover weather-tightness and finish of the roofing and flashing components. Prior to acceptance, the manufacturer shall perform the necessary roof inspections required to determine that installation is per the manufacturer's instructions and issue a letter to that effect. Roof will not be accepted without this letter.

(bb.) ROOF REPAIR PROJECTS: Shall be a 20 year material finish warranty covering all roof and wall panels and exposed trim.

(vii.) INSTALLER'S WARRANTY

(aa.) GENERAL: Installer shall provide a two (2) year material and labor warranty for all DOs.

(k.) MEMBRANE ROOFS

(i.) GENERAL: PVC single ply membrane roofs shall be mechanically fastened. Ballasted systems will not be allowed. Fully adhered systems may only be allowed where specified within individual Delivery Orders. Provide breather vents extending to the roof deck and installed as per the PVC manufacturer recommendations. Where fully adhered PVC systems are allowed, existing roofing system shall be removed to the substrate (see individual DO for mechanically fastened systems).

(ii.) THICKNESS: PVC single ply membranes shall have a minimum thickness of 60 mils. Where direct adhered membranes are allowed, felt thickness shall not be counted as a part of the required membrane thickness.

(iii.) MANUFACTURER'S WARRANTY

(aa.) NEW ROOF PROJECTS: Shall be a 20 yr. single source NDL (no dollar limit) material and labor warranty. Warranty shall cover weather-tightness. Prior to acceptance, the manufacturer shall perform the necessary roof inspections required to determine that installation is per the manufacturer's instructions and issue a letter to that effect. Roof will not be accepted without this letter.

(iv.) INSTALLER'S WARRANTY

(aa.) GENERAL: Installer shall provide a two (2) year material and labor warranty for all DOs.

(l.) METAL WALL PANELS

(i.) THICKNESS: Metal wall panels shall have a minimum bare metal thickness of 26 gauge

(ii.) PROFILE: Wall panel profile shall have primary ribs spaced at 12" o.c., trapezoidal in shape. Ribs shall have a minimum depth of 1 ¼".

(iii.) FINISH: Metal wall panel finish shall have a color finish, Kynar 500 or Hylar 5000 polyvinylidene fluoride (PVDF) with a 20 year finish warranty.

(iv.) GENERAL: Comply with additional requirements of UFGS Section 07 42 13 Metal Wall Panels.

(m.) FLASHINGS

(i.) GENERAL: Flashings (including copings) shall have a minimum bare metal thickness of 24 ga. Provide all components as required for a weathertight roof system in conformance with the manufacturer's requirements.

(ii.) FINISH: Provide factory applied painted finish to all components. Where components are exposed to view, finish shall be a color finish, Kynar 500 or Hylar 5000 polyvinylidene fluoride (PVDF) with a 20 year finish warranty. Refer to individual DO for exemptions.

(n.) ROOFING SPECIALTIES

(i.) BUILDING EXPANSION JOINT COVERS: Assemblies shall meet the following requirements:

(aa.) Sheet metal slip type expansion joint are preferred. Alternate expansion joint covers for PVC roofs only will be considered (requires prior Govt. approval) if recommended by roofing manufacturer. Joints shall comply with the roofing manufacturer's details where applicable. Where no preference is give for the configuration, use the requirements of the NRCA Roofing and Waterproofing Manual, latest edition.

(bb.) Differential movement joints consisting of extending the roof membrane over a round foam backer will not be allowed for building expansion joint covers.

(ii.) ROOF CURBS: All new roof curbs shall be prefabricated assemblies with fully welded seams. Configuration and attachments to the roof shall meet the requirements of the roofing manufacturer for warranty requirements. The curbs shall be factory painted to match the roof.

(o.) ROOF HATCHES: Provide roof hatches for internal roof access in lieu of external ladders due to antiterrorism requirements. Hatches will require exterior fall protection railing and gate per OSHA standards. Protection is not required to be attached to the hatch but must have proper structural supports and sufficient clearance for proper roof flashing.

e. DIVISION 8 – OPENINGS (1)

LOCKING DEVICES:

(a) The door hardware shall be compatible with the Base Master Keying

System. The keying system shall have seven pin interchangeable cores and interchangeable construction cores. The interchangeable cores as a design basis shall be Best Lock or equivalent. The lockset shall be compatible with the Base Master System and accept the 7-pin Best-type core. Construction cores shall remain in all doors and become property of the Government. New Best cores shall be shipped to the following address:

78 CES/CEOH/Lockshop
775 Macon Street
Robins Air Force Base, Georgia 31098

(b) For those facilities that are not covered by the Base Master Keying System, provide keys and locks for any addition or renovation that are compatible with any existing master key and lock system that is to remain.

(c) Furnish two master keys. These are to be sent direct to the Government's representative by registered mail.

(d) Furnish two copies of keying control transcripts with 100% expansion per complex as listed in hardware set. These are to be sent direct to the Government's representative by registered mail or other certified means of delivery.

(e) Maintenance Control: Furnish maintenance repair kits and manuals as listed in hardware set. These are to be sent direct to the above address by registered mail or other certified means of delivery.

(f) All padmounted transformers, exterior padmounted switchgear cabinets, etc. are to be equipped with a Best Lock Corporation padlock, lock number 21B720L-R with core number 8A59, 1 1/2" short shank. This is the same lock that is used on all other high voltage equipment on Robins AFB, and it is imperative that exterior electrical personnel have one-key access to all high voltage equipment. Upon project completion, all shipping keys to become property of the Government.

(2) EXTERIOR PERSONNEL DOORS: Keep these to a minimum. Doors, including glazing, shall meet all antiterrorism requirements [78 CEG/CEN to clarify through 78 ABW/AT (Antiterrorism Office)]. Wood exterior doors shall NOT be used. Where steel hollow metal doors are used between the exterior and conditioned spaces, the door shall have an insulated core. Total Door is NOT an acceptable manufacturer. The following doors are required:

(a) GENERAL: Main ingress and egress doors for personnel.

(b) MINIMUM HARDWARE REQUIREMENTS: Door closer, stainless steel ball-bearing NRP hinges, weatherstripping, thresholds, silencers, latch guards and latching devices or other hardware as required by applicable Codes.

(c) UTILITY ROOM EXTERIOR DOORS

(i) Main Mechanical and Electrical Rooms shall be located on the

exterior walls of the facility, and their doors shall be on the exterior walls to improve accessibility for CEG shop personnel and to minimize disruptions to user personnel. Double doors on Mechanical Rooms shall have an astragal.

(ii) Comm Rooms and non-main utility rooms may be located in the interior of the facility with interior doors.

(iii.) All shall be provided with locks such that only CE has the keys for these rooms.

(3) INTERIOR PERSONNEL DOORS: Construction may be either wood (solid core only) or metal as appropriate. Provide fire rating as required by codes. Use vertical door view lites adjacent to the door latchset/lockset where privacy is not an issue to promote safety. Where metal doors are used between conditioned and unconditioned areas, units will be insulated core. Total Door is NOT an acceptable manufacturer.

(4) WINDOWS: Follow force protection requirements for window units with glazing in accordance with UFC 4-010-01. Provide Low-E coating on insulated glazing and thermally broken frames at all conditioned buildings. All glazing shall be double-glazed in all conditions, unless noted otherwise. [778 CES to clarify through 78 ABW/AT (Antiterrorism Office)]

(a.) INDUSTRIAL CASEMENT

(i.) OPERATION: Fixed ONLY

(ii.) ALLOWABLE MATERIAL: Factory Finished Aluminum or Steel

(b) STOREFRONT

(i.) OPERATION: Fixed ONLY

(ii.)ALLOWABLE MATERIAL: Factory Finished Aluminum

(c.) RESIDENTIAL

(i.) OPERATION: Double-Hung

(ii.) ALLOWABLE MATERIAL: Insulated Vinyl/PVC

f. DIVISION 9 – FINISHES

(1) COLOR SCHEDULES

(a.) All interior finishes and colors shall be coordinated and approved

by the Base Project Manager and/or Contracting Officers Representative. Provide an Interior Color and Material Presentation board in a binder format (8 1/2" x 11") with heavy samples mechanically fastened with color and material legends referenced on floor plans. Color boards are required with the Preliminary (60%) and First Final (85%) Design Submittal Packages

(b.) All interior finishes shall be easily maintained, durable, and classic rather than trendy.

(c.) Permanent finishes such as ceramic tile, toilet partitions, solid surface and plastic laminate countertops shall be in neutral colors.

(d.) Accent colors in brighter hues must be used in limited quantities such as a tile border or painted accent wall.

(e.) Light colors shall be avoided for floor covering and high traffic areas.

(f.) All restroom facility to have ceramic tile flooring and partial height wall tile.

(2) GYPSUM BOARD

(a.) Provide paperless water-resistant gypsum wallboard in restrooms. Where acoustical ceiling is used in restrooms, gypsum board around the perimeter of the restroom (along with the underlying wall system) shall extend to the bottom of the floor or roof deck for privacy.

(b.) Provide impact resistant gypsum wallboard in potential high abuse areas. installations.

(c.) Provide exterior water resistant gypsum sheathing for exterior cavity

(3) CERAMIC TILE

(a.) Ceramic tile installed over framing shall have cement backer board as the immediate underlayment surface. Other sheathing materials are allowed between the cement backer board and framing if required.

(b.) Provide L-shaped profile with integrated anchoring leg, continuous at top of tile wainscot.

(c.) Provide inside corner profile strip with integrated anchoring leg, continuous both horizontal and vertical where base of wall tile and floor tile meet.

(d.) Provide outside corner profile strip with integrated anchoring leg, continuous vertically at outside corner details.

(4) ACOUSTICAL CEILINGS

(a.) Provide fine-fissured tegular-edged ceiling tile or equal in conference

rooms and commanders suites.

(b.) Provide cortega square-edged ceiling tile or equal in all other rooms, unless noted otherwise.

(c.) Provide washable, mildew resistant ceiling tiles in all kitchen and restroom areas, where gypsum wallboard is not used.

(d.) Center the tile grid on the center of the room. Space the tiles such that fractional pieces are of identical shape on the outside edges on opposite sides of the room.

(e.) See Appendix A for Robins AFB material samples.

(5) RESILIENT FLOORING

(a.) Provide commercial vinyl composition tile (VCT) in maintenance or industrial shop areas as well as break rooms.

(b.) Provide pre-molded corners at all wall base.

(c.) See Appendix A for Robins AFB material samples.

(6) SPECIALTY FLOORING

(a.) Provide access flooring system at computer labs, automated data processing support facilities, and all other areas as required. Access flooring system shall be aluminum stringer type.

(b.) Running track surface shall consist of a poured-in-place recycled rubber safety surface. Rubber safety surface should have “cushion-like” feel for shock absorption when running/jogging. Provide cast-in-place formed concrete border at perimeter of outdoor track.

(c.) Provide rubber composition tile flooring in weight rooms, aerobic rooms, and other gymnasium areas as required to provide shock absorption during physical fitness activities.

(7) CARPET

(a.) A patterned design or multicolored bold tweed has soil-hiding capabilities, where solid colors are recommended only for narrow borders and some billeting areas. Carpet tile is required only in areas with systems furniture or access floors. Avoid stripes and lines running parallel to walls and corridors.

(b.) Removal of carpet to be replaced (if applicable) should be handled according to pre-approved plan for recycling. Carpet must be capable of recycling by down-cycling, waste-to-energy-conversion or another disposal strategy that keeps the carpet out of a landfill. Carpet shall comply with Carpet and Rug Institute’s Green Label Indoor Air Quality. Carpet must comply with guidelines of Presidential Executive Order 13101 and meet the intent of Section 6002 of the resource and Recovery Act (RCRA).

(8) WALLCOVERING

(a.) Provide type II vinyl wall covering (flame and smoke resistant) must be used in neutral colors and subtle textures for upgraded areas.

(9) PAINT

(a.) Wall colors shall be neutral, light-reflecting colors in a semi-gloss finish, if not directed otherwise.

(b.) Ceilings shall be off-white in a flat or eggshell finish.

(c.) Dark accent walls and murals are not recommended because of difficulty of repairing or maintaining.

(d.) Semi-gloss or gloss paint is required for all trim, doors, and walls in areas that have moisture such as kitchens, restrooms, and bathrooms.

(e.) For previously painted areas, site investigation is mandatory to determine proper surface preparation for new coatings or wall covering.

(f.) See Appendix A for Robins AFB material samples.

(10) PAINT FOR HANGAR FLOORS; AFMC POLICY ON PAINTING CONCRETE FLOORS:

(a.) In general, concrete floors are not to be painted unless approved by 778 CES. For utility rooms, sealed concrete is sufficient. For industrial floors, painting is provided by the user since surface markings (aisle, safety, etc.) are defined by the user's safety office. The exception may be if a special chemical hardening and/or surface treatment is required by the user which requires application either during the concrete placement or immediately after. If concrete floors are approved to be painted/repainted the following two paragraphs must be followed:

(i.) Concrete floors shall only be painted or repaired with materials having anti-skid ingredients. The materials should have a friction coefficient of 0.5 for level surfaces and 0.8 for sloped surfaces. Painting floors with non anti-skid coatings for cosmetic appearances is not permitted. However, urethane or epoxy paints of similar composition may be used for demarcation lines, safety zones, and security warnings. All projects involving the repair of concrete floors shall be submitted through Civil Engineering channels for evaluation of floor coating specifications and application. Final approval shall be with the center/base safety office.

(ii.)Concrete floors that had been painted without anti-skid materials must be evaluated for removal prior to replacement with anti-skid coatings. The removal of floor coatings can present health hazards, so evaluations by local Safety, Environmental and Bio-Environmental Engineering Offices are necessary and required. Removal shall be sanding with HEPA-VAC sanders, abrasive blasting is NOT allowed, or solvent/chemical stripping must be approved by the local safety, health and environmental offices. In any case, the organization

requesting the removal must meet all health and safety requirements.

g. DIVISION 10 – SPECIALTIES

(1) INTERIOR SIGNAGE

(a.) Shall be in compliance with UFC 3-120-01 Air Force Sign Standards and ABA Accessibility Standard for Department of Defense Facilities.

(b.) Interior signage shall be part of SID (Structural Interior Design) and shall include building directories. Workstation identification signs shall be included with systems furniture packages in the CID (Comprehensive Interior Design).

(2) TOILET COMPARTMENTS

(a.) Provide solid core phenolic or solid plastic (hdpe) toilet partitions, urinal screens.

(3) WALL AND CORNER GUARDS

(a.) Corner guards, chair rails, and/or bumper guards shall be used depending upon the degree of wall protection required.

(4) TOILET ACCESSORIES

(a.) The current custodial contractor shall be able to maintain easily the toilet accessories such as soap and towel dispensers. Avoid expensive multiple function units that are difficult to maintain.

h. DIVISION 11 – EQUIPMENT

(1) WINDOW BLINDS

(a.) Provide horizontal blinds 2" PVC wide slats. Blinds shall be capable of being full-height raised, no partially-height raised, and mounted inside the opening.

(2) ENTRANCE FLOOR MATS

(a.) All new buildings shall have recessed entrance mats installed in recessed aluminum angle frame with foot grille with propylene brush inserts.

(b.) Walk off matting shall be used at all building entrances and in transition from shop areas to carpeted administrative areas.

(c.) Existing buildings shall have rubber-backed waterproof entrance mat.

(3) LOADING DOCK LEVELERS: At raised loading docks where levelers

are required, use minimum 6'x8' hydraulic pit levelers with manual release. Provide slip resistant finish.

(4) LOADING DOCK ACCESSORIES: At raised loading docks, provide dock bumpers as required to prevent damage to the foundation due to truck backing operations. Also provide trailer latching equipment to prevent trailer creep away from the dock during loading and unloading operations. Provide dock seals around the overhead door opening at all buildings.

i. DIVISION 12 – FURNISHINGS

j. DIVISION 13 – SPECIAL CONSTRUCTION

(1) Pre-Engineered Metal Buildings (PEMB): PEMBs are a viable alternative to conventional framed metal buildings and provide for a single source manufacturer for a metal building and the weather-tight envelope. A single source manufacturer certified by MBMA, IAS AC472 shall provide all structural and components. Where PEMBs are used, incorporate the Robins AFB, Appendix B, BFS Supplemental Requirements for Section 13 34 19 Pre-engineered Metal Buildings.

k. DIVISION 41 – MATERIAL PROCESS AND HANDLING EQUIPMENT

(1) BRIDGE CRANES: May be floor or building structure supported (Reference BFS Part 3A Structural for all structural design requirements). All bridge cranes require pendant and/or wall mounted controls (project specific). Consider using remote controllers for bridge cranes mounted over 20 ft. above floor surface. Controllers shall be either IR (infrared - preferred) or FCC Part 90 RF (radio frequency). FCC Part 15 RF controllers are **NOT** permitted for AF facilities. Remote controllers do not eliminate controls listed above which will provide redundancy should the remotes become inoperative (when remote controller is being used, pendant controller will be unplugged and pendants coiled and anchored to the crane)

<<<<< **END OF ARCHITECTURAL GENERAL SECTIONS** >>>>>

Author: Jeff Hooper, 78 CEG/CENMP, 478-926-5923

Reviewer: David Trescott, 78 CEG/CENMP, 478-926-8838
Terry Stinson, 78 CEG/CENME, 478-327-2942

Approval: _____
Stefanie Dawson, 78 CEG/CENMP, 478-327-2948

# RAFB

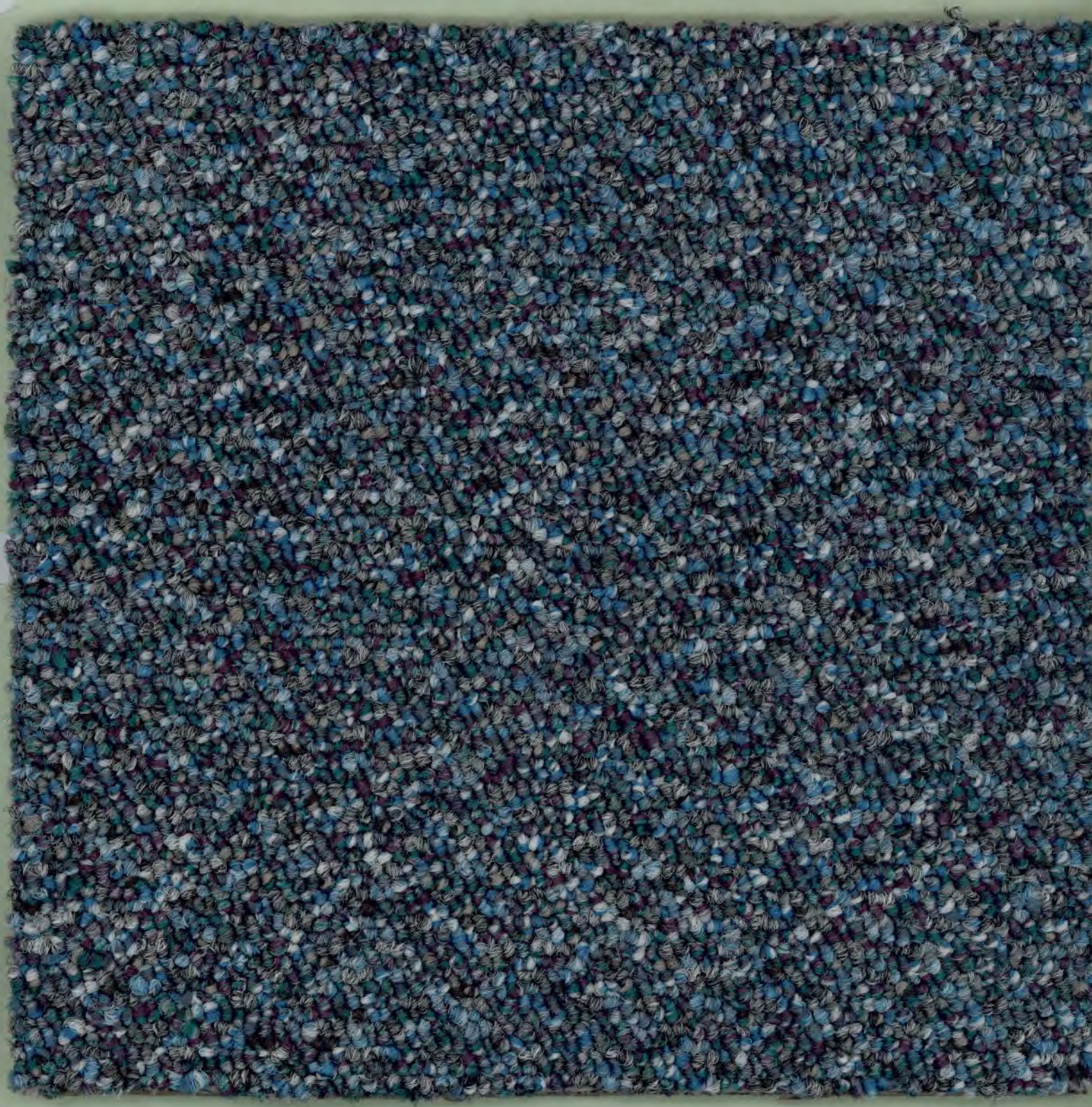
# MATERIAL

# SAMPLES

**Please note: the colors depicted here are subject to appear different from original to due to color variations in monitors. Please see original book for true color samples.**

# CARPET

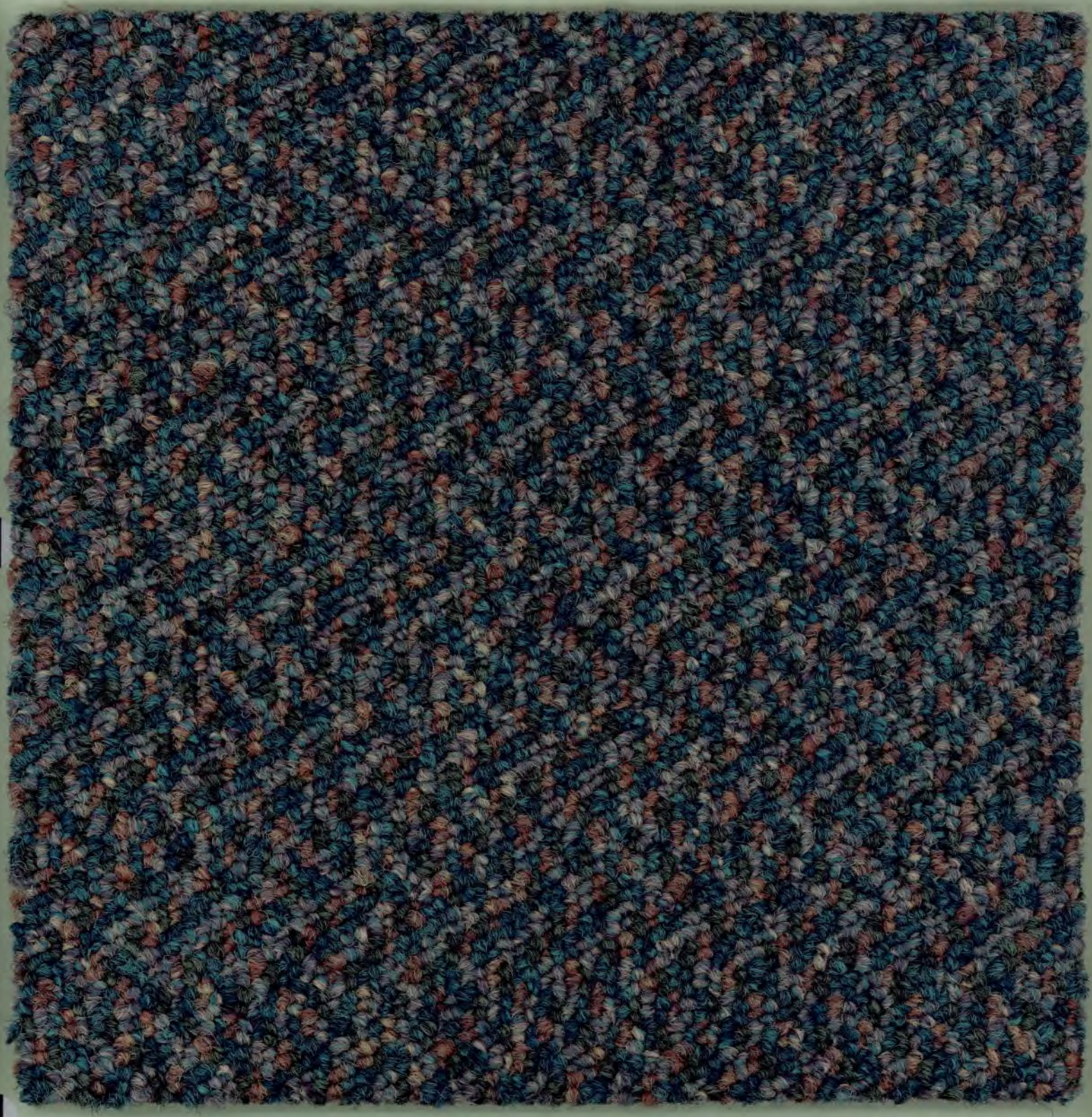
CARPET



SHAW

FAMILIAR #66932

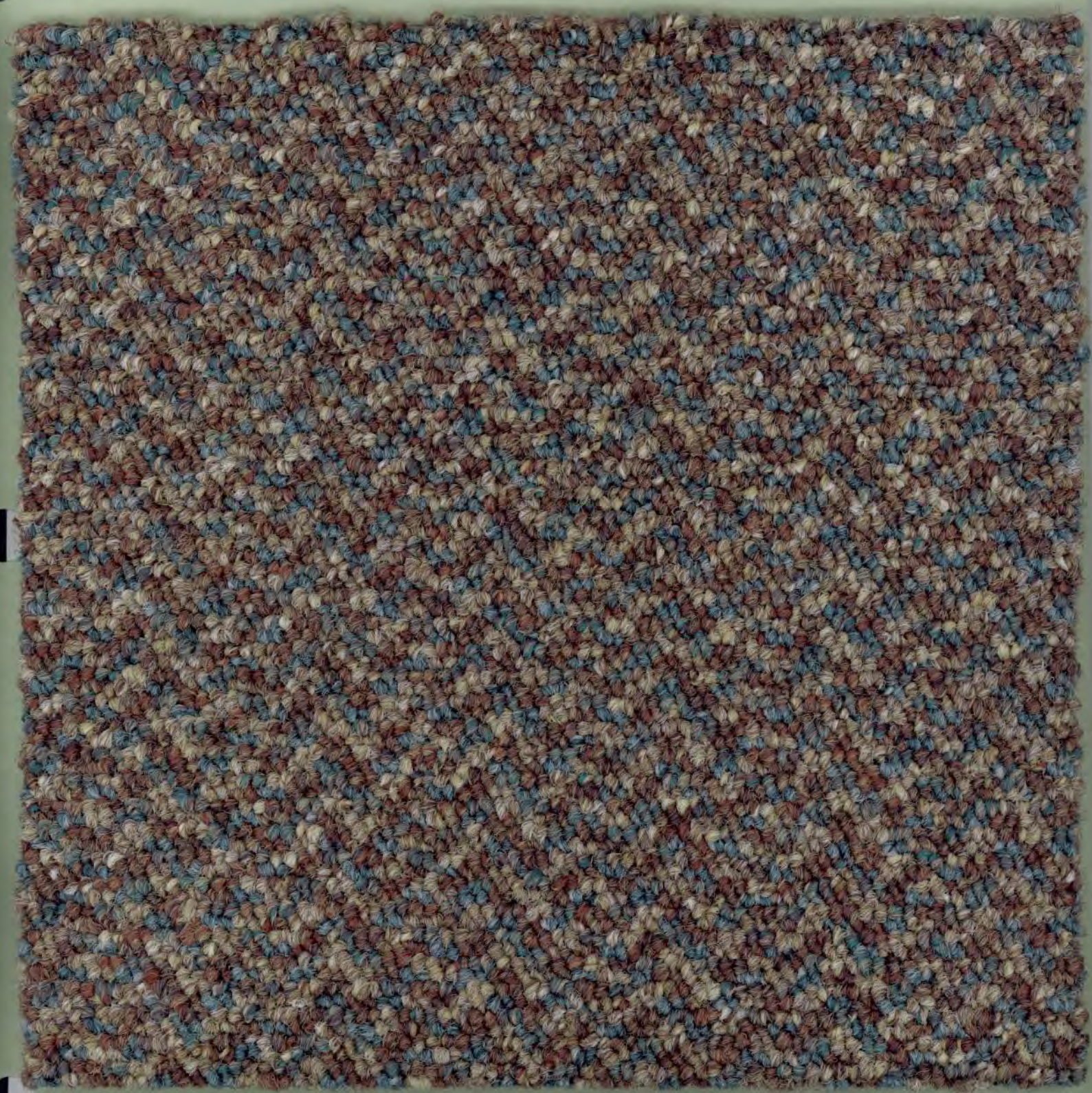
CARPET



SHAW

CORRELATE #66333

CARPET



SHAW

COMPARE #66731

# CERAMIC TILE

# FIDENZA
GLAZED PORCELAIN

## CAFÉ
FD02

**Dal-Tile Corporation**
**7834 C.F. Hawn Frwy.**
**Dallas, TX 75217**
**(214) 398-1411**

http://products/daltile.com

Also - www.dal-tile.com

# FIDENZA

GLAZED PORCELAIN

## DORADO

FD03

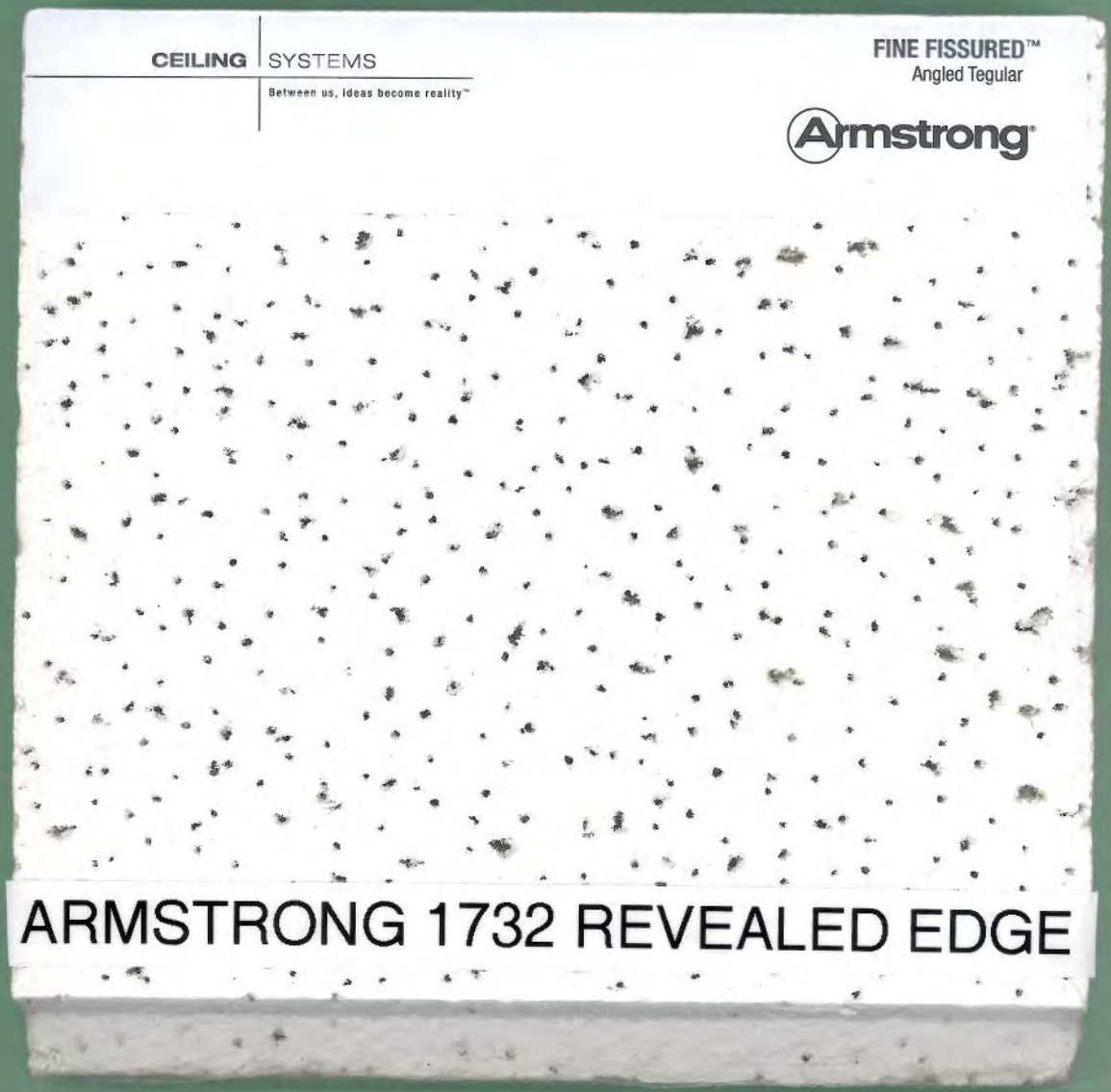
Dal-Tile Corporation
7834 C.F. Hawn Frwy.
Dallas, TX 75217
(214) 398-1411

http://products/daltile.com

Also - www.dal-tile.com

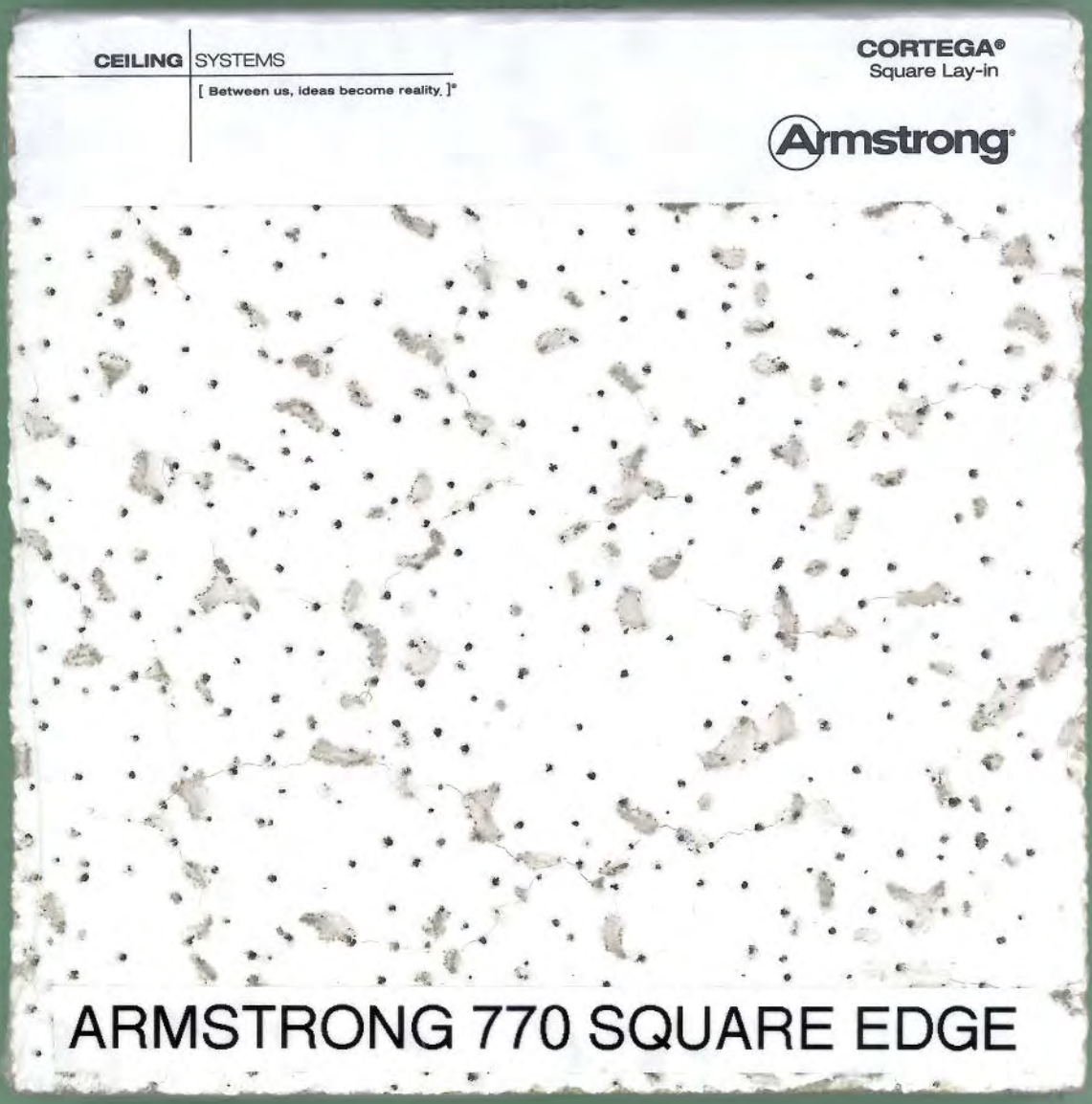
# CEILING TILES

# CEILING TILE



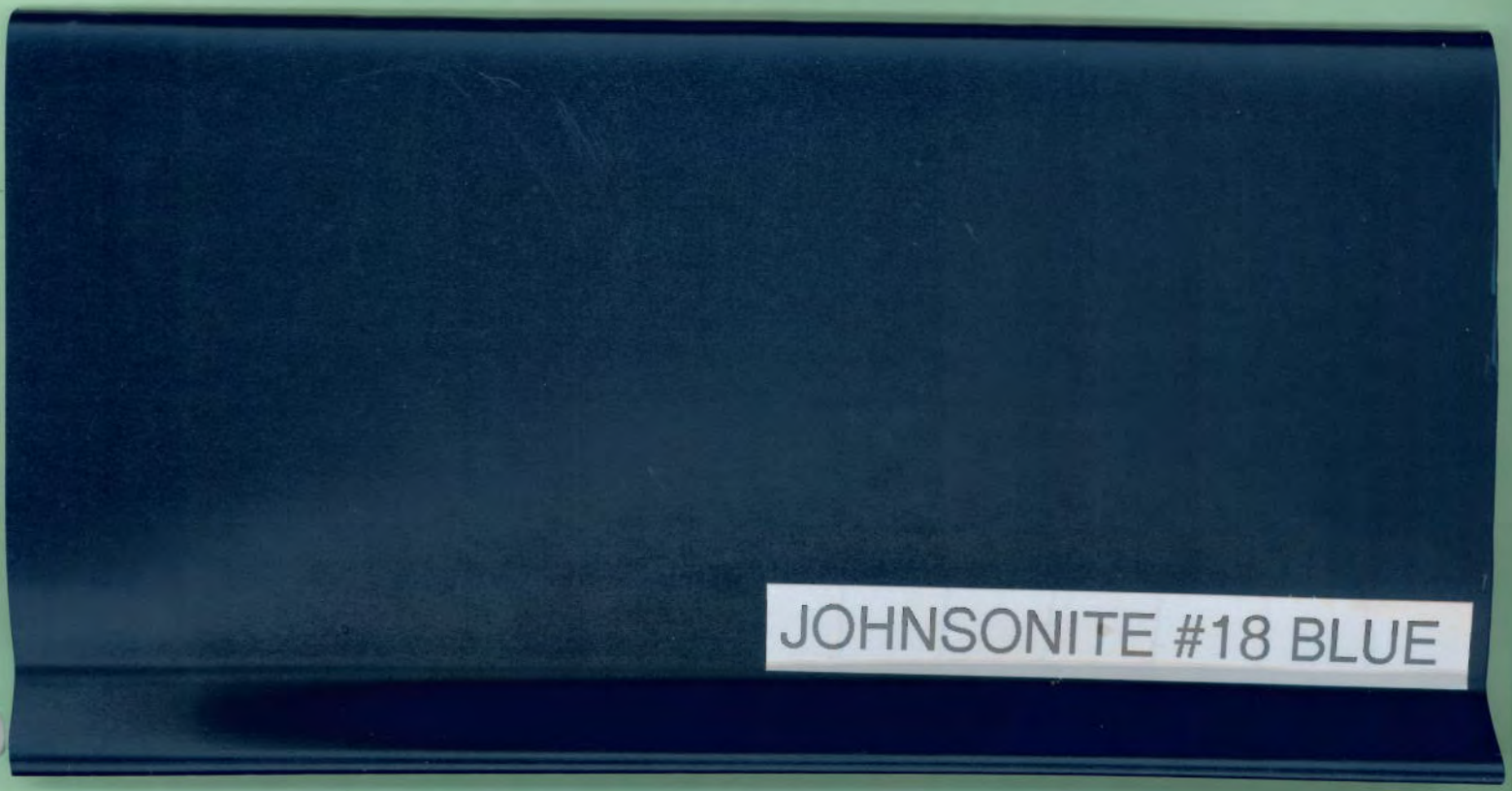

ARMSTRONG 1732 REVEALED EDGE

# CEILING TILE



# COVEBASE

# COVEBASE

# COVEBASE


# PAINT

SHERWIN-
WILLIAMS

SITE WHITE

SW7070

RHINESTONE

BENJAMIN
MOORE

RHINESTONE

# Genesis White
# 2134-70

SHERWIN-
WILLIAMS

LAZY GRAY

SW6254

RHINESTONE
TRIM

BENJAMIN
MOORE

RHINESTONE
TRIM

# White Stone
# 2134-60

SHERWIN-
WILLIAMS

BISCUIT

SW6112

LAMBSKIN

# Lambskin
# 1051

SHERWIN-
WILLIAMS

NOMADIC DESERT

SW6107

LAMBSKIN
TRIM

BENJAMIN
MOORE

LAMBSKIN
TRIM

# Fairway Oaks
# 1075

# Robins Air Force Base
# Base Facility Standards

**Part 4B**

**Architectural Compatibility Standards**

***22 November 2013***

78ABW WR/ALC 78CEG

**TABLE OF CONTENTS**

# 1. EXECUTIVE SUMMARY

> "The intention is not to limit creativity, but to aid the designer in reaching decisions consistent with the goal of this program and to create a unified AFMC image."AFMC Facility Quality Program (1996)

## A. INTRODUCTION

- In accordance with the goals of the AFMC Facility Quality Program, Robins AFB has developed Architectural Compatibility Standards to ensure consistency in future design and construction and renovation projects.

  **VISION -** As mission and process change over time, Robins Air Force Base (RAFB) will continue to adapt and grow. The design of new and renovated facilities at RAFB shall incorporate the following objectives

  - to support the mission
  - to function efficiently to the maximum extent
  - to be sustainable and minimize impact to the environment
  - to enhance morale by providing high design standards for the work environment to provide a sense of community for the military and civilian personnel

**How to Use This Document**

- Critical elements of this plan are identified in the table of contents. Specific compatibility standards and illustrations are included on the pages that follow. This document maps out the Vision for future facility and development at Robins AFB. It is intended to be used by program managers, project managers, and designers to plan and execute projects to support the objectives described herein. Detailed reference documents are listed at the end of this document. This planning document is intended to be a guide and reference tool to ensure architectural compatibility in all future maintenance, repair and construction projects.


## B. ARCHITECTURAL COMPATIBILITY GOALS

Identity. Improve the quality of the built environment and develop a greater sense of architectural identity at Robins AFB

Functionality. Encourage expression of building function and mission while maintaining a consistent design context

Innovation. Encourage the inclusion of new expression of technologies and incorporation of climate responsive elements into all facility design

Maintainability. Encourage design consideration for maintenance needs

## C. DESIGN IMPLEMENTATION.

- Designers are encouraged to explore innovative solutions utilizing the latest technology available while achieving a balance between current Air Force Guidance and Standards, budget constraints, site conditions, and user requirements.
- A number of architectural elements have been identified as particularly relevant and are highlighted below.
- Incorporate Basewide Architectural Guidelines to the extent possible for all new buildings as compatible with adjacent zone facilities and elements.

This plan is not intended to stifle creativity. It communicates and illustrates current design standards which will unify and strengthen the architectural fabric of Robins Air Force Base (RAFB) and the Warner Robins Air Logistics Center (WR-ALC). Exterior standards apply to all organizations on base including hosted units, Georgia Air National Guard, USMC, Army Corps of Engineers, AAFES, Commissary, DLA, AFRC, and commercial organizations.

### Architectural Compatibility Manager

The 78 CEG/CE Base Architectural Compatibility Manager is the **CE Technical Support Chief**. The compatibility manager is responsible for ensuring that all facility projects are compatible with the standards set forth in this document, and for maintaining and updating this plan.

## 2. ARCHITECTURAL COMPATIBILITY ZONES

### A. Zones

Robins AFB has been divided into eight Architectural Compatibility Zones identifying areas where any construction of new or the renovation of existing facilities, compatibility with adjacent facilities **is required.** Some architectural components, including paint, roofing, and signage systems, do not vary from zone to zone and become unifying elements in the overall base plan. The zones are summarized below.

## A. INDUSTRIAL FLIGHTLINE

## B. OPERATIONAL AIRCRAFT UNITS & FLIGHTLINE

## C. ADMINISTRATIVE & INDUSTRIAL FACILITIES

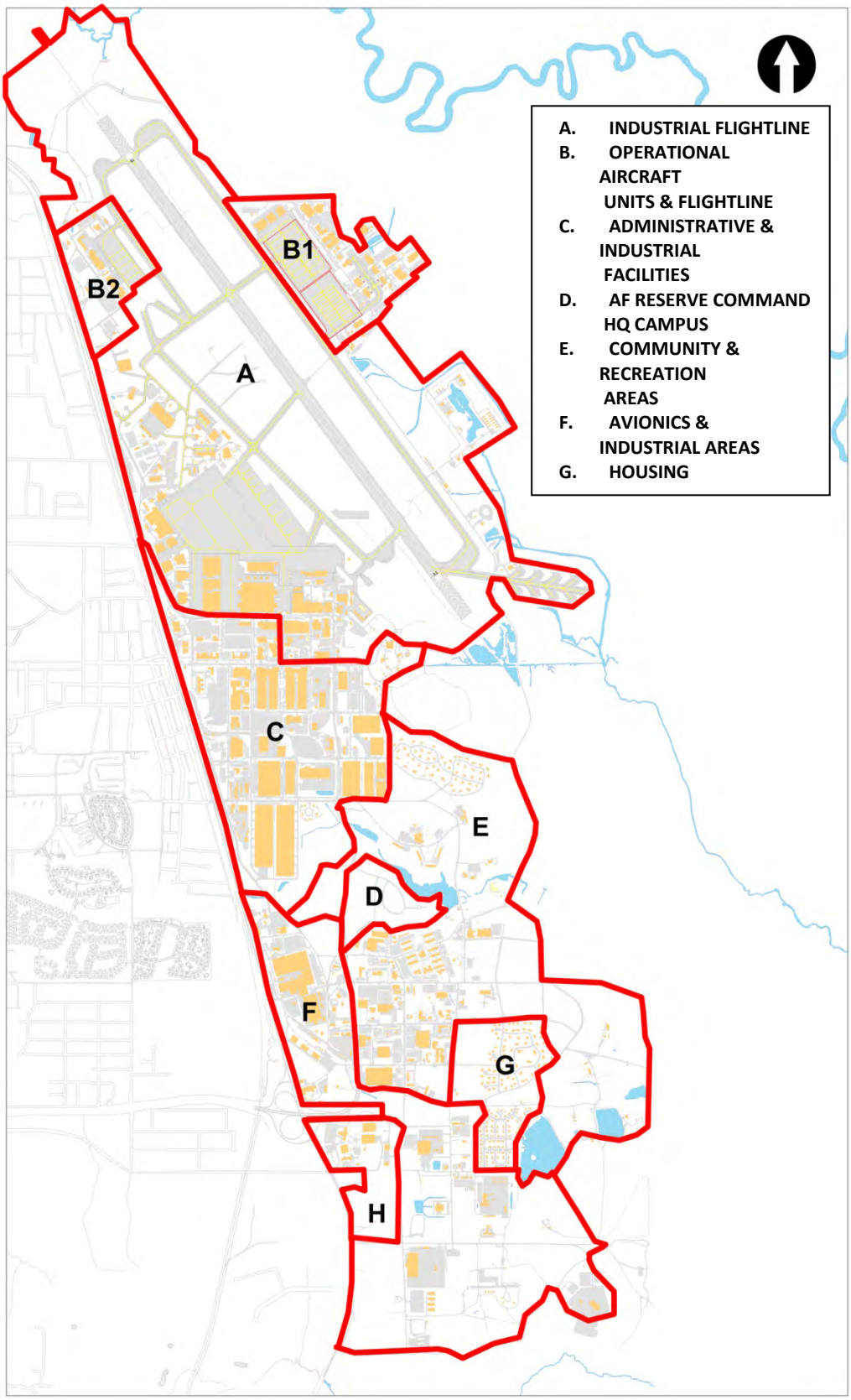
## D. AF RESERVE COMMAND HQ CAMPUS

## E. COMMUNITY & RECREATION AREAS

## F. AVIONICS & INDUSTRIAL AREAS

## G. HOUSING

## H. MUSEUM

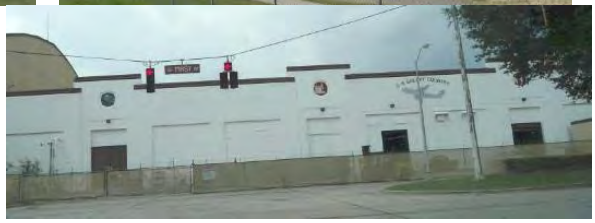

A. INDUSTRIAL FLIGHTLINE
B. OPERATIONAL AIRCRAFT UNITS & FLIGHTLINE
C. ADMINISTRATIVE & INDUSTRIAL FACILITIES
D. AF RESERVE COMMAND HQ CAMPUS
E. COMMUNITY & RECREATION AREAS
F. AVIONICS & INDUSTRIAL AREAS
G. HOUSING
B1
B2
A
C
E
D
F
G
H

**ZONE A**. Is the secure area which defines the active Flightline excluding Zone B, to the east and west. A great majority of the facilities are large hangars to support the Programmed Depot Maintenance (PDM) of the F-15, C-130, and C-141 aircraft. Secondary maintenance and administrative facilities are also scattered throughout the zone.

The Industrial Flightline District is dominated by large aircraft hangars with related ancillary buildings. The majority of facilities are metal skinned. Future construction projects will specify factory-painted metal finishes with a 20-year warranty, which are compatible with existing facilities and the color standards in Section 6.F. Roof surfaces shall be compatible with the lighter-colored base color standards in order to maximize reflectivity



GEORGIA AIR NATIONAL GUARD

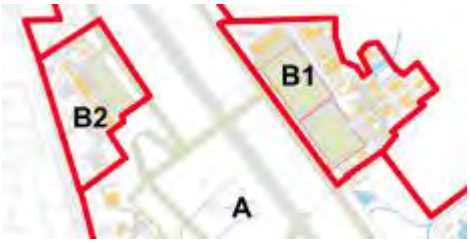


**ZONE B – Operational Aircraft Units & Flightline**

Zone B is the remaining portion of the secure Flightline located to the east and west of the runway. A majority of the administrative and maintenance facilities in this zone are brick with bronze standing seam metal roofs. Hangar facilities are metal clad. Some facilities are concrete block painted to match the RAFB standard colors. The zone includes the Joint STARS (Air National Guard & Georgia Air National Guard) areas, US Marine Corps and US Army Air National Guard facilities...

Every effort shall be made to coordinate new construction or maintenance and repair projects with the design standards prepared for the Joint STARS mission bed-downs and RAFB Standards. Brick shall be the architectural finish of choice for all administrative facilities. Hangars shall be prefinished metals consistent with the base color standards found in Section 6.0 or a combination of brick and metal.

**B1 – EAST**

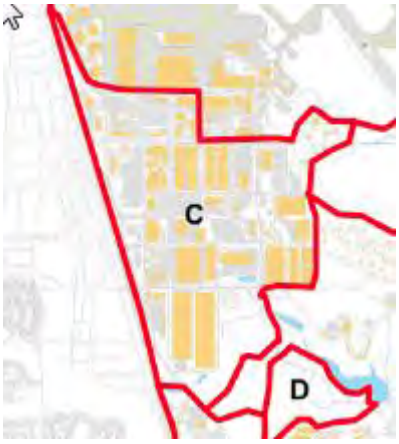


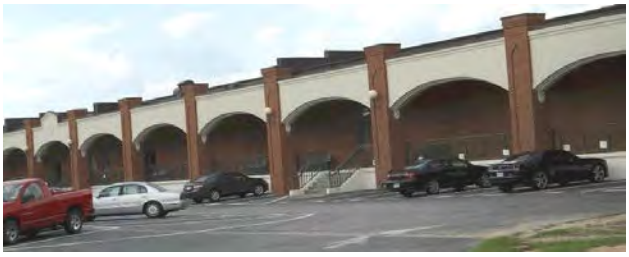

**B2 - WEST**

**ZONE C – Administrative/Industrial**

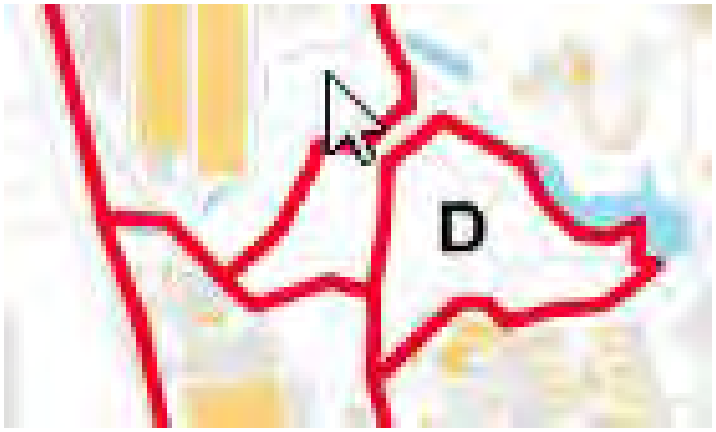
This zone identifies multiple administrative, industrial and warehousing facilities; Zone C. is comprised of many facilities which have been constructed with a multitude of architectural finishes. Careful attention to compliance with the standard architectural materials and finishes defined in Section 6.0 is critical. Future facilities construction or renovation shall be consistent with existing present and/or adjacent facilities, to ensure compatibility and continuity.

The Weapons System Support Center, B/301, is a 1992 Air Force Design Award winner and is a focal point for successful renovation of an existing facility. Similar projects should strive to emulate this quality of design while taking into consideration consistency with the Base Architectural Compatibility Standards.



**ZONE D – Air Force Reserve Command Headquarters Campus**
The new DNFC facility, the first element of the future campus, is a brick faced, EIFS paneled structure, with CMU and cast stone components, and a standing seam metal roof. This is the first phase of a future multi-building HQ Campus. Future construction is required to be consistent and compatible with design elements and construction materials.



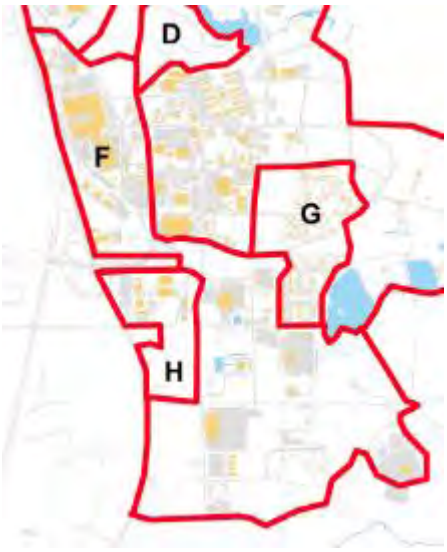

**ZONE E – Community & Recreation Areas**

The zone has high visibility, caters to all base and many off-base (retired community) and public users. Community use facilities include, Medical, Administrative, educational, Service, AFFES, Commissary and Dormitory uses. Existing structures are primarily brick and/or EFIS faced with standing seam metal roofs. Recreation Areas include Fitness/Gym facilities, athletic fields, a golf course and picnic areas. Any future construction is required to be compatible with existing adjacent facilities.

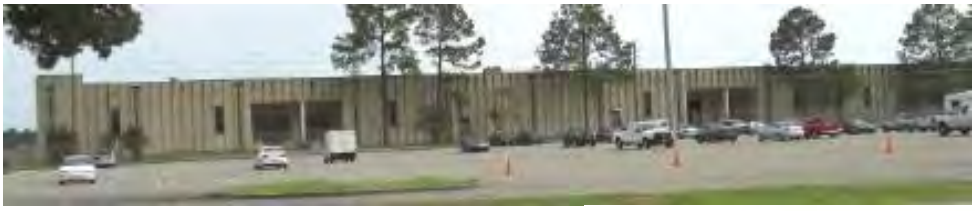

All Base tenant facilities, to include AAFEs and Commissary facilities shall also meet Architectural Compatibility Design Standards.


**ZONE F – Avionics/Industrial**

An Avionics Complex in the North part of this zone is primarily composed of metal or precast concrete surfaces. The other industrial users in the more open South portion of the zone include CE and Combat Communications facilities with a combination of brick-faced/standing seam metal roofs at administrative buildings and metal clad facilities at industrial type use structures. . Future construction or alteration shall be consistent with adjacent structures are in this district.







**ZONE G – Housing**

Is comprised of 359 Military Officer and Enlisted Family Housing units. These are privatized and maintained/operated by a contractor. The design and construction of any new facilities, is required to be compatible with existing structures and contingent on contractor and RAFB approval.


**ZONE H - Museum Area -** The zone consists of Museum Hangars, Administrative Facilities, outdoor Display Areas and ancillary structures. Hangar construction consists of primarily metal clad buildings**.** The facility colors, Blue and Gray, reflect a separate identity and vary from standard RAFB colors. All other design standards are applicable. Any future construction/renovation requires RAFB and Museum Director approval.


**BASE ENTRIES –** For Base Image purposes, the configuration and design of any future Base Entries shall be consistent with the design and materials of existing base entry new structures (Gates 3, 5 and 14).

## B. Historic Preservation

Robins AFB and AFMC are dedicated to complying with all federal legislation pertaining to the preservation of historic facilities. Coordination between the base and the State Historic Preservation Officer (SHPO) is required.

- All facilities 50 years of more must be considered as candidates for the National Register of Historic Places.
- Examples of Robins AFB facilities considered for historic preservation are Building 220 (HQ AFRC), Building 110 (Base Ops), and Building 125 (Depot Maintenance Hangar), and all General Officers' Quarters (GOQs).

**Chiefs Circle Houses**

**Base Historic Preservation Officer (BHPO)**

- Environmental Management (78CEG/CEAN) is responsible for the coordination of all historic preservation issues with the State of Georgia, 78 CEG/CE, and all appropriate using agencies. All potential candidates for the National Register of Historic Places at Robins AFB shall be determined by the BHPO and approved by the SHPO.

**State Historic Preservation Officer (SHPO)**

- Throughout the state of Georgia, The State Historic Preservation Officer (SHPO) is responsible for validating candidates for the National Register of Historic Places. The SHPO is the sole authority in the approval of candidates for the National Register of Historic Places.

- Once a facility has been identified as a potential candidate, or actually placed on the National Register, all potential designs to maintain, repair, or alter the facility in any way whatsoever must be approved by the SHPO.

- Design documents for potential construction projects must be sent to the SHPO for approval. The state of Georgia has thirty days to approve or deny proposed construction projects.

### 3. Handicapped Accessibility

Robins AFB is dedicated to providing adequate handicapped accessibility in all facilities basewide. All accessibility issues shall conform to the codes and guidance provided by the Unified Facility Criteria (UFC) 1-200-01 - General Building Requirements, which indicates the following: "Use the **ABA Accessibility Standard for Department of Defense Facilities** as adopted by the Deputy Secretary of Defense memorandum dated October 31, 2008, in lieu of IBC Chapter 11. \1\ Where the ABA references the IBC 2000-3 and supplements, the latest version of the IBC is acceptable when it meets or exceeds the ABA requirements./1/"

## 4. Base Comprehensive planning

All Planning and Facilities Siting must be coordinated and approved by the Office of the Base Community Planner and **t**hrough the base's Facility Board, The Base Commander and the Air Logistics Center Commander will also approve all siting requests for new construction.

### A. SITING COMPATIBILITY GUIDELINES

Proper siting, orientation and the configuration of a building are critical design decisions and have great impact on the quality of construction projects. Key factors are:

- Orient buildings to take advantage of summer shading and winter passive solar heating.
- Maximize natural lighting while controlling solar gain.
- Orient windows, decks and balconies to utilize natural breeze.
- Consider prevailing wind direction; locate building entrances in a protected area if possible.

Consider vehicular and pedestrian circulation to and from the facility SITING. Proper siting, orientation and the configuration of a building are critical design decisions and have great impact on the quality of construction projects. Key factors are:

- Orient buildings to take advantage of summer shading and winter passive solar heating.
- Maximize natural lighting while controlling solar gain.
- Orient windows, decks and balconies to utilize natural breeze.
- Consider prevailing wind direction; locate building entrances in a protected area if possible.
- Consider vehicular and pedestrian circulation to and from the facility

**Facility Siting**

- Proper facility siting in accordance with the Robins AFB land use plan is critical to ensure that every effort is made to avoid incompatible land usage. Through the base's Facility Board, the Air Logistics Center Commander will approve all sitting requests for new construction.

**Area Development Plans (ADP)**

- When proposed construction requires planning beyond the limits of a single facility, designers should pursue the creation of area development plans in order to facilitate thoughtful planning of the relationship facilities have with one another.

**B. Air Installation Compatibility Use Zone (AICUZ)**

- The Robins AFB study provides an assessment of noise levels, and statistical analysis to determine aircraft Accident Potential Zones (APZ). The goal of the study is to provide protection of the public and compatible development adjacent to the airfield.

**C. The Base Comprehensive Plan**

- The Base Comprehensive Plan is on the Robins AFB Web at www.gis.robins.af.mil. The plan features detailed narratives and figures (maps). There are four primary categories: (1) Constraints and Opportunities; (2) Land use; (3) Infrastructure; and (4) Capital Improvements. New projects should be compatible with the comprehensive plan.

## 5. ARCHITECTURAL COMPATIBILITY DESIGN GUIDELINES

### BUILDINGS

**Style / Form**

- Place buildings at grade and express main entrance and related features as an architectural feature.
- Rectangular elements are the standard for major building masses. In general, use clean and simple forms. .
- Emphasize horizontal proportions.
- Develop a strong relationship between buildings and exterior spaces.

**Scale / Massing**

- Reduce the monumental appearance of large structures by including smaller components.
- Combine functions whenever possible to avoid proliferation of small independent structures.
- Break up the mass of large structures or reduce plan dimensions to reduce roof volume in low height buildings.

**Existing Buildings**

- Match the existing materials for any addition/alteration projects unless a significant change to the exterior envelope is desired and approved.
- Whenever possible bring existing facilities into compliance.

## 6.0 Architectural Finishes and Components

### A. Metal and Plastic

- Metal siding is used extensively in most hangar and industrial facility construction. All metals shall be factory-finished with the manufacturer's standard paint colors to match the Robins AFB standard paint scheme as closely as possible.

- Metal conduit and cables are often mounted on the sides of facilities. These shall be factory-finished with the manufacturer's standard paint colors, or field-finished (minimum two covering coats), to match the Robins AFB standard paint scheme as closely as possible.

### B. Concrete

- Concrete elements provide an acceptable accent to masonry construction, concrete should be avoided as an entire architectural finish. The use of pre-cast concrete panels may be acceptable with approval.

### C. Brick

- Brick is the predominant and recommended architectural finish throughout all non-Flightline or Industrial zones at Robins AFB due to its low maintenance needs and durability. All bricks shall be laid in a running bond except accent elements. "Classic Velour Red" is the preferred Base brick color. Other brick colors may be used for accents. Keep in mind the basic colors for Robins AFB are shades of Tan and Bronze.

CLASSIC VELOUR RED

VELOUR LIGHT GRAY

VELOUR DIXIE ROSE

- The brick colors at existing RAFB facilities are no longer manufactured. Since several brick types have been used in past construction, the design goal is to match the brick types used in adjacent facilities, .Design basis for the Robins AFB standard bricks are Classic Velour Red, Velour Dixie Rose and Velour Light Gray as manufactured by Cherokee Brick & Tile, Macon, GA; or equal approved by the Base Architectural Compatibility Manager.

- Renovation, repair, additions of or/ to existing facilities or new construction shall match existing and/or adjacent facilities.

- Mortar color and joint finish to be used with the standard brick colors, should normally be gray or natural Colored mortar for accent purposes may be used if approved by the Architectural Compatibility Manager.

**D. Concrete Masonry Unit(s) (CMU)**

- Concrete masonry units are an acceptable and common building material at Robins AFB. Standard 8- by 12- by 16-inch CMUs shall be laid in a running bond and are acceptable with the following finishes:

  *Smooth*
  *- Standard smooth-finished CMUs are also acceptable when specified to be painted in accordance with the base color scheme or when selected with the inherent color to match the design basis shown below.*

- Design basis for CMUs shall be approved by the Base Architectural Compatibility Manager prior to incorporation in the project. All mortar color shall match the CMU color.

- Split-face CMU  Color to be TAN or to match adjacent structures.

**E. Exterior Insulation Finish System (EIFS)**

- When compatible with the base standard colors, use of EIFS products such as Dryvit, Synergy, and Durock are acceptable to accents to masonry construction.

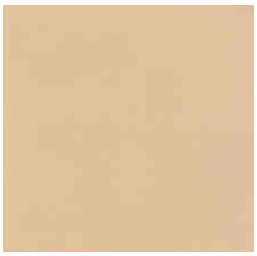
- This product shall not be designed to grade.  Brick or CMU wainscots provide a more desirable and durable alternative.
-

- Insulated Metal Panels may be used if they match finish color of adjacent facilities, and meet LEED Standards. Design basis for metal panels is “To Be Determined” (several are under consideration at this time).

**F. Paint**

- Industrial, Commercial and Administrative: All painting shall conform to the following color standards.

## STANDARD COLORS

| Base Color | Contrast Color | Accent Colors | Highlight Color |
|---|---|---|---|
| Robins 42 | Robins 62 | Robins 68<br>Robins 48 | Devoe 1UM21A<br>Garrison |
|  |  |  |  |
| Main Walls<br>Downspouts<br>Vents/Louvers | Standing Seam Roofs<br>Metal Fascia<br>Gutters<br>Doors/Door Frames | Hangars<br>Other Buildings<br>Contrast Colors for Large Buildings<br>Option for Small Doors<br>Transformers<br>Handrails – Robins 48 | Lamp Posts |

### Exempt Buildings

300 301 541 542 545 547 551 552 553 557 560 591 593 594 595 Museum

- Officers Club and Conference Center: Due to the historical nature of the Officer's Club and its architectural style and the Conference Center, those facilities should be painted white.

- Pre-engineered Metal Buildings (PEMB): Roof color shall be white (Industrial Areas on Robins), gutters, fascia and rake trim shall match Robins 62 or PEMB manufacturer's standard color that matches Robins 62, exterior prefinished metal wall panels, prefinished downspouts, sill trim, prefinished louvers, and prefinished "eyebrow" louver covers shall match Robins 42. Interior "liner" panels shall be white. Exterior personnel doors and trim shall be Robins 62. Overhead coiling doors and canopies above all doors shall be prefinished to match Robins 62. All aluminum storefront window frames shall be dark bronze. Bollards shall be safety yellow.

## 7. Roofing

Roofing is a high visibility and significant component for the visual integrity and continuity of architectural compatibility at Robins AFB

### USAF Sloped Roof Policy

- HQ USAF has published policy directives for the conversion of flat roofs to sloped roofs. This policy authorizes conversion of built-up roofs to sloped roofs provided.
  - The existing roof needs to be replaced due to its deteriorated condition.
  - No functional space is added to the facility.
  - The useful life of the facility exceeds the life of the roof system selected.
  - The selection of the sloped roof system is justified as the most economical method based on a life-cycle economic analysis

### Built-Up Roofing (BUR)

- BUR is not recommended for the construction of new facilities.
- In some instances existing industrial facilities may be reroofed with a BUR when metal roofs are not economical or feasible.

### Roof-Top Equipment

If at all possible, the placement of roof-top mechanical and utility equipment shall be avoided. However, if no other viable alternative exists, the designer shall consider concealment of this equipment through color or screening compatible with the existing facility. Any exceptions must be approved by 78CES/CEOS.

## B. Standing Seam Metal Roofs

***The NEW base standard of a SIERRA TAN, standing seam metal roof with a 3:12 slope shall be insulated and have a Cool reflective coating, and is recommended for use as much as feasible base-wide to meet LEED. (See BFS Part 7A, Energy Policy for further detail.) standards at Flightline and Industrial Facilities. Lower sloped roofs may be used, depending on the application, with the approval of the project architect. To maintain continuity and a consistent aesthetic appearance present high public use and visibility areas, such as Zone E, community facilities, the existing DARK BRONZE roof color shall be maintained, with approval of the Base Architectural Compatibility Manager, and shall include a "Cool Roof Coating". Separate major new complexes, such as the Dorm Campus Master Development Plan shall use the Sierra Tan Standard.***

SIERRA TAN

DARK BRONZE



PEARL

- Solar efficient roof panels are highly recommended for LEED and energy conservation purposes, if project cost permits.
- Solar Panels to supplement water heating requirements shall be components of all future RAFB facilities**. They may be part of the roof structure or independent elements.**
- Existing Hangars in the flightline area have "Pearl" colored metal roofs**.** Replacement roofs in this area shall utilize the same color to match existing.

**Low Slope Roofs**

Light colored roofs provide significant heat radiation benefits in most situations. They should be considered by the designer in industrial areas and/or where the roof has limited or no visibility from the primary visitor traffic routes.

**8. Fascias, Gutters and Downspouts**

- Incorporate continuous metal fascias that are scaled to match the roof. Size them 8 inches minimum and 14 inches maximum in height.
- Fascias shall match the roof color when used with metal roofing.
- Gutters on sloped roofs are encouraged and shall be factory finished to match the roof color.
- Integrate downspouts with architectural details and match their color with that of adjacent wall surfaces.
- Limit the use of angle rain water leaders to the extent possible.
- Use underground drainage where possible. At a minimum, provide concrete splash blocks to carry water away from foundations.
- Interior roof drains and open scuppers are allowed only with approval.

Roof Vents and Elements

- Minimize, consolidate, and organize roof penetrations on the least visible side of the building.
- Paint vent pipes and other roof elements to match the roof color.
- Do not use rooftop mechanical units. When required, minimize the negative visual effects with screening to match the roof color.
- Consider the use of dormer vents to conceal and screen exhaust fans.
- Make mechanical vent sizes and shapes consistent with architectural elements.
- Avoid roof-mounted antennas.

## 9. WINDOWS AND DOORS

All windows and doors are to meet AT requirements as specified in AT/PP regulations and guidelines.

**Openings**

- Use window type, size, placement and mullion pattern to emphasize the overall architectural design.
- Coordinate window and door placement horizontally and vertically.
- Set windows back at least 4 inches from the building façade.
- Use operable windows with screens as possible.
- Transom windows are encouraged.
- Provide shading and lighting devices to minimize solar gain and maximize interior lighting. (e.g., light shelves)
- In open office areas locate windows above the height of potential open office partitions.

**Doors and Frames**

- For exterior doors requiring glazing, use dark bronze aluminum storefront systems with thermal-break construction.
- Hardware shall be of same color.
- All secondary-use and service doors and frames shall be painted to match adjacent wall color.
- Limit hollow metal frames to security doors and utility rooms matching wall color.
- Sealants applied adjacent to windows and doors shall match the frame color.
- Solid exterior doors shall be of steel construction, factory primed, field painted, with stainless steel hinges and brushed chrome hardware.
- Consider wind loading and direction when designing exterior entry and service doors.

**Glazing**

- Use bronze tinted, dual-pane insulated glass.
- The inside of dual-pane windows must use a minimum of ¼" laminated glass and be framed in accordance with UFC 04-010-01 to meet AT/FP requirements.
- Avoid mirrored, spandrel, and plastic glazing. Glass block may be used with ACRB approval.
- Translucent insulated panels are acceptable. Use Kalwall Crystal panels with Bronze color finish on frames or equal product.

**Clerestories and Skylights**

- Develop clerestories or low-profile skylights integrally with the building design.
- Use clerestories in open office spaces where partitions may be placed against an exterior wall.
- Use tubular skylights to maximize natural lighting. As possible.

## 10. PARKING

Develop functional lots with clear circulation and a positive appearance that complements the facility.

**General**

- Parking layout must address maintenance, safety, and accessibility.
- Combine parking areas for multiple facilities, where possible.
- Use the 90-degree parking configuration when possible.
- Provide a greenbelt of 20 feet from parking lots to streets.
- Use shrubs in groupings and landscaped berms around the perimeter to screen and soften the impact of parking areas.
    - Wherever possible, provide tree shading or shade canopy for parking areas. Incorporation of solar panels in shade canopy design is encouraged. 78 SPS is the authority for assigning reserved parking spaces. Requests for reserved parking should be submitted to them along with justification and organization point-of-contact.

    - Parking stall width should be determined by the use of the lot. For example, parking spaces for BX or Commissary lots where drivers have to deal with packages should be wider than employee parking with low turnover. In general, spaces should not be smaller than 9 feet wide.

- Handicapped parking spaces should match the required standard from the UFAS or the ADA, whichever is predominant

**Medians and Islands**

- Reduce visual mass of large parking areas with landscaped islands and planting strips. Consider shading where possible.
- For landscaped medians and planting islands, provide a minimum dimension of 6 feet to accommodate root system.
- Use trees in medians and islands to create shade and interest.
- Use decomposed granite or approved rock in medians and islands for ease of maintenance. Allow for breaks in the medians where necessary for pedestrian cross circulation.
- Provide medians for every four rows of vehicle and planting islands for every 20 stalls where there is adequate space.
- Coordinate layout for light poles with landscape islands and minimize their number to provide the required illumination.
- Provide designated areas for pedestrian cross traffic.

**Paving**

- Provide 4 inch wide white striping for all pavement markings.
- Asphalt paving is the standard.
- Use concrete where required for heavy vehicles, motorcycle parking, and where fuel spills may occur.
- To obtain LEED points, use heat reflective concrete or pervious concrete when financially feasible in parking lots.

## 11. EXTERIOR SIGNAGE

Consistent, compatible signage throughout the base is a tool that serves to visually tie together various built and natural environments. See Attachment UFC 3-120-01 Air Force Sign Standards.

### Standard Facility Signs

- Exterior facility signs at Robins AFB are the sole responsibility of the Base Sign Manager and the 78 CES sign shop. The Robins AFB Sign Standards have been developed in accordance with UFC 3-120-01, Sign Standards. Types B1 and B2 are modified to replace the logo at the top with the building number.

- TYPE B1 – Facility Sign (upper echelon)

- TYPE B2 – Facility Sign (lower echelon)

- TYPE B4 – Building Entry Sign

- TYPE D2 – Directional Sign

- Traffic Signs – Follow the Manual on Uniform Traffic Control Devices

### Facility Identification

- Given the approval of the Base Sign Manager and the Architectural Compatibility Manager, lettering will be allowed on the exterior of prominent facilities. Size, type, and color of lettering will be approved on a case by case basis.

### Logos and Supergraphics

- Painted logos and racing stripes are not acceptable. .

### Special Signs

- Special Signs will be permitted for unique situations subject to the approval of the Base Architectural Compatibility Manager.

## 12. LANDSCAPING

Landscape Architecture goals are the enhancement of the environment, conservation and reduced maintenance and water use.

Landscape themes include planting treatments, site elements, barriers and screening, pedestrian environments, and open space; which contribute to the environment and visual quality of Robins AFB.

**Recommended Plantings (see BFS 4C – Landscaping)**



### A. LANDSCAPING GOALS

Promote landscape design that relates to the facility and relates to the neighborhood. Where appropriate, create outdoor places with landscape design in addition to enhancing building improvements.

**Ecology** - Create an overall basewide landscape image that is unique to Central Georgia and emphasizes the native natural setting of Robins Air Force Base. Eliminate the use of potentially invasive species. Consider landscape design as an extension of the local ecosystem. Provide habitat for the preservation of indigenous species.

**Context** - Promote landscape design that relates to the facility and relates to the neighborhood. Where appropriate, create outdoor places with landscape design in addition to enhancing building improvements.

**Maintenance** - Reduce maintenance requirements such as pruning, trimming, mowing, weeding, and mulching. Considerations should be given to dropping of seeds and resin, fragile tree limbs and other maintenance concerns. Longevity and disease resistance are also key considerations.

**Shade** - Use shade trees as possible in public seating areas and parking lots.

B. **LANDSCAPING DESIGN GUIDELINES** - Use landscaping design to enhance facilities and neighborhoods. Organize landscape features to connect individual facilities to walkways, roadways, and open spaces.

**Maintenance**

- Establish a maintenance program, as part of the design and in consideration of future maintenance costs.
- Prep planter and mulch beds by spraying with pre-emergent herbicide and cover with weed control fabric.
- Xeriscape planting is preferred. Provide irrigation system only if necessary and only until plants are established.
- Concrete or masonry raised planting beds are acceptable where consistent with and integrated with hardscape design. Use split-face or Allen Block.

**Edging**

- Separate and define all planting areas from sod areas with edging.
- Provide concrete mow strips at planting beds as the standard.

**Landscape Screens**

- Where possible, use landscaping instead of walls or fencing for screening.
- Reduce the negative visual impacts of open utility elements and unsightly features with landscape screening.
- Use a three-tier landscaped screen that combines ground cover, shrubs and small trees.

- Plant street trees on the building side of sidewalks as possible.

Retaining Walls shall be of Split-face Block or Allen Block in a natural or tan color'

Allen Block Retaining Wall

Split-face CMU retaining Wall with cap

## 13. SITE COMPONENTS/ELEMENTS

Consistency is the most critical factor in the selection of various site elements such as benches, trash receptacles, lighting fixtures, pavilions, and street furniture.
Designers shall consider maintaining compatibility with similar site elements within a particular architectural zone on Robins AFB.
When practical, a dark bronze anodized finish shall be selected for all site elements on base.

### A. Fencing and Screening

Comprehensive screening considerations are a major element in strengthening the visual image of RAFB. Several screening types are acceptable. Consistency and durability are essential Well-designed screens should not draw attention and shall be kept to a minimum. Screening shall be considered and /incorporated into the design of facilities to address the following types of items: Dumpsters, exterior mechanical and electrical equipment, storage/service areas, etc.

**Brick fencing**

- Selection of brick must be compatible with the standards defined in Section 6.0 of this document.
- Brick fencing may be solid or perforated for ventilation reasons.

Brick Fence

Brick fence to have limestone or exposed precast coping. Height not to exceed 7'- 0". All bricks shall be laid in a running bond.

**Metal fencing**

- Provide metal fencing in the "shadow box" configuration. To be 8' high and dark bronze color or match adjacent facility wall color.

**Chain Link Fencing**

- This type of fencing is only acceptable when required by security regulations. When required, screen with shrubbery. If not possible, provide fabric screening attached to the fence in colors compatible with adjacent facilities and RAFB color standards.

**Perimeter Fencing and Fence Gates**

All perimeter fencing shall meet AT/FP and shall comply with Unified Facilities Criteria (UFC) 4-022-03 Security Fences and Gates. Two types of fence are recommended and presently used.
**Steel Security Fencing** - Design Standard "Ameristar" Trident Steel Fence, 8'-0" high.

**Chain Link fencing** – with black vinyl coating – 7'-0" high with 3 strands of Barbed wire on 1' high outriggers.

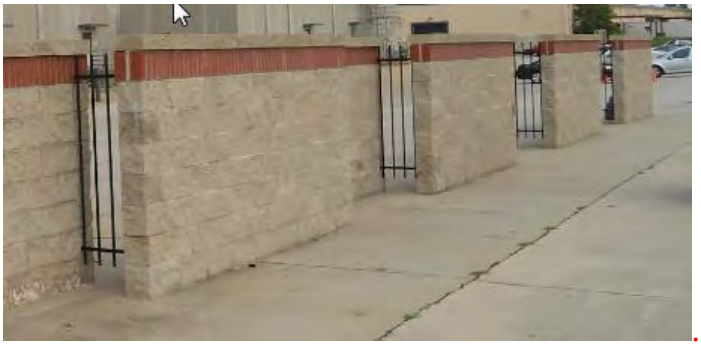
**Vinyl Coated Chain Link**

**Steel Security Fence**

**Mow Strips -** Any new fencing/or screen wall shall require a concrete mow strip if adjacent to a grassed/ or planted area

**Screen Walls**

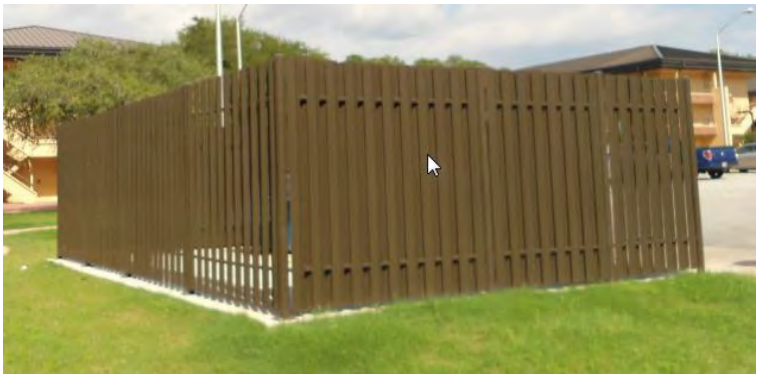
Screen walls may consist of perforated brick or CMU components to allow for ventilation. Steel security fence components may be incorporated. The below image is a combination of Split-face block with a brick course and a concrete cap, used along Watson Blvd.



Watson Blvd Screen Wall

**Dumpster Enclosure Screens**

- Use Shadowbox Dark Bronze Metal Fencing. Height to be 8'- 0"
- Locate dumpsters to minimize visual impact.
- In high-visibility locations provide metal gates to screen dumpsters.



## B. Bollards

- Provide bollards where required to protect structures or equipment and shall meet AT/FP Requirements.
- Precast concrete Bollards are required at high visibility and high vulnerability locations that include major administrative and secure locations.

High Security Area Bollards

Entry Area Bollards with Steel Chain

Removable Bollards for AT/FP

## C. Pavilions/Shade Structures (Gazebos)

Use centrally located pavilions between several facilities to create multipurpose use shaded spaces.

- A ventilation cupola is highly recommended.
- Pavilions shall be pre-manufactured metal structures. They may be square or hexagonal in shape and shall have a dark bronze finish or match adjacent facilities.
- Pavilions may include attached matching benches or recycled plastic furnishings.

Large Pavilion at Dorms Plaza

Small Pavilion

All pavilions, gazebos or shade structures, erected on Robins Air Force Base must be approved by the Base Civil Engineer. Requesters must submit to the Base Civil Engineer a proposed site plan layout showing the distance from existing buildings and concept drawings of the proposed gazebo for approval. Requests should be submitted to 778 CES/CEPT.

## D. CANOPIES

Canopies are to be prefinished metal, with a standing seam metal roof to match building roof color. All canopies over 100 square feet will require a structural design and meet Robins AFB Facility Standards - Roofing requirements.

## E. PLAZAS/PAVING

Any new plaza, courtyard or major building entry area shall use a permeable paving, surface allowing for drainage into the soil beneath it

Permeable Pavers

Airplane Plaza

## F. RAMPS/RAILS

Handrails shall meet ADA standards.
Handrails shall be finished with a dark brown powder-coated surface. Integrate handrail designs with the facility design.

## G. WALKWAYS

Develop a consistent pedestrian circulation system of walkways and paths to enhance the community. Connect passenger waiting shelters, outdoor plazas, parks, and other pedestrian gathering sites into the overall circulation network.

**Sidewalks**

- Provide minimum 5-foot wide walkways along all primary, secondary, and access roadways.
- Maintain a minimum 3-foot wide landscaped parkway between curb and sidewalk.
- Curvilinear and meandering walks are preferred where appropriate.
- Size sidewalks appropriately for the visual scale of the facility and the amount of pedestrian traffic volume.
- Use natural colored concrete with a broom finish and troweled edges.

**Crosswalks and Ramps**

- Ensure that paths lead to the safest crossing point possible, and cross roadways at 90-degree angles.
- Incorporate ADA accessible curb ramps and white-color crosswalk markings.
- Provide for adequate drainage away from the ramp.

## H. BIKE PATHS

The incorporation of a bike path leading to any new facility is highly encouraged.
Bike Paths/trails shall be constructed of asphalt and/or concrete. They may be incorporated into new roadways as an addition to existing or as a separate component. Appropriate identification signage is required. They may be separate components or alongside an existing roadway.

Dorms Area Concrete Bike Path

Robins Pkwy, Asphalt Bike Path

# 14. SITE FURNISHINGS

**Outdoor Furniture**

**Picnic Tables**
Place picnic Tables at gathering areas. Use recycled tan color plastic with steel frame.

**Benches Seating**
- Provide seating along walkways, building entries, courtyards, and plazas.
  Place benches within a paved area

- Place surface-mounted or portable litter and ash receptacles at building entrances,

pathways, outdoor seating, and picnic areas.

- Locate these to be functional, yet visually unobtrusive

**Trash Receptacles**

Place surface-mounted or portable litter and ash receptacles at building entrances, pathways, outdoor seating, and picnic areas.

Locate these to be functional, yet visually unobtrusive

**Bike Racks**

- Provide bicycle parking areas for all facilities. Combine areas for densely sited buildings.
- Incorporate bike racks into hardscape design within 200 yards of building entrance.

**DRINKING FOUNTAINS**

Are to be 2-tier ADA compliant with a concrete aggregate finish.

**15. MODULAR BUILDINGS**

**Temporary**

Temporary leased facilities are to be comprised of multiple modular units (usually 12’ x 60’) combined for temporary use as office or classroom facilities. They shall have a common roof and exterior wall finish. This is usually EIFS and must be compatible with adjacent structures. A

permanent foundation is not required. The facility lease costs shall include provision for removal and site restoration. All ADA and other regulatory requirements shall be met.

## 16. SUSTAINABLE DESIGN AND ENERGY EFFICIENCY GOALS (See *BFS Part 7C – Sustainable Design Program* for details)

All projects shall achieve sustainability and energy efficiency to the maximum extent possible as defined by Presidential Executive Order 13423.

All new major construction projects or renovations shall be at least LEED Silver certifiable as defined by the USGBC.

Aspects of energy efficiency and LEED sustainability are relevant to Robins AFB. Designers are encouraged to incorporate these elements into facility design:

**Climate Responsive Design**
- Solar orientation
- Solar gain control
- Passive solar design
- Daylighting
- Shading for outdoor spaces

**Water Use Reduction**
- Use low flow fixtures
- Use smart or Computer Controlled and monitored irrigation systems where feasible
- Eliminate permanent landscape irrigation or use high efficiency systems
- Use of reclaimed water for irrigation where possible

**Energy Use Reduction**
- Use of EMCS to monitor and control energy use within facilities
- Use of high efficiency equipment and fixtures

- Provide sensor and controls to reduce unnecessary use

**Renewable Energy**

- Incorporate solar panels into architectural design where cost effective and appropriate.
- All new construction or renovation shall use solar panels as a supplement to water heating systems.
- Solar panel arrays shall be arranged in an aesthetically pleasing manner and be accessible for maintenance.

**17. AT-FP/Security**

Plan facility to accommodate standoff distance for present and future projects.
Determine if vehicular barrier is required. If it is, plan for establishment of a larger protected area with adjacent facility with same requirements. Consider visibility from surrounding streets to allow for security patrol.

**Building Function**

- Orient service side of the facility away from main roads and streets.
- Consider noise, light, traffic and other impact generated by the facility to surrounding areas and facilities.
- Consider desired sightline for the facility mission, such as a view of the flightline.
- Provide for necessary adjacency to other facilities.

**Utilities**

- Consider existing utilities and available points of connection. Minimize relocation of utilities where possible. When site utilities modification is required, consider future demands and routing.

**18. References**

This document is intended to provide references to specific details critical to successful architectural compatibility at Robins AFB.

1.0 Executive Summary
- AFMC Facility Quality Program
- AFMC Commander's Desktop Guide to Excellence in Base Operating Support (BOS)

2.0 Architectural Zones
- AFMC Facility Quality Program
- Architectural and Landscape Design Criteria for Joint STARS Mission Beddown (ACC)

3.0 Historic Preservation
- The Secretary of the Interior Standards for Rehabilitation and Guidelines for Rehabilitating Buildings

4.0 Handicapped Accessibility
- Uniform Federal Accessibility Standards
- The Americans with Disabilities Act (ADA)

5.0 Base Comprehensive Planning

- Robins AFB Base Comprehensive Plan
- Air Installation Compatibility Use Zone (AICUZ)
- Joint Land Use Study (JLUS)
- DOD Minimum Antiterrorism Standards for Buildings, UFC 04-010-01

7.0 Roofing
- Air Force Sloped Roof Policy

8.0 Exterior Signage
- Robins AFB Sign Standards
- UFC 3-120-01 Sign Standards

9.0 Traffic Considerations
- Robins AFB Curbing Plan
- Manual of Uniform Traffic Control Devices (MUTCD)

10.0 Landscaping
- Robins AFB Base Facility Standards

**<< END OF ARCHITECTURAL COMPATIBILITY STANDARD >>**

Author: Heinz Butt, 778CES/CEPT, 478-327-2913

Reviewer: Bill Buecker, 778CES/CEPT, 478-327-2912

Approval: ***Original Signed By***
Terry Landreth, 778 CES/CEPT, 478-327-2910

Revision History

| | |
|---|---|
| 24 Aug 2005 | Separated Architectural General from combined BFS into its own document, and included the Architectural Compatibility Standard as part of it. |
| 28 Jul 2011 | Grand Update of BFS Architectural Compatibility Standards |
| 7 Nov 2012 | Update of BFS Architectural Compatibility Standards |

# SITE RESTORATION

## 1. GENERAL

All areas (grounds) disturbed that require restoration with seeding or sodding shall be final inspected and approved by the Grounds Maintenance Manager, 78 CEG/CEIA, 478-327-8910, before acceptance by the Government will occur. It is your responsibility to contact the Grounds Maintenance Manager at the time you are ready to seed or sod the disturbed areas for an appointment to view the area and for determination of restoration and inspection time frame. Your name, contract number, QAE, contracting officer, and respective phone numbers will be required at that time.

Any damage to irrigation systems caused by your digging process shall be reported immediately to the digging permit manager at 478-327-8947, and the Grounds Maintenance Manager. All repairs to irrigation systems shall be made within 24 hours and shall be approved at the site by the Grounds Maintenance Manager prior to cover up with dirt. All electrical lines and tracer wires damaged must be spliced and meet all electrical and plumbing code requirements after repair is completed.

## 2. SURFACE PREPARATION

Areas shall be graded to allow proper water drainage and grass to be mowed. The ground over which the seed is to be sown shall be smoothed free of large clods, roots, all rocks, and other material which will interfere with the work of subsequent mowing and maintenance operations.

The top 3 inches of soil throughout the restoration site shall be topsoil only with no rocks, debris, or other undesirable materials. Topsoil shall be amended to existing soil to a minimum of 3 inches.

## 3. APPLICATION OF LIME AND FERTILIZER

The lime and fertilizer shall be spread uniformly over the area to be grassed by use of an approved distributing device. On grades greater than 30% or other areas where machine spreading may not be practical, spray applications will be permitted.

Lime shall be added at a rate of 1000 pounds per acre. Lime shall be Dolomite or Calcitric agricultural grade ground lime.

Fertilizer shall be harrowed in and scarified into the soil to a depth of approximately 3 inches immediately after the fertilizer is spread. Fertilizer shall be applied at a rate of 300 pounds per acre. The fertilizer for Bermuda grass shall be 10-20-20. The fertilizer for centipede grass shall be 15-0-15.

4. SEED

Site shall be graded, seeded, and mulched. No grade shall be greater than a 40% slope in any given area. On grades greater than 30%, seeding will not be permitted. Sod or a combination of matting and hydro seeding may be used in these areas. See paragraphs below for sodding and hydro seeding.

Seed shall be Bermuda or Centipede depending upon the area to be seeded, i.e., enhanced or improved grounds. See the Grounds Maintenance Manager, 78 CEG/CEIA, 478-27-8910, for type of seed or sod to be placed.

The rate of seed shall be 23 pounds per acre of hulled and coated Bermuda or Centipede. The seed shall be mixed with annual rye seed at a ratio of 1 pound of Bermuda or Centipede to 10 pounds of annual rye seed. After site has been graded, lime, fertilizer and seed applied, wheat straw shall be blown to a depth of 1 inch and crimped in. to protect new seed and grade.

For areas that are disturbed after the grass-growing season (September through March), rye grass alone may be planted to alleviate soil erosion. During the winter months when only rye grass grows, the areas to be restored shall be reseeded after April 1st with Bermuda or Centipede seed following seeding instructions listed above. Only after a good stand of turf is established and first mowing performed will the Government accept the grounds.

5. SODDING

Centipede or Bermuda sod, whichever is stipulated by the Grounds Maintenance Manager depending upon the enhanced or improved grounds, shall be laid on soil that is loose and moist and as smooth as possible. Proper grade for drainage shall already be established. All sod laid shall be in a staggered pattern with the adjacent section starting midway from the first. After completion, sod shall be soaked with water and rolled smooth with a sod-roller until level. Sodded areas shall be watered to a depth of 3 inches every other day. Edges where sod is exposed shall be backfilled with topsoil. Sod shall have excellent root establishment and be in a healthy state of growth and first mowing performed before final acceptance by the Government will take place.

6. HYDRO-SEEDING

Areas too steep to control erosion by this method of seeding shall be hydro seeded at a rate of I pound of Bermuda per 2000 square feet, 25 pounds of paper mulch per 2000 square feet, and 1/2 pound of hydra-stik per 2000 square feet. Germination rate shall be guaranteed to 10 sprigs per square feet. Turf shall be in a healthy state of growth for a period of one year.

## 7. TURF ESTABLISHMENT PERIOD

The turf establishment period for establishing a healthy stand of turf shall begin the first day seeding or sodding operations start. In lawn areas a satisfactory stand of turf from the seeding operation is defined as a minimum of 15 grass plants per square foot. In field areas a satisfactory stand of turf from the seeding operation is defined as a minimum of 10 grass plants per square foot. Bare spots shall not exceed 2% of the total seeded area in either lawns or fields.

## 8. WATERING

All areas that are seeded or sodded shall be watered at intervals to obtain a moist soil condition. Frequency of watering and quantity of water shall be such that it provides an adequate amount for establishing a good stand of grass. Run-off, puddling, and wilting shall be prevented.

## 9. MOWING

After grass is established, which should occur within 3-5 weeks of seeding or sodding, these areas shall be mowed by the organization or contractor to whom the digging permit is issued, to maintain a height of 2 inches for centipede grass and 2-4 inches for Bermuda grass. These areas shall be mowed until final inspection and acceptance by the Grounds Maintenance Manager in 78 CEG/CEIA.

# Robins Air Force Base
# Base Facility Standards

**Title: Landscape Design**

**Date: 22 November 2013**

## BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 4C – LANDSCAPE DESIGN

LANDSCAPE DESIGN:

a. Approved plantings for the area include only those species listed in "Best Practices For Landscaping At Robins Air Force Base," March 2011 (hereafter called "Best Practices"). Where possible, plant materials selected should be in keeping with adjacent existing plantings, so long as these don't include species considered to be invasive such as English ivy. The Base Architectural Compatibility Standard and the Base Land Management Plan will provide additional information. All landscaping plans must be reviewed and approved by 78 CEG/CEIE and 78 CEG/CEOE.

b. Facility setbacks shall be as shown in the Base Land Management Plan.

c. Types of turf shall be as shown in the Base Land Management Plan and in Best Practices.

d. Seeding and sodding requirements over utility lines and at project site vary depending upon location. See Best Practices for guidance.

e. Automatic sprinkler systems shall be installed for those areas that require regular maintenance and watering. See the Civil Section for detailed requirements and Best Practices for detailed requirements.

f. Plants approved for Robins AFB are as follows (per Bob Sargent in 78CEG/CEIE), as shown in the attached document: “Best Practices For Landscaping At Robins Air Force Base”, March 2011.

g. Static displays and monuments shall comply with UFC 3-201-02, Landscape Architecture, latest version.

h. The Contractor shall cut all existing grass on the project site at least (1) one time after final acceptance of the Facility by the Government.

i. See BFS Part 4C – Attachment A for Site Restoration from Grounds Maintenance Requirements.

## “Best Practices For Landscaping At Robins Air Force Base”, March 2011

Author: Bob Sargent, 78CEG/CEIE, 478-327-3974

Reviewer: Jeff Hooper, 78 CEG/CENMP, 478-926-5923

Approval: _____

Stefanie Dawson, 78CEG/CENMP, 478-327-2948

# Robins Air Force Base
# Base Facility Standards

**Title: Elevators and Lifts**

**Date: 22 November 2013**

## BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 4D – ELEVATORS AND LIFTS

**CRITERIA REFERENCE DOCUMENTS:**

ANSI A117.1 – Accessible and Usable Buildings and Facilities

ASME A17.1 - Safety Code for Elevators and Escalators

ASME A17.3 - Safety Code for Existing Elevators

NFPA 13 - Standard for the Installation of Sprinkler Systems
NFPA 70 - National Electric Code

NFPA 72 - National Fire Alarm Code
NFPA 101 - Life Safety Code
UNIFIED FACILITIES CRITERIA-UFC 3-600-01(Fire Protection Engineering for Department of Defense Facilities) Uniform Federal Accessibility Standards (UFAS)

*BFS PART 6C – FIRE DETECTION AND ALARM SYSTEMS, INDIVIDUAL BUILDING MASS NOTIFICATION SYSTEMS*

**ELEVATORS AND LIFTS**

A. Elevators

(1) Design: New and altered elevators shall be designed in accordance with the current edition of the applicable codes listed below. To insure the design meets code requirements, the designer shall have the design reviewed and approved by the QEI Certified Elevator Inspector assigned to 78 CEG/CEOH Elevator Shop. This is to ensure compatibility with all other elevator systems on Robins AFB. To insure the completed installation or alteration meets specifications and code requirements, the contractor shall have the elevator inspected and certified by a QEI Certified Elevator Inspector assigned to 78 CEG/CEOH Elevator Shop prior to acceptance by the government.

(2) Fire Protection

(a) Provide smoke detectors at all elevator lobbies, all elevator machine rooms, and top of the hoistway if sprinklers are provided at the top of the hoistway.

(b) The FACP shall send a signal to the elevator controller to represent which smoke detector is in alarm. The elevator controller shall use these signals to send the elevator to the appropriate floor. The designated level is the main floor or other level that best serves the needs of emergency personnel for fire-fighting or rescue purposes. The alternate level is the floor with the second best access for emergency personnel. Activation of a lobby smoke detector must cause the Firefighter's Service visual signal to constantly illuminate in any elevator cab that serves the affected lobby. Activation of an elevator machine room or hoistway smoke detector must cause the Firefighter's Service visual signal to illuminate intermittently (flash) in any elevator cab which has equipment located in the affected machine room or hoistway, as required by ASME A17.1.

(c) The activation of a smoke detector at the elevator lobby on the designated level shall cause the elevator to go to the alternate level. The activation of a smoke detector at the top of the hoistway (where provided), or at any elevator lobby other than the designated level shall cause the elevator to return to the designated level.

(d) The activation of a smoke detector in the elevator machine room shall cause the elevator to return to the designated level, unless the machine room is located on the designated level. In that case, the elevator shall go to the alternate level.

(e) For buildings protected with an automatic sprinkler system, provide sprinkler(s) with sprinkler guard(s) in the machine room. Provide a supervised shut-off valve, check valve, flow switch, and test valve in the sprinkler line supplying the machine room. These items must be located outside of and adjacent to the machine room. Actuation of the flow switch must remove power to the elevator(s), served by that machine room, by shunt trip breaker operation. The flow switch must have no time delay.

(f) Provide sprinkler(s) and smoke detector in the top of elevator hoistway where hoistway walls are not 2 hour rated, and the elevator cab does not meet flame spread or smoke development requirements of ASME A17.1. These sprinklers must follow the requirements of paragraph (e).

(g) Provide sidewall sprinkler(s) with sprinkler guard(s) in the pit for hydraulic elevators. Locate the sprinkler no more than 610 mm (2ft) above the pit floor. Provide a supervised shut-off valve in the sprinkler line supplying the pit. Locate the valve outside of and adjacent to the pit. Actuation of the pit sprinkler shall not disconnect power to the elevator.

(h) Provide inspector's test connection for each water flow switch associated with the elevator machine room and hoistway sprinklers. Locate the test connection outside the rated enclosure. Route the test connection piping to a floor drain location that can accept full flow or where water may be discharged without property damage. Discharge to a floor drain may be permitted only if the drain is sized to accommodate full flow. Discharge to janitor sinks, or similar plumbing fixtures, is not permitted.

(i) All sprinkler risers and returns shall be located outside the machine room and hoistway. Branch lines in the hoistway shall supply sprinklers at not more than one floor level.

(j) Sprinkler lines that serve elevator machine rooms and hoistways shall not extend through those areas to serve other areas.

(k) Provide shunt trip on the breaker in the upstream panel board that feeds power to the elevator. Breaker shall shunt trip immediately whenever a flow switch that feeds a sprinkler in the top of the hoistway (where provided) or in the elevator machine room is activated. The shunt trip operation shall be instantaneous, shall be independent of the elevator control system, and shall not be self-resetting.

(l) Where the elevator control system is provided with a battery-lowering device, provide a signal from the FACP to the elevator controller at the same time the FACP shunt trips the elevator circuit breaker. The signal to the elevator controller shall disable the battery-lowering device immediately when the shunt trip is activated.

(3) Elevator Systems

(a) Hydraulic elevators shall be the direct-acting type, with the hydraulic plunger connected directly to the car frame. Controllers and pump units shall be located in a machine room adjacent to the hoistway.

(b) Electric traction elevators shall have controllers, drive machines, and governors located in a machine room above the top of the hoistway.

(c) Machine Room HVAC Design: The mechanical design for the elevator machine room shall include the HVAC recommended by the control system manufacturer, and shall meet ventilation requirements of ASME A17.1.

(d) Machine Room Door: The elevator machine room door shall be self-closing, self-locking, in accordance with ASME A17.1. To meet this requirement the door lock shall be the Storeroom Function type, i.e., always requiring a key to open from the outside, never locked from the inside. The lock is required to accept a BEST 7 pin core, keyed to RAFB J-1 key code.

(e) Manual Shut-Off Valve: Manual shut off valves for hydraulic elevator oil lines shall be constructed of steel, and shall have a pressure rating of 1,000 lbs PSI or higher.

(f) Fire Extinguishers: Each elevator machine room shall have an A-B-C fire extinguisher.

(g) Equipment in Hoistways and Machine Rooms: Only equipment, conduit, wiring, pipes, and ducts directly associated with the elevator shall be located in the elevator machine room or hoistway. Discharge line for the sump pump in the elevator pit shall not be routed through the elevator machine room.

(h) Provide a fusible disconnect in the elevator machine room for the elevator main power, lockable in the off position. The disconnect switch shall be fed from a shunt trip breaker. Shunt trip shall only be activated by flow switches that feeds sprinklers located in elevator machine room and top of elevator hoist way (if provided).

(i) If the elevator control system is provided with a battery lowering device, provide 1 NC/NO (normally closed /normally open) set of auxiliary contacts in the main power fusible disconnect in the elevator equipment room. The battery lowering device shall be wired in series through the auxiliary contacts and through contacts in a shunt trip relay module so that whenever the fusible disconnect is turned off, or the shunt trip is activated, the battery lowering device shall be disabled.

(j) Provide a fusible disconnect in the elevator machine room for the elevator car lights, lockable in the off position.

(k) Elevator Telephone: Provide an ADA compliant telephone *(except for Secure Buildings where a standard hand-speaker phone must be used)* designed for elevators, in a cabinet with a stainless steel door. Phone shall be on a dedicated phone line, with the capability to receive incoming calls. If the phone or phone line is dependent on building power, provision shall be made to keep phone active in the event building power is lost. Phone shall be programmed to dial 6-5657, which is manned 24/7 by Civil Engineering. Phone shall be operational prior to certification of the elevator.

(l) Elevator Controllers: Provide solid-state microprocessor elevator controllers that are non-proprietary, i.e., universally serviceable and maintainable by any qualified elevator maintenance provider

capable of maintaining apparatus of similar design and complexity. Store all programming in non-volatile memory. Systems that require battery to maintain memory are not acceptable. Controllers shall have on-board diagnostics, programming, and adjustments. Controllers shall not require special tools, proprietary tools, computers, or modem hookup to outside sources, for diagnostics, programming, adjustments, or repair. Diagnostics shall provide full access – no levels blocked. Diagnostics shall not lose any function over time or contain self-expiring software. Provide documentation required for complete maintenance of control system including diagnostics, programming, adjustments, and repair.

(m) Spare/Replacement Parts from Controller Manufacturer: Parts shall be available without conditions or restrictions (i.e.: exchange only versus availability for inventory if desired). Parts shall be available for purchase by the dealer, installer, maintainer, or the Government, without limitation. All charges for parts shall be published, fair, and reasonable.

(n) Technical Support from Controller Manufacturer: Telephone hotline support shall be available for the life of the control system, without arbitrary restrictions. All charges for technical support and other services shall be published, fair, and reasonable.

(o) Parts Cabinet: Provide a metal parts cabinet with lockable door in each elevator machine room. Approximate size of cabinet shall be 21 inches wide, 15 inches deep, and 32 inches high, with 2 or 3 shelves. Provide four complete sets of owner's manual, operating manual, parts list, wiring diagrams, and controller documentation in cabinet.

(p) Fire Key Box: Provide a fire key box at designated landing elevator lobby, with a lock keyed to state of Georgia requirements. Key box shall have brushed stainless steel cover, with "FIRE DEPARTMENT USE ONLY" engraved on the cover and filled with black. Provide the following keys in fire key box: Elevator door unlocking key or tool, elevator machine room door key, and one of each key for all elevator key switches.

(q) Certificate Holder: Provide a stainless steel certificate holder in each elevator for inspection certificate. Certificate holder shall have a clear plastic window, with viewable area approximately 4-3/4” wide by 3-1/2" high. Certificate holder shall be attached with screws or rivets.

(r) Position Indicators: Car and hall position indicators shall be electronic with digital-readout. The main landing shall have a hall position indicator.

(s) Conduit: All fittings for electrical metallic tubing conduit shall be of the steel compression type only. Flexible conduit shall be liquid-tight with steel core.

B. Wheelchair Lifts

(1) Wheelchair lifts shall be designed and installed in full compliance with the Safety Standard for Platform Lifts and Stairway Chairlifts - ASME A18.1, and NFPA 70. To insure the design meets code requirements, the designer shall have the design reviewed and approved by the QEI Certified Elevator Inspector assigned to 78 CEG/CEOH Elevator Shop. This is to ensure compatibility with all other elevator systems on Robins AFB. To insure the completed installation or alteration meets specifications and code requirements, the contractor shall have the elevator inspected and certified by a QEI Certified Elevator Inspector assigned to 78 CEG/CEOH Elevator Shop prior to acceptance by the government.

(2) Wheelchair Lift Telephones: Provide an ADA compliant telephone *(except for Secure Buildings where a standard hand-speaker phone must be used)* designed for elevators. Phone shall be on a dedicated phone line, with the capability to receive incoming calls. If the phone or phone line is dependent on building power, provision shall be made to keep phone active in the event building power is lost. Phone shall be programmed to dial 6-5657, which is manned 24/7 by Civil Engineering. Phone shall be operational prior to certification of the lift.

(3) Disconnects: Provide a fusible disconnect switch near the lift that is lockable in the off position. Provide a secondary contact in the disconnect switch for the battery lowering device, so that when the disconnect switch is in the off position, the battery lowering is disabled.

(4) Parts Cabinet: Provide a wall mounted metal cabinet with door lock near the lift, for small parts and paperwork. If mounted outdoors, cabinet shall be weather-tight, or shielded from the weather. Provide four complete sets of owner's manual, operating manual, parts list, wiring diagrams, and controller documentation in cabinet.

(5) Fire Key Box: Provide a fire key box at main landing, with a lock keyed to state of Georgia requirements. Key box shall have brushed stainless steel cover, with "FIRE DEPARTMENT USE ONLY" engraved on the cover and filled with black. Provide the following keys in fire key box: Lift door unlocking key or tool, key to the wall mounted metal cabinet, and one of each key for all lift key switches.

(6) Certificate Holder: Provide a stainless steel certificate holder in each wheelchair lift for inspection certificate. Certificate holder shall have a clear plastic window, with viewable area approximately 4-3/4” wide by 3-1/2" high. Certificate holder shall be attached with screws or rivets.

(7) Lift operating pushbuttons shall be operable only with use of a key switch using a standard handicap lift key.

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Reviewer: Jeff Hooper, 78 CEG/CENMP, 478-926-5923

Approval: _____
Stefanie Dawson, 78 CEG/CENMP, 478-327-2948

# Robins Air Force Base
# Base Facility Standards

**Title: MECHANICAL STANDARDS**

**Date:** ***Revised 12 May 2014***

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 5A – MECHANICAL, GENERAL

**CRITERIA REFERENCE DOCUMENTS:**

ETL 01-1 Reliability and Maintainability (R&M) Design Checklist

ETL 08-13 Incorporating Sustainable Design and Development (SDD) and Facility Energy Attributes in the Air Force Construction Program.
ETL 88-6, Heat Distribution System Outside of Buildings.

UFC 3-400-01 Energy Conservation

UFC 3-400-02 Design: Engineering Weather Data

UFC 3-401-01FA Utility Monitoring and Control Systems

*BFS Part 5E – Fire Suppression*
*BFS Part 7A –Energy Conservation*

*BFS Part 7C – Sustainable Design & Development*

MECHANICAL STANDARDS

a. This is one part of the Robins AFB Base Facility Standards. Refer questions or exception requests to the Technical Support Flight Chief in 78 CEG/CENMP. Any exceptions granted to these requirements shall be noted clearly in the project design analysis by using a Deviation Request.

1. DESIGN STANDARDS:

a. *Mechanical systems shall be designed in accordance with current ASHRAE Standards, UFC's, AFI's, ETL's, NFPA Standards, and other codes and standards referenced in this Standard.*

b. Fire Protection: *(Also see BFS Part 5E – Fire Suppression)*

(1) A Registered Fire Protection Engineer shall provide all fire protection system design. The fire protection engineer shall be a professional engineer, registered by the fire protection written examination of the Council of Examiners for Engineers and Surveyors (NCEE).

(2) Comply with all Air Force Engineering Technical Letters for fire protection.

(3) Under **no** circumstances will any fire suppression or alarm system be left inoperative overnight.

c. Energy Conservation: *(Also see BFS Part 7A – Energy Conservation)*

(1) Integrate energy reduction and sustainable development principles into the mechanical system selection and design.

(2) Purchase premium efficient electric motors, air conditioning and refrigeration equipment. Purchase Energy Star and FEMP-designated products when procuring energy-consuming items covered by the Energy Star program, except when purchasing such items is not cost-effective or does not meet functional requirements of the agency.

(3) Integral sized electric motors should be NEMA PREMIUM type motors that conform to NEMA MG 1, minimum Class F insulation system. Motors with efficiencies lower than the NEMA PREMIUM standard may only be used in unique applications that require a high constant torque speed ratio.

(4) Recovered and renewable energy shall be used in each design to the maximum extent that is life cycle cost effective.

2. MAINTENANCE CONSIDERATIONS: Consideration shall be given to maintenance requirements of all mechanical equipment. The following shall be incorporated into mechanical designs:

a. Provide access doors for all equipment requiring maintenance such as valves, dampers, smoke detectors, filters and control components.

b. Provide manufacturer's recommended service clearance and coil pull space for all equipment. Locate all valves, pumps, strainers, controls, sensors, and other items requiring regular service such that they can be maintained from floor level where possible. All units shall be mounted on a concrete housekeeping pad. Permanent Maintenance platforms and access ladders shall be provided to all suspended mechanical units in hangers and high bay areas or above ceilings. Roof mounted units shall incorporate protection for roofing to allow regular maintenance.

c. Provide snap-on plastic pipe labeling only (no tape or stenciling). Comply with ANSI A13.1. Label all valves, instruments, piping, etc. Provide a special tag on system isolation valves identifying area served (e.g. "chilled water shutoff to AHU's 1 - 4"). Require "valve" chart identifying all labeled items. Provide piping diagrams framed under glass in mechanical rooms.

d. Provide metal identification tag attached to each steam trap. Provide in the O&M manual a listing of each trap, trap capacity, type, and location.

***e. On <u>ALL</u> warranty issues: Notify 78 CEG/CEN and provide service tickets to indicate what measures were taken to correct the problem.***

3. STORM DRAINAGE SYSTEM: *See BFS Part 3G, Stormwater.*

4. UTILITY DISTRIBUTION SYSTEM: Plans of the existing utility distribution lines will be provided by Base Civil Engineer if available. Utility meters, compatible with Robins' Advanced Metering Infrastructure (AMI) system, shall be installed on all utilities. Meters shall be connected to the base wide energy and utility monitoring and control system either directly or via the building HVAC control system.

a. Steam and Condensate: The designer shall evaluate the feasibility of using the central utility steam system and submit a recommendation to the Base. The Base shall make the decision to use the central system.

b. Chilled Water Piping: Central chilled water shall be used when appropriate. Contact the Base project manager to discuss availability of central chilled water prior to design. New underground chilled water distribution piping, 4 inches and larger, shall be insulated PVC Carrier pipe with an HDPE polyethylene jacket, 200 psi pressure class at 73.4 deg F, SDR 21, and conform to ASTM D2241. Chilled water piping smaller than 4 inches shall be insulated schedule 40 carbon steel pipe with an HDPE jacket. Provide tracer wire and warning tape for locating buried PVC piping. Provide cathodic protection for all underground steel pipe.

c. Natural gas: All underground natural gas lines installed on Robins AFB shall be polyethylene type PE 3408 as designated by ASTM D2513. Minimum wall thickness shall correspond to a standard dimensional ratio (SDR) of 11. If pressure requirements exceed the PE 3408 capability, ASTM A53B carbon steel pipe (minimum schedule 40) shall be used. All aboveground or exposed piping shall be ASTM A53B carbon steel. All underground metal piping shall be coated per the corrosion control section and shall have cathodic protection installed. Also install tracer wires and warning tape placed on the lines using #10 AWG Cu with nicked TW insulation to facilitate detection of the wire with pipe locators.

d. Installation: Install all utilities (including potable water, fire water, Chilled Water/Hot Water Heating Piping, Steam and Condensate, Natural gas, drainage piping, etc.) following applicable current codes, i.e. International Mechanical codes, International Plumbing and Gas codes and including the following: Minimum depth for all new utilities shall be 3 ft from the top of the piping to the grade elevation and maximum depth shall be 7 ft to the top of the piping. Install tracer wires and warning tape placed on the lines using #10 AWG Cu with nicked TW insulation to facilitate detection of the wire with pipe locators for all plastic and CPVC, PVC, PE and ABS piping. Warning tape shall be located 6 inch to 12 inch below grade.

e. The project design engineer or the design build contractor shall be responsible to locate all underground utilities which shall be shown on the project site plans. GPR (Ground penetrating radar) and/or pot holing is required as part of the design/RFP development to accurately locate all underground utilities unless excluded in writing.

5. PETROLEUM, OILS, AND LUBRICANTS:

a. Design of all petroleum, oils, and lubricants (POL) systems shall be IAW Military Handbook 1022, American Petroleum Institute (API), and other industry standards, including all applicable NFPA regulations.

b. Welders shall be certified in accordance with API and MH 1020 and shall do all welding outside the fuels area.

c. All valves and piping accessories are required to be rated for fuels being handled.

d. All electrical equipment shall be explosion proof per Division 1, Class 1.

e. Tank refill access shall be readily available to tank trucks.

f. Surge suppressors will be used to prevent pressure build-up in the lines.

g. All above ground tanks shall be diked in accordance with EPA requirements.

h. All below ground tanks shall meet the latest editions of the EPA regulations, be double walled, and have cathodic protection.

i. Safety rails and platforms (for gauging tanks) will be provided for above ground tanks.

j. All pumps will be rated specifically for the fuel they will be handling.

k. The system will be designed such that the metals being used in the system will not react with fuel.

l. All pipes shall be painted with the proper POL color coded markings.

m. Below ground piping will be double wall, properly coated, and cathodically protected per applicable EPA regulations. The designer will evaluate the use of underground fuel pipe and submit recommendations to the Base. The Base will make the decision on the use of underground piping.

n. Design shall include emergency precautions to stop fuel flow, shut down pumps, etc., including a cutoff switch in an easily accessible location.

o. Pumps to below ground tanks shall have leak detectors for piping pressure loss.

p. WARNING signs will be properly displayed.

q. Underground tanks shall be anchored properly so that flotation will not occur.

r. Pea gravel backfill shall be used to fill around tanks.

s. All tanks shall have manways with access ladders.

<<<<< END OF PART 5A >>>>>

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Reviewer: Jerry Thovson, 78 CEG/CENPD, 478-926-8840

Approval: _____
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# Robins Air Force Base
# Base Facility Standards

**Title: Heating, Ventilation, and Air Conditioning**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 5B – HEATING, VENTILATION, AND AIR CONDITIONING

**CRITERIA REFERENCE DOCUMENTS:**

AFI 32-1068 Heating Systems and Unfired Pressure Vessels

ETL 04-3 Design Criteria for Prevention of Mold in Air Force Facilities, with Change 1

ETL 90-10 Commissioning of Heating, Ventilating and Air Conditioning Systems Guide Specification

ETL 86-16 Direct Digital Control of Heating, Ventilation and Air Conditioning Systems

ETL 83-1 Design of Control Systems for HVAC

UFC 3-410-02A Heating, Ventilating, and Air Conditioning (HVAC) Control Systems

UFC 3-410-02N Heating, Ventilating, Air Conditioning and Dehumidifying Systems

UFC 3-410-04N Industrial Ventilation

UFC 3-430-01FA Heating and Cooling Distribution Systems

UFC 3-430-11 Boiler Control Systems

ASHRAE Standard 90.1, Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings

International Mechanical Codes.

International Gas Codes.

*BFS Part 5F – Utility Monitoring & Control Systems (UMCS)*

*BFS Part 7A –Energy Conservation*

*BFS Part 7B – Corrosion Control & Cathodic Protection*

*BFS Part 7C – Sustainable Design & Development*

1. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC):

a. General:

(1) When providing new HVAC and suspended ceilings in existing unconditioned spaces, such as when converting warehouse space to admin space, design shall include a structural analysis to ensure the structural system can handle the additional weight of the ceiling and ductwork. Include in the design analysis documentation and engineer PE certification.

(2) Provide modular VAV unit type which shall be capable to shut down the supply air to 25% of the diffuser specified air flow rate with a minimum setting device. Design basis is Therma-fusers from Accutherm zoned systems.

(3) Outside air intakes shall be installed above ten feet or on the roofs of single story buildings in compliance with force protection requirements and a minimum of 10 feet from any exhaust duct or plumbing vent.

(4) New facilities and facilities undergoing major and minor renovation are required to be analyzed to determine the most cost effective and practical fuel source(s) and heating and cooling system types. The designer shall evaluate all energy conservation items that appear to have potential for savings, such as heat recovery for HVAC and service water heating, thermal energy storage, desiccant dehumidification, plastic door strips for loading docks, etc., and include those items in the design that are life cycle cost effective. Ensure that all operation and maintenance costs are included in the life cycle cost analysis.

b. Existing Systems:

(1) Existing steam systems. The designer shall consult with the Energy Manager in 78 CEG/CEE for him/her to make the choice on reusing the steam central feed or convert to natural gas feed. Document the Energy Manager's choice in the Design Analysis. Where steam is used, convert to hot water at the building entrance. Also, for systems over 1000MBH, evaluate flash tank and pre-heat heat exchanger to determine cost effectiveness and energy savings. Piping downstream of steam traps shall be sized for 2-phase flow assuming zero backpressure. Minimum pipe size is 1".

(2) Distribution Piping and/or Ducting: All distribution piping 3 inches and smaller shall be type K copper. Piping larger than 3 inches shall be domestic ASTM A53 or ASTM A120 sch 40 steel with all welded joints. Water velocities in distribution piping shall not exceed 3 ft/sec. Piping shall be routed to provide the greatest accessibility possible for maintenance. Pipe chases shall have removable covers, which allow access to the entire piping system. Converters, pumps, expansion tanks, and other items requiring maintenance shall be located such that they can be easily serviced from floor level. Provide drain valves to allow complete system drainage and air vents at high points and at coils.

(3) Chilled Water/ Hot Water Pumps: Provide redundancy for the chilled water pumping station and the hot water pumping station. Provide DDC control to alternate pump operation.

(4) Chilled and cold water pipes and supply air ducts insulation shall be designed such, that the surface temperature of the insulated pipe or duct anywhere inside the interior space of the building (including duct and pipe chases) is above the dew point, to prevent condensation and mold issues.

(5) Any work which requires the shutdown of the building chilled water system (or hot water heating system) during the occupied or unoccupied modes, the contractor shall be responsible for draining the chilled water (or hot water heating) system prior to the starting of the construction work and refill the chilled water (or hot water heating) system after the completion of the work. Line block method can be used in lieu of draining the chilled water system.

c. Ventilation/Air Conditioning/Refrigeration Systems:

(1) All air-handling units (AHUs) shall be specified with adequate space. A minimum of 12" access section (sizes to be as recommended by the manufacturer) shall be provided between heating and cooling coils to allow for cleaning and repair. All mechanical rooms shall have adequate space for the service and maintenance of the AHUs in accordance with the manufacturer's recommendations.

(2) Projected cooling/heat loads: the designer in accordance with ASHRAE procedures shall calculate the design heating load requirements. Submit building heat load calculations using Trane Trace software or as approved equal to size all the building HVAC equipment for review and approval. The building heat load calculations shall be prepared and stamped by a registered professional HVAC engineer.

(3) Distribution Piping and Ducting: See paragraph 1.a. above.

(4) Typical space, supply air, ventilation, and temperature requirements: All administrative areas shall be designed for 75 deg F Dry Bulb (DB) and 50% Relative Humidity (RH) for summer and 70 deg F DB and between 30%RH to 50% RH for winter. Install humidifiers in the AHU discharge to provide re-humidification.
All classrooms shall be designed for 73 deg F Dry Bulb (DB) and 50% Relative Humidity (RH) for summer and 70 deg F DB and between 30%RH to 50% RH for winter. Heat load calculation for the classroom shall include the heat load generated from the total number of the students in the classroom. Shop areas shall be maintained at 82 F in the summer and 55 F in the winter.

Typical conditioned supply air flow rate to the space shall be equal to or greater than 1.1 CFM per sq ft area for office spaces. For the therma-fuser design, the 1.1 CFM is required for the minimum at full open.

(5) Mechanical Rooms: Install unit heaters to keep the temperature above 55 deg F DB. Provide forced ventilation with thermostat control.

(6) Electrical Rooms: Provide HVAC systems to maintain the space to no more than 30 degrees C, or 86 degrees F. Provide unit heaters as needed to maintain the temperature above 55 deg F DB.

(7) Communications (Telephone, LAN, etc) Rooms: Provide a dedicated independent conditioned air for required load.

(8) Combined Mechanical and Electrical Rooms: Provide physically separate rooms in all new construction. For existing combined rooms, physically separate the two areas, and provide cooling to the electrical area.

(9) Comply with ASHRAE Standard 62.1-2004 (Ventilation for Acceptable Indoor Air Quality) to calculate the outside air requirement for the building HVAC equipment sizing.

(10) Provide pressure independent control valves and associated control system for heating coils and cooling coils for the air handling units. The pressure independent control valves shall be sized and selected per the manufacturer's recommendations based on the air flow requirements. The valves shall be provided with automatic control system to maintain chilled/hot water coils delta T and supply air temperatures as specified.

(11) Refer to Part 5F – for Utility Monitoring & Control system

(12) Refrigeration Systems: All new HVAC equipment shall be provided with R-410a refrigerant. All new residential HVAC window units shall be provided only with THR-03. Do not provide any service or product with any specification, standard, drawing, or other document that requires the use of a Class I or Class II ODS in the test, operation, or maintenance of any system, subsystem, item, component, or process. Refer to section 01560 for the list of products which are Class I and Class II ODS:

2. HVAC SYSTEM WATER TREATMENT:

a. General:

(1) Base the equipment installation upon specific information obtained at the construction site and upon existing Base water treatment methods. Information includes data such as current analysis of Base water.

(2) All water treatment design must be performed by an NACE accredited "Corrosion Specialist" with at least five years' experience in this design.

(3) Chemical pot feeders:

(a) Use at least 5-gallon capacity.

(b) Provide pressure gauge on intake side of protected system.

(c) Completely serviceable from floor level.

(d) Chemical feed tank shall not be connected to the recirculation pump suction side. Chemical feed tank inlet and outlet can be both connected to the pump discharge side across the isolation valve.

(4) Use interlocks to insure chemicals will not feed when main system is off; e.g., on condenser pumps.

(5) Automatic chemical feed shall use one of these methods:

(a) Water meter - timer method, where chemicals are added in relation to water make-up.

(b) Solids controller to control boiler blow down and chemical feed based upon manual setting.

(6) Inject chemicals downstream of pumps.

b. Chilled Water:

(1) Closed System:

(a) 100 tons or less: Provide chemical pot feeders.

(b) Over 100 tons: Provide automatic system or manual system as determined by the base project engineer.

(2) Open system (cooling towers): Provide automatic system.

c. Hot Water (Closed System):

(1) 1000 MBTU/H or less: Provide chemical pot feeders.

(2) Over 1000 MBTU/H: Provide automatic system or manual system as determined by the base project engineer.

d. Steam:

(1) Provide automatic system.

(2) Inject oxygen scavengers directly into the de-aerator tank.

(3) Inject boiler water chemicals into feed water line right before the boiler drum.

(4) Blowdown Dumping:

(a) At main plant, dump to industrial waste.

(b) Dump elsewhere to sanitary sewer.

(c) Blowdown must be run through a cooler to limit discharge temperature to 120F. This will ensure it is compatible with the IW/SS piping.

(5) Provide for manual blowdown of bottom drum.

3. SYSTEM COMMISSIONING OF HVAC:

a. Special Requirements:

(1) On-site training shall be provided to instruct Government personnel in each phase involved with the sequence of operation for the system. The training shall be accomplished by the manufacturer's representative, and take between two and seven days as determined by the scope of the project. This training will include the set-up, operation, and balance of the system for the respective Government shops. Specify that the training shall be conducted and completed prior to Prefinal inspection.

(2) An independent firm certified by the American Association of Balancing Contractors (AABC) or the National Association of Balancing Contractors (NABC) shall accomplish test and balance of the system. The Government reserves the right to spot check the contract. The contractor shall be spot checked by the balancing contractor in the presence of a Government representative. If 25% of the systems checked are not within the required allowance (allowance being: 10% of what is stated on the

plans) the balancing contractor will return to the site and completely redo the testing and balancing. If the system is dependent upon steam or chilled water, testing and balancing shall be accomplished during the time of year when they are available.

(3) All required test results, equipment O&M manuals, and schematics shall be turned over to the Government two weeks prior to the Prefinal inspection.

(4) Other requirements will be provided in the project description if necessary.

(5) Specifications shall require construction contractor to demonstrate the proper operation of each function described in the sequence of operation.

4. AIR CONDITIONING/HEAT LOAD ESTIMATES: The designer shall provide complete load calculations with the preliminary design. If the designer uses a computer program to compute the loads, a description of the program and copies of all input data shall be included in the design analysis. Robins AFB Weather Data shall be used for all HVAC calculations. Design data is available at the design analysis. Robins AFB Weather Data shall be used for all HVAC calculations. Design data is available at the design analysis. Robins AFB Weather Data shall be used for all HVAC calculations. Design data is available at https://www.afccc.af.mil/.

5. SYSTEM MAINTAINABILITY:

(a) System maintainability is a critical, but often overlooked, aspect of a facility. Provide adequate clearances around all pieces of equipment for periodic maintenance, inspection and cleaning. Service of one piece of equipment shall not require disturbance of adjacent equipment. This shall be coordinated with all systems (for example it is unacceptable planning to install lights, then block access to them with pipes and conduit). System maintainability has three broad categories. The design analysis and O&M manuals shall address these features/procedures in detail:

(1) Routine Maintenance (filters, lights, lubrication, inspection, etc.): This requires the most frequent and easiest access. The need for portable or fixed ladders (no more than 10 feet (3 m)) should be minimized and, where needed, ensure that space is available to use them properly.

(2) Component Replacement (coils, fans, motors, boiler/chiller tubes, etc.): This requires less frequent access, but when the need arises, this work must be done quickly and efficiently, since normally this has the greatest impact on the user. Everything needed to perform these tasks shall be provided (work platforms, equipment access hatches/panels, hoists, cranes, freight elevators, etc.).

(3) Equipment Replacement (air handling unit, switchgear, boilers, chillers, etc.): This occurs very seldom that permanent equipment to support these tasks is not required. However, equipment replacement must be accommodated and the facility shall include items such as removable wall sections, access routes, etc. to allow replacement with the least amount of collateral damage.

(b) Ensure that all equipment, including filters, controls, control valves, backflow preventers, and coils are easily accessible and have ample room for servicing, inspection, and cleaning. Isolation valves shall be provided for each terminal unit, zone, branch, long runs, etc. as necessary for proper isolation and maintenance. Coils shall be fully removable without requiring demolition of any building components. Piping configuration at all coils shall include unions to facilitate easy removal.

(c) The design-build contractor shall ensure that all maintenance and repair activities can be performed safely and efficiently without needing to bring in extensive material handling (e.g. A-frames) or access equipment (e.g. ladders).

(d) Locate all valves, pumps, strainers, controls, sensors, and other items requiring regular service such that they may be maintained from floor level when possible. If not accessible from floor level, then permanent maintenance access shall be provided.

(e) Ensuring maintainability requires careful coordination of piping, conduit, etc., to avoid blocking access by cranes, hoists, ladders etc. The contractor shall make this a priority, recognizing that this will generally result in longer runs of pipe/conduit.

(f) All above ceiling utilities (cable trays, ductwork, junction boxes, utility piping, etc.) shall be accessible for a worker to reach two sides plus the service side with a minimum 3'3" (1 m) clearance (greater if required for component maintenance/disassembly).

g) Permanent maintenance access shall be provided for all suspended mechanical equipment. Provide catwalks for all equipment requiring servicing located above ceilings.

(h) Mechanical equipment is not permitted on the roof. Only secondary items that do not require maintenance or access such as vents are permitted. Anything penetrating the roof shall be painted the same color as the roof. Mechanical equipment may not be permitted on the roof, but some type of innovative method needs to occur so that the vertical stacks from the
painting shop tanks are vented into short (~30' or less under roof) runs overhead directly into the ventilation fan/scrubber assemblies, who in turn, need to be directly vented to the outside or on a short run (~20' or less) of ducting.

(i) Water treatment systems for boilers/chillers (if provided) shall be designed and installed such that chemical handling is accomplished at the floor level.

**END OF PART 5B**

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**Robins AFB Base Facility Standards Part 5B Attachment**

# 78TH CIVIL ENGINEER GROUP

# REFRIGERANT MANAGEMENT PROGRAM

**OPR: 78 CEG/CEIE**
**ENVIRONMENTAL BRANCH**
**22 November 2013**

# List of Acronyms

AEL Allowable Exposure Limit
ALJ Administrative Law Judges
ALKY alkylbenzene lubricant
ARI Air Conditioning and Refrigeration Institute
ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

CAA Clean Air Act
CAS Chemical Abstracts Service (http://www.epa.gov/spdpublc/ods.html)
CERCLA Comprehensive Environmental Response, Compensation and Liability Act
CFC chlorofluorocarbon
CFR Code Federal Regulation

DOJ Department of Justice
DOT Department of Transportation

EPA Environmental Protection Agency
ETL Electrical Testing Laboratory

GLFW Gross Legal Fill Weight
GWP Global Warming Potential (http://www.epa.gov/spdpublc/ods.html)
HBFC Hydrobromofluorocarbon
HCFC Hydrochlorofluorocarbon
HFC Hydroflourocarbon
HMMP Hazardous Material Management Process

ID Identification

MACS Mobil Air Conditioning Society
MSDS Material Safety Data Sheet
MVAC Motor Vehicle Air Conditioning

NFPA National Fire Protection Association

ODP Ozone Depletion Potential
ODS ozone-depleting substances
OEM original equipment manufacturer

PAFT Program for Alternative Fluorocarbon Toxicity
PAG polyalkylene glycol lubricant
PEL Permissible Exposure Limit
POE polyolester lubricants
ppm parts per million
psig pounds per square inch (gauge)

RCM Refrigerant Compliance Manager™ software
RCP Refrigerant Compliance Plan
RCRA Resource Conservation and Recovery Act

SAE Society of Automotive Engineers
SNAP Significant New Alternatives Program

TAE Technical Assistance Evaluation
TLV Threshold Limit Value
TW Tare Weight

UL Underwriters Laboratories

WC Water Capacity

# 17 Contractor Requirements

## 17.1 Objective

To define requirements for managing refrigerant service contractors and contractors installing new equipment. The Shop Refrigerant Monitor, Refrigerant Program Manager, Engineering, and Contracting departments shall work as a team to modify construction/renovation contracts and service contracts to meet the requirements of this chapter.

## 17.2 Contract Amendments

Use the following text to develop a contract amendment for all refrigerant service contractors or provide a copy of this text and implement the requirements.

**Contractor shall be responsible and accountable for compliance with the EPA Clean Air Act (CAA) Section 608, 40 CFR Part 82 and any state and local codes for all refrigerant-related work. Contractor shall ensure that all contractor employees are made aware of the content of these practices prior to beginning work on refrigerant containing equipment.**

Contractor shall provide only proper level EPA-certified technicians using EPA-certified and registered recovery/recycle units to perform work on Robins AFB refrigerant equipment.

Contractor shall submit the following information prior to starting any work.
• A list of all service technicians along with legible copies of each technician's EPA Certification Card.
− Note: ID number on card may be blacked out as long as Testing program name and EPA level are readable.

## 17.3 Documentation and Recordkeeping

Contractor shall provide service records with all required information to the Shop Refrigerant Monitor. The service documentation required is as follows:
• Equipment ID tag number
• Manufacturer model and serial number
• Location of equipment
• Refrigerant type and unit charge
• Date of service
• Service, repair or disposal description
• Quantity of refrigerant added
• Quantity of refrigerant recovered, recycled or disposed of
• Quantity of lubricant disposed of, and method of disposal
• Detailed information and exact location of any leaks discovered and repaired
• Initial and Follow-up Leak Verification tests
• Name(s) of EPA certified service technicians who performed work
• Note if recovery unit was used

The Shop Refrigerant Monitor will provide a copy of the records to the Refrigerant Program Manager when requested. Please note: A Service Invoice that is only sent to accounts payable does not meet the requirement for site records.

## 17.4 Consequences for Non-Compliance

Robins AFB shall have the right to stop work under any contract at any time if the work fails to meet the EPA regulations.
Robins AFB shall have the right to withhold payment for services if the proper documentation of refrigerant work or related work is not completed.

## 17.5 New Equipment Guidelines

When possible (i.e., does not violate a Department of Defense Technical Order), all new equipment installed shall utilize non-CFC refrigerants. The goal is to limit the number of new alternative refrigerants utilized on site. Maintenance and inventory costs will be reduced by standardizing and limiting refrigerant types.

• Each shop, with assistance from the Refrigerant Program Manager, shall determine what refrigerants are presently in use and set standards for all future refrigerant equipment purchases.

− Further maintenance and parts inventory cost savings can be achieved by standardizing on equipment manufactures.

− Service history and existing parts inventory shall be considered in this analysis and the recommendations presented to purchasing.

The Shop Refrigerant Monitor shall assure all new equipment is properly tagged with equipment ID numbers.
For shops using the RCM software, New Equipment needs to be entered into the RCM software.

### 17.5.1 New Equipment ID Tags

All new equipment shall be tagged with a Robins AFB Unit ID number as specified.

• For shops using the RCM software, this number shall be used as the equipment id number by the RCM software.

### 17.5.2 New Equipment Leak Testing

All new equipment shall be leak tested prior to or during startup, including: packaged equipment (factory charged or field charged), split systems, and/or field-constructed systems with field installed refrigerant piping.

• The leak testing process shall utilize the appropriate electronic leak testing equipment and shall be witnessed by the Shop Refrigerant Monitor or a designated HVAC technician.

• If a leak is detected the following shall occur:

1. Notify the Shop Refrigerant Monitor
2. Document the leak
3. Repair the leak.
4. Leak test to verify the leak was repaired.
5. **Schedule and provide a 30-day follow-up verification leak test**.
6. Repeat the above process if follow-up leak is detected.

− For shops using the RCM software, document follow-up leak testing on the RCM Service Order form.

• For new equipment installed by a contractor, the contractor or installing party shall submit a verified leak test and submit results to the Shop Refrigerant Monitor.

## 17.6 Demolition Procedure for Equipment Removed by Contractors

Contract language for any refrigerant handling work by contractors shall include:

• A requirement for the contractor to provide technician EPA certification cards showing the testing organization and certification level of all persons who will be performing the refrigerant equipment demolition and refrigerant recovery.

• A written record of the work performed shall be filled out by the certified contractor technician and forwarded to the Shop Refrigerant Monitor upon completion of the job.

– For shops using the RCM software, an RCM Service Order Form shall be filled out and entered upon completion of the work.

**Note**: *If a properly certified contractor technician removes the refrigerant, the unit tagged as such, then a non-certified person may perform the actual demolition.*

In all cases the contractor technician shall tag the unit indicating that the refrigerant was removed.

An example of an Environmental Safety Notice is shown below:

**Figure 1: Environmental Safety Notice**

The contractor shall (in contractor-provided refrigerant recovery cylinders) take ownership of the recovered refrigerant and transport off site to a proper disposal company or certified reclaimer (**unless otherwise directed by Robins AFB**). The quantity removed from each unit and from the site shall be documented.

**ENVIRONMENTAL SAFETY NOTICE**

ENVIRONMENTALLY HARMFUL REFRIGERANTS AND OIL HAVE BEEN REMOVED FROM THIS UNIT IN COMPLIANCE WITH SECTION 608 OF THE CLEAN AIR ACT

REMOVED BY: (PRINT)_____

COMPANY NAME: (PRINT)_____

ADDRESS: (PRINT)_____

_____

TELEPHONE:_____DATE:__/__/__

SIGNATURE_____

# Robins Air Force Base
# Base Facility Standards

**Title: Plumbing**

**Date:** ***22 November 2013***

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 5C – PLUMBING

**CRITERIA REFERENCE DOCUMENTS:**
AFI 32-1066 Backflow Prevention Program

ETL 04-4 Trenchless Technology (TT) for Crossing Air Force Pavements, with Change 1

ETL 08-10 Alternative Water Sources -- Use of Non-Potable Water

UFC 3-420-01 Plumbing Systems

Senate Bill 370, Water Stewardship Act June 2010

Georgia and International Plumbing and Gas Codes

*BFS Part 7A –Energy Conservation*

*BFS Part 7B – Corrosion Control & Cathodic Protection*

*BFS Part 7C – Sustainable Design & Development*

PLUMBING:

a. General: Plumbing systems will be designed in accordance with the *Georgia and* International Plumbing Code. Plumbing systems will include water service pipes, building soil and waste drains and building storm drains, all pipes, fixtures, vents, branches, rain leaders and special piping systems necessary for fire protection. Individual shut-off valves shall be provided for each fixture. Floor drains shall be provided in all toilets, janitor closets, and mechanical rooms to prevent flooding. Provide trap primers for all floor drains.

b. Building Water Supply:

(1) Potable Water Source: The water supply will be from the nearest Base water distribution main line. Domestic water supply must have reduced pressure principle type backflow prevention. Any solder used in domestic water supply system must be 90/10 or 95/5.
Reduced pressure principle backflow preventer shall be provided on all new or renovated projects requiring a backflow preventer connected to potable water.

(2) Backflow preventer shall be located in an accessible location. Provide adequate clearance space for maintenance and repair of the backflow preventer in accordance with AFI 32-1066 and the International Plumbing Codes.

(3) Hot Water Requirements: Domestic hot water shall be provided by the most cost-effective means.

(4) All plumbing hot and cold water piping shall be provided with 1" thick insulation.

c. Drinking Fountains: Provide refrigerated drinking fountains when fountains are required. Drinking fountains are required in office and shop areas.

d. Sanitary Sewer System: See BFS Civil Standards.

e. Piping Systems:

(1) Plumbing: Sanitary piping shall be schedule 40 PVC or cast iron. Domestic water piping shall be type L copper (above ground), or type K copper (below ground) or CPVC SDR 11 (Design basis is FlowGuard Gold CPVC for piping equal or smaller than 2" diameter). CPVC pipe and fittings shall meet or exceed the requirements of ASTM D2846. Do not use CPVC pipe under the slab.

(2) Hot/Chilled Water Systems: All hot and chilled water piping systems shall contain the following as a minimum.

(a) Make-up water system with reduced pressure principle backflow preventer.

(b) Freeze protection for exposed piping by means of drain-down capabilities, or heat tape and insulation, or a combination of the above depending on the specific situation (discuss with the AF Project Manager prior to making a decision in order to agree on specific approach to be used). Also, when using a Heat Tape freeze protection system, it shall be thermostatically controlled based on the outside air temperature, not based on the pipe temperature.

(c) Drains at low points of the piping system and vents at high points.

(d) Expansion tank for water expansion and air separator for air control.

(e) Balancing valves at the discharge of all pumps and at coils requiring metered flow.

(f) Water treatment sampling and injection ports for all closed loops.

(g) System design shall include water treatment capability.

(h) Provide air relief valves at all high points.

(i) Provide floor sinks with basket for all air handling units' condensate drain lines in the mechanical rooms.

f. Restroom Equipment: Provide floor mounted water closet when possible. Water closets shall incorporate flush valve operation. Tank type water closets shall not be provided. Provide wall-mounted urinals in men's restrooms. All wall-mounted fixtures shall incorporated closet carriers or fixture carriers as applicable. Low water flow urinals should be provided for the new projects. In the renovated projects, if the existing wall mounted water closet is required to be replaced, provide either a new floor mounted type or a new wall mounted type with additional approved floor supports.
Any new construction project that requires the installation of toilets, shower heads, and faucets must follow the standards related to high-efficiency plumbing fixtures.

These shall include:

(1) A water closet or toilet that:

(A) Is a dual flush water closet that meets the following standards:
(i) The average flush volume of two reduced flushes and one full flush may not exceed 1.28 gallons;
(ii) The toilet meets the performance, testing, and labeling requirements prescribed by the following standards, as applicable:
(I) American Society of Mechanical Engineers Standard A112.19.2-2008; and
(II) American Society of Mechanical Engineers Standard A112.19.14-2006 'Six-Liter' Water Closets Equipped with a Dual Flushing Device.

(B) Is a single flush water closet, including gravity, pressure assisted that meet the following standards:
(i) The average flush volume may not exceed 1.28 gallons;
(ii) The toilet must meet the performance, testing, and labeling requirements prescribed by the American Society of Mechanical Engineers Standard A112.192/CSA B45.1 or A112.19.14.

(2) A shower head that allows a flow of no more than 2.5 gallons per minute at 60 pounds per square inch of pressure;

(3) A urinal and an associated flush valve that:
(A) Uses no more than 0.5 gallons of water per flush;
(B) Meets the performance, testing, and labeling requirements prescribed by the American Society of Mechanical Engineers Standard A112.19.2/CSA B45.1;
(C) For flushing urinals, meets all WaterSense™ specifications for flushing urinals.
(D) Nonwater urinals are not to be employed on Robins AFB.

(4) A lavatory faucet or lavatory replacement aerator that allows a flow of no more than 0.5 gallons of water per minute at a pressure of 60 pounds per square inch in accordance with American Society of Mechanical Engineers Standard A112.18.1/CSA B.125.1 and listed to the WaterSense™ High-Efficiency Lavatory Faucet Specification;

(5) A kitchen faucet or kitchen replacement aerator that allows a flow of no more than 2 gallons of water per minute.

g. Installation: Install all utilities (including potable water, fire water, Chilled Water/Hot Water Piping, Steam and Condensate, Natural gas, drainage piping, etc.) following applicable codes, i.e. International Mechanical codes, International Plumbing and Gas codes and including the following:

(1) Minimum depth for all new underground utilities shall be 3 ft from the top of the piping to the grade elevation. Install tracer wires and warning tape placed on the lines using #10 AWG Cu with nicked TW insulation to facilitate detection of the wire with pipe locators for all plastic and CPVC, PVC, and PE piping. Warning tape shall be located 6 inch to 12 inch below grade.

(2) All above-ground piping which is equal to or greater than 2" in diameter shall be labeled for the type of utility and arrows showing direction of flow. Use only snap-on plastic pipe labeling which complies with ANSI 13.1. Do not use tape or stenciling.

<<<END OF PART 5C>>>

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# Robins Air Force Base
# Base Facility Standards

**Title: Compressed Air**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 5D – COMPRESSED AIR

**CRITERIA REFERENCE DOCUMENTS:**

UFC 3-420-01 Plumbing Systems

ETL 04-4 Trenchless Technology (TT) for Crossing Air Force Pavements, with Change 1 (may be more appropriate under the Civil Section)
AFI 32-1066 Backflow Prevention Program

UFC 3-420-02FA

UFGS-43 15 00.00

UFGS-22 15 26.00 20

UFGS-22 15 13.16 40

*BFS Part 7A –Energy Conservation*

*BFS Part 7B – Corrosion Control & Cathodic Protection*

*BFS Part 7C – Sustainable Design & Development*

ANSI/ASME A13.1 – American National Standards Institute
American Society of Mechanical Engineers

International Plumbing Codes.

C.A.G.I. – Compressed Air and Gas Institute

COMPRESSED AIR:

The intention of this standard is to provide criteria to achieve economical, durable, efficient, and dependable compressed air systems to support Robins AFB. Where special conditions and problems are not covered in this Base Facility Standard, industry standards will be followed. Modifications or additions to existing systems solely for purpose of meeting criteria in this standard are not authorized. SPECIAL NOTE: Central Plant compressed air systems are considered on par with electrical generation systems. As such, every effort should be made to provide both a maintenance spare and an emergency spare compressor (but do not duplicate other contingency factors), and to ensure capability to operate at full capacity with any possible single point of failure. Provide an ORM analysis of likely concurrent points of failure, so the Base can make an informed decision as to mitigating the risk or determining operational responses should the event occur.

a. Energy Conservation

Evaluate feasibility, life cycle cost, and operational impact of incorporating the following energy conservation measures:

(1) Compressors.

(a) In selecting the type and number of compressors. the peak and non-peak compressed air demands must be determined.

(b) Install automatic compressor controls to modulate and sequence on-line compressor operations and shut down idling compressors.

(c) Reduce compressor discharge pressure as low as feasible to reduce motor load.

(d) Where possible, locate air-cooled compressors where room temperature will not exceed 100 degrees F. Recover heat from compressors to provide space heating in winter and provide ventilation to remove heat from the plant in summer or for preheating industrial process water.

(e) Select an air compressor with a pneumatic load-unload feature that, when fully unloaded, consumes approximately 15 percent of the base load horsepower.

(f) Use waste heat from the oil cooler to heat makeup air, or for building space heating in the winter.

(g) When economically justifiable, use multistage compressors with intercoolers.

(h) Motors shall be the premium efficiency type in accordance with NEMA .

(i) Develop lead/leg compressor design, deployment and operating strategy.

(j) Locate air intake outside of the building or low heat area to reduce ambient air inlet temperature.

(k) Evaluate the need for a demand controller to maintain a constant pressure regardless of downstream demand fluctuations.

(2) After cooler.

(a) Aftercooler selection shall be based on degree of drying required downstream of the aftercooler. Final discharge air temperature of the aftercooler will affect dryer sizing and can reduce both initial and operating costs of compressed air dryers.

(b) Duct air from air-cooled aftercoolers to provide space heating in winter and to remove heat from the plant in summer. Pipe coolant water to recycle heat waste where possible.

(3) Filters and dryers.

(a) Improve air quality only to the degree required at the point of use. If air quality requirements differ at various points of use, specify appropriate filters or dryers in applicable branch lines.

(b) Accurately determine the dew point required at each point of use. The type and size of dryer selected will affect operating cost. If the dryer must prevent condensation of moisture in air systems, determine lowest temperature to which piping will be exposed and select dryer to achieve a system pressure dew point 20 degrees F below that lowest freezing to temperate, select a dryer which allows dew point adjustment.

(c) Room air temperatures will affect drying efficiency. Where practicable, locate dryers where ambient temperature will not exceed 100 degrees F.

(d) Select dryer in conjunction with aftercooler so inlet air temperature to the dryer can be as low as feasible. The inlet air temperature will not exceed 100 degrees F. Keep inlet pressure as high as possible. Accurately determine operating temperature and pressure, since even minor changes in either can result in substantial operating costs.

(4) Air leakage.

(a) Maximum acceptable air leakage rate for a compressed air system shall not exceed 10 percent of the installed system flow rate.

b. Air Compressors.

(1) Whenever it is economically feasible, a central compressed air system shall be utilized to serve multiple points of use. Compressors and all accessories shall conform to American Society of Mechanical Engineers (ASME) B19.l and B19.3, ASME Boiler and Pressure Vessel Code Section VIII, PTC-9 & PTC-10, and Instrument Society of America (ISA) S7.3, as applicable.

(2) Total air requirement shall not be based upon the total of individual maximum requirements, but upon the sum of the average air consumption of air operated devices. Determination of the average air consumption shall be based on the load factor (the ratio of actual air consumption to the maximum continuous full-loaded air consumption). After making the calculation, add 10 percent to the estimated consumption for leakage. The total is the compressor capacity required for design. More capacity may be added to allow for future growth of the facility or serviced area over the next 2 years.

(3) An economic evaluation is necessary to determine whether a central compressed air distribution system or a system of separate compressors located near the point of usage is most cost-effective. Selection of the number of compressors for either situation should be based upon economics and other factors such as system reliability. Seasonal or operational load variations must also be considered.

(4) Compressors shall be located in clean, well-lighted, and ventilated areas of sufficient size to permit easy access for cleaning, inspection, maintenance, repair and any necessary dismantling. Adequate aisle space is needed between items of equipment for normal maintenance as well as for equipment removal and replacement.

(5) Air compressor systems shall be protected against high temperature, high pressure, and low oil pressure. Protective controls will include a fault indicator and a manual reset device.

(6) Compressors shall be filled with all manufacturer required fluids and shall have all manufacturer required filters prior to start up. Initial startup shall be by the manufacturer or a manufacturer approved vendor.

(7) Compressors shall not be allowed to sit in storage for extended periods prior to installation unless it is by the recommendations of the manufacturer.

(8) After installation, a sound test must be performed on all compressors and accessories. Sound reading test results must not exceed limitations set by OSHA Standard *1910.95.* Measurement of sound emitted from installed and operating air compressors will be in accordance with CAGI Compressed Air and Gas Handbook, Appendix B, "CAGI Pneurop Test Code for the Measurement of Sound from Pneumatic Equipment."

(9) Consideration must be given to critical pipe lengths of the air discharge pipe, and certain lengths must be avoided to prevent resonance. The critical lengths vary with the type and size of air compressor, and can be determined from air compressor manufacturers.

(10) Connection to a compressor shall be made with a flexible connection to avoid damage to components internal to the compressor due to vibration.

(11) Each system shall be evaluated for the need of a Demand Controller.

(12) For compressors installed inside of a facility, duct the exhaust to the exterior of the facility, with louvers designed to match the building exterior for architectural compatibility. Provide duct rated to withstand the heat generated.

c. Air Dryers.

(1) Provide properly sized compressed air dryers that properly fits the needs of the process(es) that require a dryer. A pre-filter with an automatic condensate drain shall be used ahead of the air dryer to remove water, oil, and other undesirable particles with a maximum pressure drop of 0.5 psi. Use oil separators/filters with a max pressure drop of 1.0 psi ahead of equipment sensitive to oil contamination. Provide an afterfilter to protect downstream piping and equipment from any debris or particles that are added to the air as a result of passing through the dryer. Consult air dryer manufacturer for recommendations and selection of prefilters and afterfilters for specific air quality requirements. Thermal mass air dryers are the most effective means of controlling condensation for normal pressure dew points (40F or higher). Desiccant dryers should be used only when the need for pressure dew points below 30F can be justified and generally should be point of use (some activities such as paint/depaint hangars may require such a large quantity that building entrance is more practical). Use external blower regeneration type only.

d. Receiver Tanks

(1) Pressure tanks shall be sized to provide adequate compressed air storage for the system.

(2) Air receivers shall be constructed in accordance with ASME Boiler and Pressure Vessel Code Section VIII and shall have an ASME National Board number.

(3) The receiver will be installed on an equipment pad to keep it dry. Adequate space around the unit is needed for draining, inspection, and maintenance. Tanks shall be equipped with a manual condensate drain, an automatic condensate drain, a liquid filled pressure gauge, and a pressure relief valve. All associated shall be arranged to drain back to the receiver. Where automatic condensate traps are used with receivers located outdoors, the traps shall be protected from freezing.

(4) No welding shall occur on the receiver tank unless the weld and welder is certified and the receiver tank is recertified by ASME.

e. Piping

(1) Steel compressed air piping will be Schedule 40 for all sizes and will be galvanized, black steel, stainless steel, or copper. Stainless steel Schedule 5 may be used if pressfit style couplings are used and installation is per manufacturer's recommendations. Copper compressed air piping or tubing will be Type K or Type L.

Pipe fittings will be same material as piping. When copper pipe or tubing is used, brazed joints will be used for connections. Brazing filler metals with melting temperatures between 1,000 degrees F and 1,600 degrees F will be used. Pressfit style fittings may also be used if installed per manufacturer's recommendations.

(2) Thermoplastic piping systems for transport or storage of compressed air will not be allowed.

(3) PE 3408 Polyethylene, SDR 7.4, pipe, butt fusion welded is acceptable for underground applications. Because of the wall thickness, the interior pipe diameter is about a size smaller than the corresponding steel pipe. For instance, a 6" steel pipe size would require an 8" PE pipe size to get equivalent air flow and pressure drop. Also, any branches off the system should be in a valve pit with steel tees, and isolation valves on all three sides. This ensures air can be distributed even with one catastrophic failure.

(4) Compressed air pipe shall be pitched so that any liquids flow towards a drain point or to a receiver tank.

(5) Compressed air piping shall be labeled in accordance with the most current ANSI/ASME A13.1.

(6) The loss of pressure in piping is caused by resistance in pipe, fittings, and valves, which dissipates energy by producing turbulence. The piping system shall be designed for a maximum allowable pressure drop of 5 percent from the compressor to the most distant point of use.

(7) Where possible the piping system should be arranged as a closed loop to allow for more

uniform air distribution to consumption points and to equalize pressure in the piping. Separate services requiring heavy air consumption and at long distances from the compressor unit should be supplied by separate main airlines. Pipes shall be installed parallel with the lines of the building, with main and branch headers sloping down toward a dead end. Branch headers from compressed air mains will be taken off at the top to avoid picking up moisture. When an isolation valve, or other flow restricting device, is placed in the discharge line between the compressor and after cooler or receiver, a safety valve or valves will be placed in the pipeline between them.

f. Air Drops and Connectors

(1) Air drops shall terminate approximately four feet above floor and shall have a valve drain cock, strainer, and automatic drain. Provide a pressure-regulating valve at the point of use to maintain operating pressure where necessary. A shut off valve shall be provided at every air drop and shall be within reach without need of equipment or ladder.

(2) Quick disconnects shall be a safety type. They shall be selected by the end user and be compatible with other quick disconnects already in use.

g. Automatic Drain Valves

(1) Automatic condensate drains used for receiver tanks and equipment shall be *design basis* "Drain-All" brand.

h. Design analysis.

(1) The following items will be considered in the design analysis:
- (a) Application (hospital. industrial. etc.).
- (b) Maximum operating pressure required.
- (c) Location of air requirements in buildings.
- (d) Air usage. continuous or intermittent demand.
- (e) Operating pressure dew point requirements.
- (f) Air filtration needs at points of use.
- (g) Need for oil-free air.

i. Equipment schedules.

(1) Equipment schedules will be shown on the drawings. Including the following:

(a) Air compressor.
- (1) Capacity (cubic feet of free air per minute).
- (2) Discharge pressure. psig.
- (3) Minimum motor horsepower.
- (4) Volts, phase, hertz.
- (5) Accessory list.
- (6) Spare parts list.

(b) Air receiver.
- (1) Capacity (cubic feet of volume).
- (2) Design pressure, psig.
- (3) Type horizontal (vertical).

(4) Diameter (feet).
(5) Length (feet).
(6) Accessory list.
(7) Spare parts list.

(c) After cooler-separator. (Water Cooled)
(1) Capacity (cfm and psig).
(2) Dew point temperature entering and leaving.
(3) Length (inches). diameter (inches).
(4) Cooling water.
— Gpm flow.
— Temperature in.
— Temperature out.
(5) Accessory list.
(6) Spare parts list.

(d) After cooler-separator. (Air cooled)
(a) Capacity (cfm and psig).
(b) Compressed air inlet temperature entering aftercooler.
(c) Approach temperature.
(d) Ambient air temperature.
(e) Minimum fan motor horsepower.
(f) Volts, phase, hertz.
(g) Accessory list.
(h) Spare parts list.

(e) Air dryer.
(1) Type.
(2) Capacity (cfm and operating pressure).
(3) Dew point temperature entering and leaving.
(4) Ambient temperature (degrees F).
(5) Volts, phase, hertz (if applicable).
(6) Accessory list.
(7) Spare parts list.

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# Robins Air Force Base
# Base Facility Standards

**Title: Fire Suppression**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 5E – FIRE SUPPRESSION

**CRITERIA REFERENCE DOCUMENTS:**

NFPA-13 Standard for the Installation of Sprinkler Systems

UFC-3-600-1 Fire Protection Engineering for Facilities

ETL 02-15 Fire Protection Engineering Criteria - New Aircraft Facilities

ETL 01-18 Fire Protection Engineering Criteria - Electronic Equipment Installations

ETL 98-8 Fire Protection Engineering Criteria - Existing Aircraft Facilities, with Change 1

ETL 95-1 Halon 1301 Management Planning Guidance, with Change 1 (if we have any left)

ETL 94-6 Fire Protection Engineering Criteria and Technical Guidance - Removal of Halogenated Agent Fire Suppression Systems, with Change 1 (if we have any left)

ETL 86-8 Aqueous Film Forming Foam Waste Discharge Retention and Disposal (coordinate with environmental management - this may have been superseded by later regulations/law).
*BFS Part 7A –Energy Conservation*

*BFS Part 7C – Sustainable Design & Development*

FIRE PROTECTION (See Electrical Section for Detection and Alarms)

a. Construction Submittal Requirements: Contractor shall submit fire protection system shop drawings, as-builts, and hydraulic calculations prepared and stamped by a Registered Fire Protection Engineer. A level III Technician certified by the National Institute for Certification in Engineering Technologies (NICET) in the Automatic Sprinkler System Layout sub-field of Fire Protection Engineering Technology in accordance with NICET 1014 is acceptable for design of new areas or new additions of less than 4000 SF where no fire riser or fire pump is required.

b. Suppression:

(1) Water supply analysis/modification requirements: The designer is fully responsible for all water supply analyses required for each project, including making water flow tests, fire pump tests, etc. The Civil Engineering Plumbing Shop will assist the project A-E in making the tests and will provide previous flow test data when available. All the fire water flow tests shall be performed in the presence of the Base Fire Department and the Plumbing/Utilities Shop personnel.

(2) Calculations: Provide a hardcopy printout of the sprinkler hydraulic calculations in the HASS format (by HRS Systems, Atlanta, GA) or other Base Approved agencies. Provide the final sprinkler design in the form of both the specified hardcopy printout plus the design data file compatible with the HASS sprinkler hydraulics program on a CD Rom.

(3) Provide a preliminary sprinkler design by at least the Preliminary (65%) design stage. Hydraulic calculations shall be provided by at least the First Final (85-90%) design stage.

(a) Design shall be IAW NFPA 13, Factory Mutual (FM), UL, UBC, Unified Facilities Criteria-UFC 3-600-01 (Fire Protection Engineering for Department of Defense Facilities), and the System Safety Analysis for each project.

(b) In some cases, only sprinkler head locations need be shown, with calculations to be performed by the construction contractor. This must be approved during design fee negotiations for each project.

(4) Fire hydrants: Provide additional fire hydrants as needed.

(5) Fire extinguishers shall be in cabinets flush mounted to the wall.

(6) Warehouses shall have large drop sprinkler heads.

(7) Electronic equipment shall not have halon protection. Use wet pipe water suppression with early detection and shutdown of equipment.

(8) Fire Pumps are discouraged. If used, feed from another building or place a sign on the transformer feeding the building warning the Shops to not disconnect the transformer during a fire.

(9) Drawing Requirements: Drawings shall be prepared and stamped by a licensed Professional Engineer practicing in Fire Protection.

(10) Use water motor gongs at each riser.

c. Limiting: Provide dampers, vents, partitions, fire rated doors, and other materials as needed.

d. Pipe: Do not use any type plastic, CPVC, PVC, or polybutylene pipe in any fire protection piping systems. Do not use any schedule 10 pipe. Provide steel schedule 40 or heavier pipe for fire suppression system that complies with NFPA-13.

e. All fire suppression piping in the attic areas, above suspended ceilings, and any other unheated spaces must be provided with freeze protection. Also, connect freeze protection circuit to the fire alarm panel to provide a "trouble signal" if the freeze protection system becomes inoperative.

f. All exposed piping in inhabited spaces shall be painted to match with the existing surrounding conditions. In all other locations, the piping shall be painted in red. Do not paint sprinkler heads.

g. All fire sprinkler piping which is equal to or greater than 2" in diameter shall be identified and labeled every 20 feet apart. The labels shall be snap-on plastic only, and shall indicate "Sprinkler" and shall have "Arrows" that show direction of flow.

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# Robins Air Force Base
# Base Facility Standards

**Title: UTILITY MONITORING & CONTROL SYSTEMS (UMCS)**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 5F – UTILITY MONITORING & CONTROL SYSTEMS

**CRITERIA REFERENCE DOCUMENTS:**

Air Force Instruction (AFI) 32-1063, Electric Power Systems.

ETL 01-1 Reliability and Maintainability (R&M) Design Checklist

ETL 08-13 Incorporating Sustainable Design and Development (SDD) and Facility Energy Attributes in the Air Force Construction Program.
ETL 11-1 Civil Engineer Industrial Control System Information Assurance Compliance
[This ETL supersedes ETL 09-11]

UFC 3-400-01 Energy Conservation with Change 4

UFC 3-401-01FA Utility Monitoring and Control Systems

UFC 3-410-01FA Heating, Ventilating, and Air Conditioning, with Change 4

UFC 3-410-02A Heating, Ventilating, and Air Conditioning (HVAC) Control Systems, with Change 1

*BFS Part 7A – Energy Conservation*

*BFS Part 7C – Sustainable Design & Development*

**HISTORICAL DOCUMENTS (Use the more current documents referenced above):**
ETL 83-1 Design of Control Systems for HVAC
ETL 86-16 Direct Digital Control of Heating, Ventilation and Air Conditioning Systems

UTILITY MONITORING & CONTROL SYSTEMS STANDARDS

a. This is one part of the Robins AFB Base Facility Standards. Refer questions or exception requests to the Technical Support Flight Chief in 78 CEG/CENMP. Any exceptions granted to these requirements shall be noted clearly in the project design analysis by using a Deviation Request.

b. *Systems shall be designed in accordance with current UFC's, AFI's, ETL's, NFPA Standards, and other codes and standards referenced in this BFS Part.*

c. Controls and metering: Controls shall be electronic/electric/Direct Digital control.

d. All new construction and/or major renovation shall have utility meters installed if not already in place.

e. Complex HVAC systems shall be designed as Direct Digital Control systems compatible and communicable with the existing Base DDC systems. Coordinate with the Base Project Manager for specific alterations pertaining to each project. Metering will be required for all utilities. Meters shall be connected to the base wide energy and utility monitoring and control system either directly or via the building HVAC control system. Meters shall be non-resettable with a local numeric display. Employees of the control equipment manufacturer shall install control systems.

f. HVAC DDC control system (UMCS) shall be BACHnet open protocol (design basis) by Johnson Controls Metasys or Honeywell. The new DDC system shall communicate with the remote DDC station located in Building 1555 (Base Civil Engineering Control Center) for monitoring, trending, scheduling, adjusting, troubleshooting, etc. (Potential alternative for the HVAC DDC control system (UMCS) is LonWorks).

g. Provide programming time by the contractor in each contract to program the existing HVAC DDC stations in B/1555 from the remote DDC station, so the operator can monitor, program and change the set points, etc. for the building's newly installed HVAC equipment. Provide all job specific programming (logic, web graphics, program objects) which shall be turned over to the Government at the completion of the project for possible use by government to operate and maintain these systems.

h. Verification of DDC control system shall be conducted prior to any contract acceptance.

<<<END OF PART 5F>>>

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# Robins Air Force Base
# Base Facility Standards

**Title: Facility Electrical, General**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR
ROBINS AFB

**PART 6A – Facility Electrical, General**

**CRITERIA REFERENCE DOCUMENTS**: The publications listed below form a part of this document to the extent referenced. The publications are referred to in the text by the basic designation only.

NEMA MG-1

NFPA 70 (2011), National Electrical Code

NFPA 70E (2012), Standard for Electrical Safety in the Workplace

UFC 1-200-01, General Building Requirements

UFC 3-501-01, Electrical Engineering

UFC 3-520-01, Interior Electrical Systems

BFS Part 7A –Energy Conservation

BFS Part 7C – Sustainable Design & Development

1. LISTING: All electrical devices and components shall be listed for their intended use by UL or FM.

2. LOAD LEVELS: Calculate load levels for at least the following items
NOTE :Consider derating for 50 degree C ambient in uncooled spaces.

a. Branch and feeder circuits.

b. Panelboards and switchboards.

c. Generators and automatic transfer switches.

d. Transformers.

3. DEMAND FACTORS: Size service entrance, pad mount transformers, downstream panelboards, dry type transformers, feeders, etc., as listed below.

a. General Purpose Convenience Receptacles:

(1) First 10 KVA, use 100 percent demand. PF = .95 lagging.

(2) 50 percent demand factor for remaining over 10 KVA. PF = .95 lagging
(3) Note: This does not include system furniture receptacles in office areas, individual office rooms, and large open office areas without system furniture.

b. Mechanical Equipment: Assume 100 percent demand load, PF = .80 lagging.

c. Lighting: Assume 100 percent demand load at PF = .95 lagging. Lighting shall be considered a continuous load with circuits serving such loads not loaded more than 80 percent of their rating.

d. System Furniture: Assume each cubicle contains one (6 amp) 720 VA CPU computer and a (2 amp) 240 VA computer monitor. Design on each six cubicles sharing a (8 amp) 960 VA printer. Include in load calculations an additional 180 VA per cubicle for typical furniture task lighting and miscellaneous loads (such as calculators, electric pencil sharpeners, etc.) Assume 80 percent demand load at PF = 0.95.

e. Individual Office Rooms: Assume each room contains one (6 amp) 720 VA CPU computer, one (2 amp) 240 VA computer monitor, and one (8 amp) 960 VA printer. Include in load calculations an additional 180 VA per room for typical desktop task lighting and miscellaneous loads (such as calculators, electric pencil sharpeners, etc.) Assume 100 percent demand load at PF = 0.95.

f. Large Open Offices (250 SF and above) w/o system furniture: Design using 15 VA per SF at 80 percent diversity at PF = 0.95.

g. Busways (and Bus Ducts):

(1) Only use busways to supply plug-in busway for shop areas with large pieces of equipment. Do not use them to feed downstream loads from the service entrance such as panelboards and MCC's.

(2) Protective device and feeder to each busway shall have an ampacity not less than the busway ampacity.

(3) Each busway shall be fed with a separate protective device and homerun feeder.

h. Facility Transformers and Service Lateral Conductors - No additional diversity or demand factor shall be applied to the pad mount transformers and service lateral

conductors.

i. Service Entrance Rated Equipment - Service entrance rated equipment shall be sized based on a summation of the individual demand loads. No additional diversity or demand factor shall be applied to the service entrance rated equipment.

j. Feeders - These shall be sized to carry the anticipated current. Demand factors may be specific depending on a certain application. Demand factors not listed, or proposed that are different from this standard, must be approved by 78 CEG/CEOI at Robins AFB.

4. POWER SYSTEM PROTECTION STUDIES

a. Design: Perform a short-circuit study during design to determine proper AIC ratings of all electrical equipment. Include calculations in the design analysis.

b. Time Current Coordination Study: For projects that contain adjustable trip settings, a short circuit and time current coordination study will be needed to properly set the settings on the breaker trip units. The study needs to be based on the actual equipment that will be supplied on the project. Include in the study all cut sheets on the electrical equipment, breakers, and trip units being furnished on the project. The study and the equipment cut sheets shall be provided in a single 3 ring binder.

(1) For Design-Bid Build Projects

Specify in the specifications that the Contractor perform a short-circuit study and time-current coordination study prior to procurement of any equipment/material. Both the short-circuit study and the time-current coordination study shall be performed by the same company, either consulting engineering services with the equipment manufacturer or an independent Registered Professional Engineer regularly engaged in performing these studies. Specify all equipment material submittals be provided with the study in a single 3 ring binder.

(2) Design – Build Projects

After design is completed, but prior to procurement of any material, the Design Build Contractor shall obtain a short circuit and time-current coordination study. Both the short-circuit study and the time-current coordination study shall be performed by the same company, either consulting engineering services with the equipment manufacturer or an independent Registered Professional

Engineer regularly engaged in performing these studies. The study will be based on the actual equipment that will be supplied on the project. The Engineering group with the Design Build Contractor shall review the study and make any recommended changes if needed to the design. Submit all equipment material submittals with the study in a single 3 ring binder.

c. MVA: At a minimum, use 400 MVA with X/R = 15 available at the primary side of the main transformer.

d. Scope: Include the protective system from the nearest upstream devices beyond the transformer primary fuses down to and including all adjustable or selectable low-voltage protective devices.

e. Limiters: Do not use low voltage cable limiters to achieve short-circuit limitation for equipment.

f. Transient Voltage Surge Suppression (TVSS): Resettable TVSS is required at the main service entrance
as a minimum. Double-ended switchboards will require a TVSS on each side.

5. MOTORS

a. Size: Motors of 1 HP and more shall be 3-phase.

b. Reduced Voltage Starting: Use reduced voltage motor starting on 75 HP and up. For smaller motors, evaluate motor-starting voltage drop and provide reduced voltage starting if over 10% drop.

c. Efficiency of polyphase squirrel-cage induction motors shall be premium, design E per NEMA MG-1 - 1993, rev. 1.

6. INTERIOR POWER

a. General.

(1) In existing facilities fed at 208V, convert to 480V. In new facilities the service voltage shall be 480Y/277 unless the Civil-Electrical Engineer in 78 CEG/CENMP gives approval for 208Y/120 volts.

(2) Provide small distributed dry-type transformers (delta-wye) as needed for

208Y/120V to step the voltage down from 480Y/277. In administrative areas, locate dry type transformers and branch panelboards in electrical closets distributed throughout the facility to keep the branch circuits below 200 feet.

(3) Use reduced voltage motor starting on 75 HP and up. For smaller motors, evaluate motor-starting voltage drop and provide reduced voltage starting if over 10% drop.

(4) Power Factor Correction: Install capacitors to correct power factor to 95% at full load for motors 50 HP and larger. Show every capacitor next to the motor. Install as close to the motor terminals as possible. Do not install capacitors on any motor with variable frequency drive (VFD).

(5) The Contractor shall have an electrician with a Master's License on site during all installations.

(6) Use generic "off the shelf" equipment. Field fabrication of panels, switches, etc., is not allowed.

(7) Equipment that is obsolete or scheduled to be obsolete is not allowed.

(8) Provide a submittal at the final inspection that lists the vendors for all equipment, so CE shops can contact them later as needed.

(9) The following wiring methods shall not be used: Armored Cable (Type AC), Flat Cable Assemblies (Type FC), Flat conductor Cable (Type FCC), Integrated Gas Spacer Cable (Type IGS), Metal-Clad Cable (Type MC), Mineral-Insulated, Metal-Sheathed Cable (Type MI), Nonmetallic-Sheathed Cable (Types NM, NMC, and NMS) {except for residential use}, Power and Control Tray Cable (Type TC) {unless specifically called for in project scope documents}, Underground Feeder and Branch-Circuit Cable (Type UF), Nonmetallic Underground conduit with Conductors (Type NUCC), Flexible Metallic Tubing (Type FMT), Electrical Nonmetallic tubing (Type ENT), and similar wiring methods with various manufacturer's name brands.

(10) All wiring shall be rated 600 volts, single copper conductor, with Type THHN, THWN, or XHHW insulation rated for 75°C or higher as applicable.

(11) Color coding - All branch circuit conductors shall be color coded as specified hereinafter. The color coding shall be continuous throughout the facility on each phase conductor to its point of utilization so that the conductor phase connection is readily

identifiable in any part of the installation. The equipment grounding conductor shall be covered with solid green insulation only. Conductors covered with green insulation with yellow, orange, violet, or red tracers shall only be used for other grounding systems. Neutral conductors shall be continuous insulated white for 120/208/240V systems, and continuous insulated gray for 277/480V systems. Where color coding is not available in the larger size conductors, the conductors shall be color coded by use of color coded tape, half lapped for a minimum length of 3 inches and shall be tested to prevent phase crossover prior to terminations. Where conductors are color coded in this manner, they shall be color coded in all junction and pull boxes accessible raceways, panel boards, outlets, and switches, as well as at all terminations. Conductors in accessible raceways shall be coded in such manner that by removing or opening any cover, the coding will be visible.

Phase conductors shall be color coded as follows:

Three Phase

| 120/208 or 240 Volts | 277/480 Volts |
|---|---|
| Phase A _ Black | Phase A _ Yellow |
| Phase B _ Red | Phase B _ Brown |
| Phase C _ Blue | Phase C _ Orange |

(12) All wiring shall be installed in metallic conduit raceways above grade or PVC (schedule 40 or 80 as appropriate) below grade.

(13) Wireway (rectangular shells with top covers into which cables are laid) are highly discouraged and allowed by exception only.

(14) Cable tray as a raceway for power wiring is highly discouraged and is approved only by exception upon request.

(15) Raceways shall be concealed wherever practical in finished spaces and minimum size shall be ¾".

(16) Motor Control Centers shall have disconnects, branch circuit overload protection, and controllers mounted in a single assembly. Whenever the starter is located in the MCC, use thermal magnetic or instantaneous trip circuit breaker with separate adjustable overloads. If the unit contains no starter, and the starter is located at the machine, then a thermal-magnetic circuit breaker shall be used to supply the motor feeder.

(17) Electric - Operated Projector Screens in Conference Rooms, Classrooms, and Training Rooms: Coordinate locations with user. Provide power and wall switches for control.

(18) Main electrical rooms shall be a separate room with no other trades sharing

the electrical room. Main electrical room shall be located on an exterior wall with exterior double doors, and without a center support, in the opening for removal of equipment. Doors shall contain an exterior lock.

(19) Electrical closets within the facility shall be separate rooms with no other trades sharing the closets. Electrical closet doors shall contain a lock.

(20) Unless special permission is granted by Civil Engineering, all dry-type transformers shall be installed within the main electrical room and the electrical closets within the facility.

b. Branch Circuits.

(1) On all new circuits, allow for future expansion by loading less than the NEC maximum.

(2) 20 Amp receptacle circuits, place no more than 10 duplex outlets on a circuit. All circuits supplying convenience receptacles shall be protected with a 20-amp circuit breaker.

(3) Do not use multi-wired circuits (shared neutrals) for single-phase loads. Run a separate neutral.

(4) Do not use under floor duct systems.

(5) Provide a separate green grounding equipment conductor in all conduits. Raceway shall not be used as a sole equipment ground. Ground shall be sized in accordance with Table 250 of the NEC.

(6) Do not use ground fault breakers for 120 volts, 20-ampere circuits.

(a) Use only individual ground fault receptacles.

(b) Provide GFCI receptacles in all bathrooms, locker rooms, within all wet areas of a facility, and at all outside locations.

(7) Branch circuits shall be rated a minimum of 20 amperes, except where lesser ratings are required for specific applications. Branch circuit conductors will in no case be less than No. 12 AWG.

(8) Maximum of three phases or poles shall be installed in any conduit system, which includes single-phase circuits, regardless of derating tables in the NEC.

(9) The combined voltage drop on feeders and branch circuits will not exceed 5 percent. Individual voltage drop on feeder and branch circuits shall not exceed the recommendations of the NEC.

c. Dry-type Transformers:

(1) Use dry-type general purpose (delta-wye) in the facilities except in cases listed below which require K = 13 non-linear dry type transformers.

(2) Use K-rated (K=13) non-linear dry types when providing power to the following areas:

(a) Office administrative areas

(b) Cubicles or System Furniture

(c) Individual office Rooms

(d) Large open office areas

(e) Computers

(f) Electronic Equipment

(g) Electronic Test Labs

(3) Dry type transformers shall be not be ceiling-mounted or wall-mounted. Mount the transformer on a concrete pad on the floor with rubber pad isolators.

(4) Maximum size dry type shall not exceed 300 KVA.

d. Low voltage cable and conduit:

(1) Use only copper conductors.

(2) Use Type THHN, THWN, or XHHW as appropriate.

(3) Base conductor size on the above.

(4) Do not use setscrew or die cast conduit connectors on EMT conduit. Use zinc coated steel compression fittings only.

(5) Screw-in flex connectors are not allowed. Connectors for flexible metal conduit shall be malleable iron/zinc plated and of the 2-screw clamp type with insulated throats conforming to UL 514B & NEMA FB-1.

(6) For areas without conditioned air, apply the ambient correction factors in NEC, article 310.

e. Computer areas:

(1) Locate separate emergency shutdown switches (inside hinged covers to prevent accidental activation) for all computerized operations, including their air handling and computer room units. Locate switches at each exit door of the computer room.

(2) Activation of the fire alarm system shall also shut down the computer equipment, computer room units, and air-handling units.

f. Air Handling Equipment and Devices:

(1) Device Plates: All device plates shall be type 302, 0.035 inch thick, brushed finish, and UL Listed stainless steel.

(2) Disconnect Switches:

(a) Heavy duty type.

(b) NEMA 3R outdoors, NEMA 4X in corrosive areas.

(c) When fused, use rejection type R fuses.

g. Grounding:

(1) Ground rods - ¾" X 10' copper clad. Use exothermic weld to connect to grounding system.

(2) Service Entrance Ground Electrode: Connect a tripod of three ground rods spaced 20 feet apart to the service entrance electrode connection. Tripod shall be at least 10 feet from the facility.

(3) For new construction: In addition to the service entrance ground electrode listed above, install a ground ring with ground rods around the entire new facility with connections to the steel beams evenly spaced around the perimeter of the structure. Connect the electrical service entrance ground bus to the ground ring at a single point copper ground bus bar located in the main electrical room.

(4) Grounding shall be provided for all new communications rooms. Refer to the communications section of this BFS. For new construction, connect the grounding in each communication room to the single point ground bus located in the main electrical room.

(5) Grounding shall be provided for all new raised floor systems. Due to the various methods of grounding computer raised floors, details are left to be provided by others.

(6) Static ground receptacles shall be provided for all new hangars and painting facilities. Receptacles shall be interconnected together with the grounding system and steel structure in the facility.

(7) All raceways shall have an insulated equipment ground conductor sized in accordance with the NEC.

h. Wall switches:

(1) 20 Amp minimum.

(2) Industrial Specification Grade, not general or standard grade.

i. Convenience Receptacles - General:

(1) An outlet is defined as 20 Amp minimum, NEMA 5-20R, and duplex. Locations shall be as described for convenience receptacles in this standard.

(2) Industrial Specification Grade, not general or standard grade.

(3) When weatherproof, use spring-hinged flap covers.

(4) Convenience receptacles shall be located 18 inches AFF, to the center of the outlet. Exception: 24 inches AFF to bottom of outlet plate is allowed in explosion proof areas.

(5) Explosion proof convenience receptacles shall be provided at all explosion proof areas within a facility. Locations shall be as described for convenience receptacles in this standard. Explosion proof convenience receptacles shall be rated in accordance with Article 500 of the National Electrical Code.

(6) Explosion proof convenience receptacles shall be rated 20 amperes.

(7) Provide a plug for each explosion proof convenience receptacle.

j. Areas - Convenience Receptacles shall be provided in all the following areas listed below:

(1) At Communication Outlets - adjacent to each communication outlet

(2) Small Individual Office Rooms (less than 250 SF) - one outlet on each wall.

(3) Conference Rooms:

(a) One outlet ceiling mounted approximately 18 feet from the center wall where a projection screen would be installed.

(b) An outlet on each wall but mounted at 16 ft maximum separations around the perimeter of the room. I

(c) Install one outlet in the corner of the room opposite where a projection screen would be used.

(d) Install a floor mounted receptacle in the front of the room for a podium.

(4) Communication Rooms: Provide two outlets in the center of each wall.

(5) Receptacles for Pre-wired System Furniture:

(a) Prewired system furniture is defined as follows: furniture that contains pre-wired powered panels with plug-in receptacles and communication outlets mounted in the furniture base. Prewired system furniture would have the power and communication wiring extended into the furniture channel through a power pole or flexible whip.

(b) If furniture is included in the Design Build RFP or Statement of Work, then all raceway, wiring, and power capacity should be provided. Wiring should be extended to the furniture and terminated on the outlets.

(c) If the project does not provide the prewired systems furniture, but it will be procured by the user at a later date, then the project shall include future provisions for the furniture. This shall consist of all loads in the design calculations, capacity in all feeders and panelboards, breaker space in all panelboards, branch wiring with associated raceway to the point of connection, etc. Design Build RFP or Statement of Work should indicate who will provide the final connections to the furniture. If final connections will be performed by others, then the wiring should be left terminated in a junction box above the ceiling near the future power poles or in a wall mounted junction box.

(d) In design/build projects, the location of furniture or quantity of workstations in each area should be included in the RFP.

(6) Administrative areas larger than 250 square feet with or without prewired systems furniture (now or later):

(a) In these spaces, install one outlet at 8 feet intervals around all walls and one outlet on each furred out interior column.

(b) These outlets shall be installed flush in the walls and interior columns. This is in addition to the outlets specified for prewired system furniture cubicles.

(7) Non-Prewired Systems Furniture - If furniture is installed in areas of the facility, which is not prewired system furniture, but uses the outlets in the walls, then provide the following:

(a) Two outlets shall be installed in the center of each cubicle flush mounted in the wall. Maximum separation shall not exceed 8 feet on the walls. Maximum two cubicles shall share a circuit.

(b) In design/build projects, the location of furniture or quantity of workstations in each area shall be included in the RFP.

(8) Mechanical, Electrical rooms and Mechanical Mezzanines: One outlet at 20 ft intervals around all walls. Provide additional outlets as needed to coordinate with equipment locations.

(9) Mechanical and Electrical Equipment: One outlet shall be installed within 16 feet to 20 feet of each piece of equipment. This shall be provided wherever equipment is located, whether inside or outside, roof, mezzanines, etc.

(10) Corridors: Provide one outlet at every 20-ft interval along the length of the corridor (on one side of wall or alternate wall).

(11) Lobby: Two outlets total, on opposite walls.

(12) Warehouses, Shop Areas, Storage Areas, and Hangars: One outlet at 40 feet intervals around the perimeter of all walls and on outlet at all interior columns.

Locate outlets in the web of interior columns.

(13) Each DDC Control Panel - Provide one receptacle outlet at each DDC control panel. This is used for maintenance personnel to use portable tools, laptops, etc.

(a) This is in addition to a hardwired connection for the panels' power.

(b) At each DDC panel, provide a dedicated hardwired circuit for the DDC panel power requirements.

(14) All other areas within a facility not specifically addressed above shall have outlets installed as follows:

(a) Install one outlet at 16 ft maximum intervals around the perimeter of all walls and one outlet on each interior column. Locate outlets in the web of interior columns.

(b) Walls less than 16 feet shall have minimum one outlet installed on each wall; this outlet shall be centrally located on the wall but may be the same outlet as outlets spaced 16 ft on center around the room.

(15) Receptacles outside the facility shall be as follows:

(a) One outlet shall be installed at each personnel door on the outside.

(b) One outlet shall be installed at each roll-up door on the inside.

(c) One outlet shall be installed at all mechanical equipment outside within 16 feet to 20 feet of the equipment.

(16) Coordination Notes: The above is based on the minimum requirements. A/E shall be responsible to coordinate with the user on the exact location for the outlets during the design stage. This shall be based on final equipment locations, users' needs, and workstation or desk locations. This statement applies to design projects and design/build contracts.

k. Special Receptacles for Hangars: Obtain special requirements from user or project scope of work.

7. SYSTEM GROUNDING

a. Soil Resistivity: The median value runs in the 25,000 ohm-cm range for soil near buildings at Robins AFB. This would normally result in a single ground rod having a resistance of nearly 100 ohms. To meet the NEC requirement of 25 ohms or less a tripod set of ground rods 20 feet apart with thermit-welded bare copper 4/0 wire between them is usually sufficient, provided the closest ground rod is at least 10 feet from the facility.

b. Buildings under 4,000 SF roof size and larger buildings without any admin space or office: When a bldg or structure meets this description after the work of this project, the system ground may meet the NEC requirement of 25 ohms or less.

c. Buildings of 4,000 SF and larger roof size with any admin space or office: Provide maximum of 10 ohms of resistance to hard earth ground in the system ground connected to the electrical service entrance.

8. SWITCHBOARDS, PANELBOARDS, AND MOTOR CONTROL CENTERS

a. Choice of type:

(1) Use switchboard construction when 1000 Amps or larger.

(2) Use power distribution panelboard construction when equal to 800 Amps. Boxes shall be minimum 9 ½ inches deep.

(3) Use panelboards when 600 Amps or less.

b. General:

(1) Use NEMA 3R outdoors. NEMA 4X may be specified in cases where the corrosion potential is high. Fiberglass is preferred over stainless steel for NEMA 4X.

(2) Use copper bus only.

(3) Size to allow for a 25% increase in power demand.

(a) A 25% spare capacity over calculated load (20% of the equipment rating) shall be provided for all electrical equipment including transformers, motor control centers, switchboards, panelboards, feeders, and associated overcurrent

protective devices.

(b) Calculations shall clearly demonstrate how the spare capacity is included for each bus in the system. Include hand written calculations or a spreadsheet to demonstrate how the spare capacity is included in each bus and feeder in the system.

(4) Provide spare circuit breakers to fill approximately 25 percent of the pole spaces in new panelboards. (For example, a panelboard with 42 single pole circuits will have 10 spare single pole circuit breakers for future use). Circuit breaker ampacity and number of poles to be the most common type of circuit breakers being placed in the panelboard. Remaining unused poles will be noted as "Space"."

(5) Panelboards, switchboards, or motor control centers shall not be tapped to feed new loads. If there is no space for protective devices in the existing piece of equipment to feed the new load, then a new panelboard, new switchboard (add section if feasible), or new motor control center (add section if feasible) shall be provided.

(6) Existing Equipment: When installing breakers in existing panels, insure the manufacturer can still supply them and at reasonable price and delivery schedule.

(7) When doing any work involving the main service entrance, install or re-install a laminated riser diagram of the electrical system on the wall near the panel.

(8) Provide typed directories in each cabinet.

(a) Clearly label each circuit as to type load and specific location. Example – Receptacles N. Wall

(b) Note on the directory from where the cabinet is fed. Example - “Fed From Panel PA in Mech Room, Ckt. 4”

(9) All service entrance equipment shall contain a main breaker. If the facility requires double ended design, as stated elsewhere in this standard, then two main breakers with a normally open tie breaker shall be provided, with Kirk key interlock.

(10) Feeders to service entrance and any panelboard within the facility shall not contain any derated neutrals. As a minimum, neutrals shall have an ampacity of

the phase conductors. Feeders to panels with 200 percent rated neutral busses shall have the neutral conductors rated 200 percent of the feeder phase conductors.

(11) New construction shall be designed with one service entrance, except as noted for transformer requirements over 5,000 KVA.

(12) Labeling of Panel Schedules and Drawings for Branch Circuits: Each homerun symbol on the drawings shall be labeled in accordance with the pole numbers instead of a circuit number.

(a) Three-phase loads shall be designated by the three-pole numbers, such as HB - 1,3,5 or HB - 8,10,12. The single pole number, such as LA-12, shall designate single-phase loads.

(b) Panel schedules shall be numbered with odd numbers on the left side, top to bottom, and even numbers on the right side top to bottom.

c. Distribution Panelboards and Switchboards:

(1) Protect by breakers. Fuses are not permitted.

(2) All switchboards and panelboards shall be 3-phase, 4-wire, with ground bus. Install a neutral conductor to all switchboards and panelboards regardless of load.

(3) If the main breaker has ground fault protection, provide it as well on the feeder breakers.

(4) Show future frame space in all service entrance rated or distribution panelboards or switchboards, with full mounting hardware provided for plugging the breakers into them.

(a) Switchboards. 1000 - 1200 Amps, provide:

1. 1-400 amp frame space.

2. 2-225 amp frame spaces.

3. 1-100 amp frame space.

(b) Switchboards. 1600 Amps and above, provide:

1. 1-800-amp frame space.

2. 2-400 amp frame spaces.

3. 2-225 amp frame spaces.

3. 1-100 amp frame space.

(c) Double-ended switchboards. Provide for each side (a) or (b) above for future frame space sizes.

(d) 800 amp panelboards. Provide:

1. 2-225 amp frame spaces.

2. 2-100 amp frame spaces.

(e) 600 amp panelboards and below. Provide:

1. 1-225 amp frame space.

2. 3-100 amp frame spaces.

(f) All frame space sizes shall be based on three pole breakers.

(5) Use an electronic multi-meter in the main panelboard or switchboard instead of ammeters,

(6) On double-ended switchboards, control switches and meters shall be connected to the side of the energized source. As soon as power is de-energized from one of the incoming sides of the double-ended switchboard, all control power shall automatically transfer to the other side of the available energized source.

(7) Switchboards

(a) Main through bus shall be fully rated and non-tapered copper bus.

(b) Distribution sections shall have the same depth as the main service section.

(c) TVSS units may be located integrally with service entrance equipment.

d. Panelboards - Other:

(1) All panelboards shall be “main breaker interior” type unless the upstream circuit protective device is within sight of the downstream bus being fed.

(2) Gutter taps, sub-feed lugs, feed-thru panels, and taps of conductors inside junction boxes are unacceptable circuit feeds to panelboards.

(3) All panelboards shall be fed from a separate circuit breaker in an upstream bus. The only exception to this shall be when no more than two panelboards shall share the same feeder circuit from a dry type transformer. The second panelboard shall be connected from a feeder breaker in the first panelboard. The second panelboard shall be installed adjacent to the first panelboard or inside the same room.

(4) If multiple (three or more) 208Y/120 volt panelboards are fed from the same dry type transformer, then a 208Y/120 volt distribution panelboard shall be installed downstream from the dry type transformer. Each panelboard shall be connected to a dedicated circuit breaker in the distribution panelboard.

(5) Minimum panelboard size:

(a) Use minimum 225 Amp bus rating and main breaker, 42 poles.

(b) If the demand load is 40 Amps or less, then a 100 Amp panel, minimum 30 poles, is permitted.

(6) Mount main breakers at the top or bottom in a vertical position specifically designed for that purpose. Exceptions only apply for approved applications of 100 Amps of less and 30 poles or less.

(7) Do not use load center type panelboards except for military family housing construction and temporary lodging facility construction.

(8) Panelboards with 200 percent rated neutrals shall be used when supplying power to the following areas:

(a) Office administrative areas

(b) Cubicles or System Furniture
(c) Individual office Rooms

(d) Large open office areas

(e) Computers

(f) Electronic Equipment

(g) Electronic Test Labs

(9) When supplying panelboard feeders to panels with 200 percent rated neutrals, the neutral conductors to the panel shall have an ampacity of twice the phase conductors in the feeder.

(10) When supplying panelboard feeders to panels with 100 percent rated neutrals, the neutral conductors to the panel shall not be derated less than the phase conductors in the feeder.

(11) Column width panelboards are unacceptable.

(12) Panelboards shall not contain integral TVSS units. Any resettable TVSS units installed at panelboards shall be separate units and installed adjacent to the panelboards.

e. Circuit Breakers:

(1) Use only bolt-on type or I-Line type.

(2) Do not use ground fault breakers. Use only individual ground fault receptacles.

(3) Magnetic only switches shall not be installed in any switchboard or panelboard. All breakers shall have thermal-magnetic characteristics.

f. Main Breakers and Feeder Breakers shall be as follows:

(1) Main and Tie Breakers in Main Switchboards – (Including Double-Ended)-

Service Entrance Rated.

(a) Insulated-case.

(b) 100% rated.

(c) Individually mounted (drawout in 2000 amp bus and above).

(d) Solid state trips with digital integral ammeter display with the following trip functions:

Main Breakers: Adjustable LT, Adjustable ST, Adjustable GF, with separate adjustable time delay settings for LT, ST, GF.

Tie Breaker: Adjustable LT, Adjustable ST, Adjustable Instantaneous, Adjustable GF, with separate adjustable time delay settings for LT, ST, GF. Same long time pickup setting as main breakers.

(e) Electrical operation with backup manual operation.

(2) Feeder Circuit Breakers in Main Switchboards – (Including Double-Ended) Service Entrance Rated.

(a) Molded-case.

(b) 80% rated.

(c) Group mounted - stationary.

(d) Solid state trips with digital integral ammeter display with the following trip functions:

Adjustable LT, Adjustable ST, Adjustable Instantaneous, Adjustable GF, with separate adjustable time delay settings for LT, ST, GF.

(3) Main Circuit Breakers in Main Distribution Panels (MDP) - Service Entrance Rated ( 800 Amp Bus).

(a) Molded-case.

(b) 80% rated

(c) Stationary mounted.

(d) Solid state trips with integral digital ammeter display with the following trip functions:

Adjustable short time pickup with adjustable delay bands, and adjustable instantaneous pickup.

(4) Feeder Circuit Breakers in Main Distribution Panels (MDP) - Service Entrance Rated ( 800 Amp Bus).

(a) Molded-case.

(b) 80 % rated.

c) Use standard thermal magnetic breakers. Breakers shall contain adjustable magnetic trip on all 225 amp breakers and larger where available.

(5) Breakers Used in Service Entrance Rated Panelboards 600 Amps and below shall be standard molded-case thermal magnetic.

(6) Circuit Breakers within a Sub-distribution Panelboard and 1000 Amps or Greater.

(a) Molded-case.

(b) 80 % rated.

(c) RMS digital solid-state trip with adjustable short time and instantaneous pickup.

(7) Circuit Breakers within a sub-distribution panelboard and 800 Amps or less may be standard molded-case thermal magnetic.

(8) If required by the project scope, breakers shall have additional metering functions for the solid-state trips.

(a) Functions shall include the following:

1. Energy (KWH, MWH)

2. Real Power (KW, MW)

3. Total Power (KVA, MVA)

4. Frequency (HZ)

(b) Provide device monitor to serve as a central location for reading and displaying all data at each solid-state trip unit and the facility meters. Connect monitor to all devices with a RS-485 network. Device monitor shall be a separate device from the facility meter.

g. Startup: Provide special startup along with training on setting and maintaining the breakers to CE shops. Use an independent testing firm registered with NETA or manufacturer's service engineer to set the adjustable devices. Include:

(1) Startup in the field.

(2) CE Shop training.

(3) O&M manuals.

(4) Schematics of electronic devices.

(5) Solid state trips tested in field with a portable test kit.

(6) Specified equipment used in the startup provided to CE shops for future maintenance.

9. ARC FLASH LABELS

a. General: All switchboards, panelboards, industrial control panel, meter socket enclosures, motor control centers and fused/non-fused disconnect switches shall have warning label as per NFPA 70 National Electrical Code (NEC) – Article 110.16 Flash Protection. In addition, the above mentioned electrical equipments shall have a label containing either the incident energy, Hazard/Risk Category (HRC) and required level of Personal Protective Equipments (PPE) as per NFPA 70E Standard for Electrical Safety in the Workplace – Article 130.5(C).

Arc Flash Analysis: This is an electrical system engineering study performed by engineers familiar with the power distribution and control equipments and the calculation methods required. The arc flash analysis will determine the incident energy potential of each piece of electrical distribution equipment in the facility. The methodology for conducting this arc flash analysis is outlined in IEEE 1584 Guide for Performing Arc-Flash Hazard Calculations.

Arc Flash Warning Labels: Develop a standard Arc Flash warning label for each Hazard/Risk Category (HRC) per NFPA 70E. Once the analysis determines a risk in the system, place the appropriate label on all equipments indicated. Labels shall includes as a minimum the equipment name, nominal system voltage, flash hazard boundary, flash hazard energy in cal/cm2 at 18 inches, PPE class and requirements, shock hazard, and approach distances (limited, restricted, prohibited).

Deliverable Items: Method of calculating and data to supporting the information for each label of a specified electrical equipment, single line diagram of power distribution from service to equipments with arc flash labels (incident energy and HRC/PPE), floor plan diagram of electrical equipment location with arc flash labels (incident energy and HRC/ PPE), graphical and numerical reports of analysis. All of the above information shall be provided in a single 3 ring binder and in electronic format such as MSWord, MSExcel and AutoCAD (drawings).

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# Robins Air Force Base
# Base Facility Standards

**Title: Facility Electrical, General**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR
ROBINS AFB

**PART 6A – Facility Electrical, General**

**CRITERIA REFERENCE DOCUMENTS**: The publications listed below form a part of this document to the extent referenced. The publications are referred to in the text by the basic designation only.

NEMA MG-1

NFPA 70 (2011), National Electrical Code

NFPA 70E (2012), Standard for Electrical Safety in the Workplace

UFC 1-200-01, General Building Requirements

UFC 3-501-01, Electrical Engineering

UFC 3-520-01, Interior Electrical Systems

BFS Part 7A –Energy Conservation

BFS Part 7C – Sustainable Design & Development

1. LISTING: All electrical devices and components shall be listed for their intended use by UL or FM.

2. LOAD LEVELS: Calculate load levels for at least the following items
NOTE :Consider derating for 50 degree C ambient in uncooled spaces.

a. Branch and feeder circuits.

b. Panelboards and switchboards.

c. Generators and automatic transfer switches.

d. Transformers.

3. DEMAND FACTORS: Size service entrance, pad mount transformers, downstream panelboards, dry type transformers, feeders, etc., as listed below.

a. General Purpose Convenience Receptacles:

(1) First 10 KVA, use 100 percent demand. PF = .95 lagging.

(2) 50 percent demand factor for remaining over 10 KVA. PF = .95 lagging
(3) Note: This does not include system furniture receptacles in office areas, individual office rooms, and large open office areas without system furniture.

b. Mechanical Equipment: Assume 100 percent demand load, PF = .80 lagging.

c. Lighting: Assume 100 percent demand load at PF = .95 lagging. Lighting shall be considered a continuous load with circuits serving such loads not loaded more than 80 percent of their rating.

d. System Furniture: Assume each cubicle contains one (6 amp) 720 VA CPU computer and a (2 amp) 240 VA computer monitor. Design on each six cubicles sharing a (8 amp) 960 VA printer. Include in load calculations an additional 180 VA per cubicle for typical furniture task lighting and miscellaneous loads (such as calculators, electric pencil sharpeners, etc.) Assume 80 percent demand load at PF = 0.95.

e. Individual Office Rooms: Assume each room contains one (6 amp) 720 VA CPU computer, one (2 amp) 240 VA computer monitor, and one (8 amp) 960 VA printer. Include in load calculations an additional 180 VA per room for typical desktop task lighting and miscellaneous loads (such as calculators, electric pencil sharpeners, etc.) Assume 100 percent demand load at PF = 0.95.

f. Large Open Offices (250 SF and above) w/o system furniture: Design using 15 VA per SF at 80 percent diversity at PF = 0.95.

g. Busways (and Bus Ducts):

(1) Only use busways to supply plug-in busway for shop areas with large pieces of equipment. Do not use them to feed downstream loads from the service entrance such as panelboards and MCC's.

(2) Protective device and feeder to each busway shall have an ampacity not less than the busway ampacity.

(3) Each busway shall be fed with a separate protective device and homerun feeder.

h. Facility Transformers and Service Lateral Conductors - No additional diversity or demand factor shall be applied to the pad mount transformers and service lateral

conductors.

i. Service Entrance Rated Equipment - Service entrance rated equipment shall be sized based on a summation of the individual demand loads. No additional diversity or demand factor shall be applied to the service entrance rated equipment.

j. Feeders - These shall be sized to carry the anticipated current. Demand factors may be specific depending on a certain application. Demand factors not listed, or proposed that are different from this standard, must be approved by 78 CEG/CEOI at Robins AFB.

4. POWER SYSTEM PROTECTION STUDIES

a. Design: Perform a short-circuit study during design to determine proper AIC ratings of all electrical equipment. Include calculations in the design analysis.

b. Time Current Coordination Study: For projects that contain adjustable trip settings, a short circuit and time current coordination study will be needed to properly set the settings on the breaker trip units. The study needs to be based on the actual equipment that will be supplied on the project. Include in the study all cut sheets on the electrical equipment, breakers, and trip units being furnished on the project. The study and the equipment cut sheets shall be provided in a single 3 ring binder.

(1) For Design-Bid Build Projects

Specify in the specifications that the Contractor perform a short-circuit study and time-current coordination study prior to procurement of any equipment/material. Both the short-circuit study and the time-current coordination study shall be performed by the same company, either consulting engineering services with the equipment manufacturer or an independent Registered Professional Engineer regularly engaged in performing these studies. Specify all equipment material submittals be provided with the study in a single 3 ring binder.

(2) Design – Build Projects

After design is completed, but prior to procurement of any material, the Design Build Contractor shall obtain a short circuit and time-current coordination study. Both the short-circuit study and the time-current coordination study shall be performed by the same company, either consulting engineering services with the equipment manufacturer or an independent Registered Professional

Engineer regularly engaged in performing these studies. The study will be based on the actual equipment that will be supplied on the project. The Engineering group with the Design Build Contractor shall review the study and make any recommended changes if needed to the design. Submit all equipment material submittals with the study in a single 3 ring binder.

c. MVA: At a minimum, use 400 MVA with X/R = 15 available at the primary side of the main transformer.

d. Scope: Include the protective system from the nearest upstream devices beyond the transformer primary fuses down to and including all adjustable or selectable low-voltage protective devices.

e. Limiters: Do not use low voltage cable limiters to achieve short-circuit limitation for equipment.

f. Transient Voltage Surge Suppression (TVSS) is required at the main service entrance as a minimum. Double-ended switchboards will require a TVSS on each side.

5. MOTORS

a. Size: Motors of 1 HP and more shall be 3-phase.

b. Reduced Voltage Starting: Use reduced voltage motor starting on 75 HP and up. For smaller motors, evaluate motor-starting voltage drop and provide reduced voltage starting if over 10% drop.

c. Efficiency of polyphase squirrel-cage induction motors shall be premium, design E per NEMA MG-1 - 1993, rev. 1.

6. INTERIOR POWER

a. General.

(1) In existing facilities fed at 208V, convert to 480V. In new facilities the service voltage shall be 480Y/277 unless the Civil-Electrical Engineer in 78 CEG/CEN gives approval for 208Y/120 volts.

(2) Provide small distributed dry-type transformers (delta-wye) as needed for 208Y/120V to step the voltage down from 480Y/277. In administrative areas,

locate dry type transformers and branch panelboards in electrical closets distributed throughout the facility to keep the branch circuits below 200 feet.

(3) Use reduced voltage motor starting on 75 HP and up. For smaller motors, evaluate motor-starting voltage drop and provide reduced voltage starting if over 10% drop.

(4) Power Factor Correction: Install capacitors to correct power factor to 95% at full load for motors 50 HP and larger. Show every capacitor next to the motor. Install as close to the motor terminals as possible. Do not install capacitors on any motor with variable frequency drive (VFD).

(5) The Contractor shall have an electrician with a Master's License on site during all installations.

(6) Use generic "off the shelf" equipment. Field fabrication of panels, switches, etc., is not allowed.

(7) Equipment that is obsolete or scheduled to be obsolete is not allowed.

(8) Provide a submittal at the final inspection that lists the vendors for all equipment, so CE shops can contact them later as needed.

(9) The following wiring methods shall not be used: Armored Cable (Type AC), Flat Cable Assemblies (Type FC), Flat conductor Cable (Type FCC), Integrated Gas Spacer Cable (Type IGS), Metal-Clad Cable (Type MC), Mineral-Insulated, Metal-Sheathed Cable (Type MI), Nonmetallic-Sheathed Cable (Types NM, NMC, and NMS) {except for residential use}, Power and Control Tray Cable (Type TC) {unless specifically called for in project scope documents}, Underground Feeder and Branch-Circuit Cable (Type UF), Nonmetallic Underground conduit with Conductors (Type NUCC), Flexible Metallic Tubing (Type FMT), Electrical Nonmetallic tubing (Type ENT), and similar wiring methods with various manufacturer's name brands.

(10) All wiring shall be rated 600 volts, single copper conductor, with Type THHN, THWN, or XHHW insulation rated for 75°C or higher as applicable.

(11) All wiring shall be installed in metallic conduit raceways above grade or PVC (schedule 40 or 80 as appropriate) below grade.

(12) Wireway (rectangular shells with top covers into which cables are laid) are highly discouraged and allowed by exception only.

(13) Cable tray as a raceway for power wiring is highly discouraged and is approved only by exception upon request.

(14) Raceways shall be concealed wherever practical in finished spaces and minimum size shall be ¾".

(15) Motor Control Centers shall have disconnects, branch circuit overload protection, and controllers mounted in a single assembly. Whenever the starter is located in the MCC, use thermal magnetic or instantaneous trip circuit breaker with separate adjustable overloads. If the unit contains no starter, and the starter is located at the machine, then a thermal-magnetic circuit breaker shall be used to supply the motor feeder.

(16) Electric - Operated Projector Screens in Conference Rooms, Classrooms, and Training Rooms: Coordinate locations with user. Provide power and wall switches for control.

(17) Main electrical rooms shall be a separate room with no other trades sharing the electrical room. Main electrical room shall be located on an exterior wall with exterior double doors, and without a center support, in the opening for removal of equipment. Doors shall contain an exterior lock.

(18) Electrical closets within the facility shall be separate rooms with no other trades sharing the closets. Electrical closet doors shall contain a lock.

(19) Unless special permission is granted by Civil Engineering, all dry-type transformers shall be installed within the main electrical room and the electrical closets within the facility.

b. Branch Circuits.

(1) On all new circuits, allow for future expansion by loading less than the NEC maximum.

(2) 20 Amp receptacle circuits, place no more than 10 duplex outlets on a circuit. All circuits supplying convenience receptacles shall be protected with a 20-amp circuit breaker.

(3) Do not use multi-wired circuits (shared neutrals) for single-phase loads. Run a separate neutral.

(4) Do not use under floor duct systems.

(5) Provide a separate green grounding equipment conductor in all conduits. Raceway shall not be used as a sole equipment ground. Ground shall be sized in accordance with Table 250 of the NEC.

(6) Do not use ground fault breakers for 120 volts, 20-ampere circuits.

(a) Use only individual ground fault receptacles.

(b) Provide GFCI receptacles in all bathrooms, locker rooms, within all wet areas of a facility, and at all outside locations.

(7) Branch circuits shall be rated a minimum of 20 amperes, except where lesser ratings are required for specific applications. Branch circuit conductors will in no case be less than No. 12 AWG.

(8) Maximum of three phases or poles shall be installed in any conduit system, which includes single-phase circuits, regardless of derating tables in the NEC.

(9) The combined voltage drop on feeders and branch circuits will not exceed 5 percent. Individual voltage drop on feeder and branch circuits shall not exceed the recommendations of the NEC.

c. Dry-type Transformers:

(1) Use dry-type general purpose (delta-wye) in the facilities except in cases listed below which require K = 13 non-linear dry type transformers.

(2) Use K-rated (K=13) non-linear dry types when providing power to the following areas:

(a) Office administrative areas

(b) Cubicles or System Furniture

(c) Individual office Rooms

(d) Large open office areas

(e) Computers

(f) Electronic Equipment

(g) Electronic Test Labs

(3) Dry type transformers shall be not be ceiling-mounted or wall-mounted. Mount the transformer on a concrete pad on the floor with rubber pad isolators.

(4) Maximum size dry type shall not exceed 300 KVA.

d. Low voltage cable and conduit:

(1) Use only copper conductors.

(2) Use Type THHN, THWN, or XHHW as appropriate.

(3) Base conductor size on the above.

(4) Do not use setscrew or die cast conduit connectors on EMT conduit. Use zinc coated steel compression fittings only.

(5) Screw-in flex connectors are not allowed. Connectors for flexible metal conduit shall be malleable iron/zinc plated and of the 2-screw clamp type with insulated throats conforming to UL 514B & NEMA FB-1.

(6) For areas without conditioned air, apply the ambient correction factors in NEC, article 310.

e. Computer areas:

(1) Locate separate emergency shutdown switches (inside hinged covers to prevent accidental activation) for all computerized operations, including their air handling and computer room units. Locate switches at each exit door of the computer room.

(2) Activation of the fire alarm system shall also shut down the computer equipment, computer room units, and air-handling units.

f. Air Handling Equipment and Devices:

(1) Device Plates: All device plates shall be type 302, 0.035 inch thick, brushed finish, and UL Listed stainless steel.

(2) Disconnect Switches:

(a) Heavy duty type.

(b) NEMA 3R outdoors, NEMA 4X in corrosive areas.

(c) When fused, use rejection type R fuses.

g. Grounding:

(1) Ground rods - ¾" X 10' copper clad. Use exothermic weld to connect to grounding system.

(2) Service Entrance Ground Electrode: Connect a tripod of three ground rods spaced 20 feet apart to the service entrance electrode connection. Tripod shall be at least 10 feet from the facility.

(3) For new construction: In addition to the service entrance ground electrode listed above, install a ground ring with ground rods around the entire new facility with connections to the steel beams evenly spaced around the perimeter of the structure. Connect the electrical service entrance ground bus to the ground ring at a single point copper ground bus bar located in the main electrical room.

(4) Grounding shall be provided for all new communications rooms. Refer to the communications section of this BFS. For new construction, connect the grounding in each communication room to the single point ground bus located in the main electrical room.

(5) Grounding shall be provided for all new raised floor systems. Due to the various methods of grounding computer raised floors, details are left to be provided by others.

(6) Static ground receptacles shall be provided for all new hangars and painting facilities. Receptacles shall be interconnected together with the grounding system and steel structure in the facility.

(7) All raceways shall have an insulated equipment ground conductor sized in accordance with the NEC.

h. Wall switches:

(1) 20 Amp minimum.

(2) Industrial Specification Grade, not general or standard grade.

i. Convenience Receptacles - General:

(1) An outlet is defined as 20 Amp minimum, NEMA 5-20R, and duplex. Locations shall be as described for convenience receptacles in this standard.

(2) Industrial Specification Grade, not general or standard grade.

(3) When weatherproof, use spring-hinged flap covers.

(4) Convenience receptacles shall be located 18 inches AFF, to the center of the outlet. Exception: 24 inches AFF to bottom of outlet plate is allowed in explosion proof areas.

(5) Explosion proof convenience receptacles shall be provided at all explosion proof areas within a facility. Locations shall be as described for convenience receptacles in this standard. Explosion proof convenience receptacles shall be rated in accordance with Article 500 of the National Electrical Code.

(6) Explosion proof convenience receptacles shall be rated 20 amperes.

(7) Provide a plug for each explosion proof convenience receptacle.

j. Areas - Convenience Receptacles shall be provided in all the following areas listed below:

(1) At Communication Outlets - adjacent to each communication outlet

(2) Small Individual Office Rooms (less than 250 SF) - one outlet on each wall.

(3) Conference Rooms:

(a) One outlet ceiling mounted approximately 18 feet from the center wall where a projection screen would be installed.

(b) An outlet on each wall but mounted at 16 ft maximum separations around the perimeter of the room. I

(c) Install one outlet in the corner of the room opposite where a projection screen would be used.

(d) Install a floor mounted receptacle in the front of the room for a podium.

(4) Communication Rooms: Provide two outlets in the center of each wall.

(5) Receptacles for Pre-wired System Furniture:

(a) Prewired system furniture is defined as follows: furniture that contains pre-wired powered panels with plug-in receptacles and communication outlets mounted in the furniture base. Prewired system furniture would have the power and communication wiring extended into the furniture channel through a power pole or flexible whip.

(b) If furniture is included in the Design Build RFP or Statement of Work, then all raceway, wiring, and power capacity should be provided. Wiring should be extended to the furniture and terminated on the outlets.

(c) If the project does not provide the prewired systems furniture, but it will be procured by the user at a later date, then the project shall include future provisions for the furniture. This shall consist of all loads in the design calculations, capacity in all feeders and panelboards, breaker space in all panelboards, branch wiring with associated raceway to the point of connection, etc. Design Build RFP or Statement of Work should indicate who will provide the final connections to the furniture. If final connections will be performed by others, then the wiring should be left terminated in a junction box above the ceiling near the future power poles or in a wall mounted junction box.

(d) In design/build projects, the location of furniture or quantity of workstations in each area should be included in the RFP.

(6) Administrative areas larger than 250 square feet with or without prewired systems furniture (now or later):

(a) In these spaces, install one outlet at 8 feet intervals around all walls and one outlet on each furred out interior column.

(b) These outlets shall be installed flush in the walls and interior columns. This is in addition to the outlets specified for prewired system furniture cubicles.

(7) Non-Prewired Systems Furniture - If furniture is installed in areas of the facility, which is not prewired system furniture, but uses the outlets in the walls, then provide the following:

(a) Two outlets shall be installed in the center of each cubicle flush mounted in the wall. Maximum separation shall not exceed 8 feet on the walls. Maximum two cubicles shall share a circuit.

(b) In design/build projects, the location of furniture or quantity of workstations in each area shall be included in the RFP.

(8) Mechanical, Electrical rooms and Mechanical Mezzanines: One outlet at 20 ft intervals around all walls. Provide additional outlets as needed to coordinate with equipment locations.

(9) Mechanical and Electrical Equipment: One outlet shall be installed within 16 feet to 20 feet of each piece of equipment. This shall be provided wherever equipment is located, whether inside or outside, roof, mezzanines, etc.

(10) Corridors: Provide one outlet at every 20-ft interval along the length of the corridor (on one side of wall or alternate wall).

(11) Lobby: Two outlets total, on opposite walls.

(12) Warehouses, Shop Areas, Storage Areas, and Hangars: One outlet at 40 feet intervals around the perimeter of all walls and on outlet at all interior columns.

Locate outlets in the web of interior columns.

(13) Each DDC Control Panel - Provide one receptacle outlet at each DDC control panel. This is used for maintenance personnel to use portable tools, laptops, etc.

(a) This is in addition to a hardwired connection for the panels' power.

(b) At each DDC panel, provide a dedicated hardwired circuit for the DDC panel power requirements.

(14) All other areas within a facility not specifically addressed above shall have outlets installed as follows:

(a) Install one outlet at 16 ft maximum intervals around the perimeter of all walls and one outlet on each interior column. Locate outlets in the web of interior columns.

(b) Walls less than 16 feet shall have minimum one outlet installed on each wall; this outlet shall be centrally located on the wall but may be the same outlet as outlets spaced 16 ft on center around the room.

(15) Receptacles outside the facility shall be as follows:

(a) One outlet shall be installed at each personnel door on the outside.

(b) One outlet shall be installed at each roll-up door on the inside.

(c) One outlet shall be installed at all mechanical equipment outside within 16 feet to 20 feet of the equipment.

(16) Coordination Notes: The above is based on the minimum requirements. A/E shall be responsible to coordinate with the user on the exact location for the outlets during the design stage. This shall be based on final equipment locations, users' needs, and workstation or desk locations. This statement applies to design projects and design/build contracts.

k. Special Receptacles for Hangars: Obtain special requirements from user or project scope of work.

7. SYSTEM GROUNDING

a. Soil Resistivity: The median value runs in the 25,000 ohm-cm range for soil near buildings at Robins AFB. This would normally result in a single ground rod having a resistance of nearly 100 ohms. To meet the NEC requirement of 25 ohms or less a tripod set of ground rods 20 feet apart with thermit-welded bare copper 4/0 wire between them is usually sufficient, provided the closest ground rod is at least 10 feet from the facility.

b. Buildings under 4,000 SF roof size and larger buildings without any admin space or office: When a bldg or structure meets this description after the work of this project, the system ground may meet the NEC requirement of 25 ohms or less.

c. Buildings of 4,000 SF and larger roof size with any admin space or office: Provide maximum of 10 ohms of resistance to hard earth ground in the system ground connected to the electrical service entrance.

8. SWITCHBOARDS, PANELBOARDS, AND MOTOR CONTROL CENTERS

a. Choice of type:

(1) Use switchboard construction when 1000 Amps or larger.

(2) Use power distribution panelboard construction when equal to 800 Amps. Boxes shall be minimum 9 ½ inches deep.

(3) Use panelboards when 600 Amps or less.

b. General:

(1) Use NEMA 3R outdoors. NEMA 4X may be specified in cases where the corrosion potential is high. Fiberglass is preferred over stainless steel for NEMA 4X.

(2) Use copper bus only.

(3) Size to allow for a 25% increase in power demand.

(a) A 25% spare capacity over calculated load (20% of the equipment rating) shall be provided for all electrical equipment including transformers, motor control centers, switchboards, panelboards, feeders, and associated overcurrent

protective devices.

(b) Calculations shall clearly demonstrate how the spare capacity is included for each bus in the system. Include hand written calculations or a spreadsheet to demonstrate how the spare capacity is included in each bus and feeder in the system.

(4) Provide spare circuit breakers to fill approximately 25 percent of the pole spaces in new panelboards. (For example, a panelboard with 42 single pole circuits will have 10 spare single pole circuit breakers for future use). Circuit breaker ampacity and number of poles to be the most common type of circuit breakers being placed in the panelboard. Remaining unused poles will be noted as "Space"."

(5) Panelboards, switchboards, or motor control centers shall not be tapped to feed new loads. If there is no space for protective devices in the existing piece of equipment to feed the new load, then a new panelboard, new switchboard (add section if feasible), or new motor control center (add section if feasible) shall be provided.

(6) Existing Equipment: When installing breakers in existing panels, insure the manufacturer can still supply them and at reasonable price and delivery schedule.

(7) When doing any work involving the main service entrance, install or re-install a laminated riser diagram of the electrical system on the wall near the panel.

(8) Provide typed directories in each cabinet.

(a) Clearly label each circuit as to type load and specific location. Example – Receptacles N. Wall

(b) Note on the directory from where the cabinet is fed. Example - “Fed From Panel PA in Mech Room, Ckt. 4”

(9) All service entrance equipment shall contain a main breaker. If the facility requires double ended design, as stated elsewhere in this standard, then two main breakers with a normally open tie breaker shall be provided, with Kirk key interlock.

(10) Feeders to service entrance and any panelboard within the facility shall not contain any derated neutrals. As a minimum, neutrals shall have an ampacity of

the phase conductors. Feeders to panels with 200 percent rated neutral busses shall have the neutral conductors rated 200 percent of the feeder phase conductors.

(11) New construction shall be designed with one service entrance, except as noted for transformer requirements over 5,000 KVA.

(12) Labeling of Panel Schedules and Drawings for Branch Circuits: Each homerun symbol on the drawings shall be labeled in accordance with the pole numbers instead of a circuit number.

(a) Three-phase loads shall be designated by the three-pole numbers, such as HB - 1,3,5 or HB - 8,10,12. The single pole number, such as LA-12, shall designate single-phase loads.

(b) Panel schedules shall be numbered with odd numbers on the left side, top to bottom, and even numbers on the right side top to bottom.

c. Distribution Panelboards and Switchboards:

(1) Protect by breakers. Fuses are not permitted.

(2) All switchboards and panelboards shall be 3-phase, 4-wire, with ground bus. Install a neutral conductor to all switchboards and panelboards regardless of load.

(3) If the main breaker has ground fault protection, provide it as well on the feeder breakers.

(4) Show future frame space in all service entrance rated or distribution panelboards or switchboards, with full mounting hardware provided for plugging the breakers into them.

(a) Switchboards. 1000 - 1200 Amps, provide:

1. 1-400 amp frame space.

2. 2-225 amp frame spaces.

3. 1-100 amp frame space.

(b) Switchboards. 1600 Amps and above, provide:

1. 1-800-amp frame space.

2. 2-400 amp frame spaces.

3. 2-225 amp frame spaces.

3. 1-100 amp frame space.

(c) Double-ended switchboards. Provide for each side (a) or (b) above for future frame space sizes.

(d) 800 amp panelboards. Provide:

1. 2-225 amp frame spaces.

2. 2-100 amp frame spaces.

(e) 600 amp panelboards and below. Provide:

1. 1-225 amp frame space.

2. 3-100 amp frame spaces.

(f) All frame space sizes shall be based on three pole breakers.

(5) Use an electronic multi-meter in the main panelboard or switchboard instead of ammeters,

(6) On double-ended switchboards, control switches and meters shall be connected to the side of the energized source. As soon as power is de-energized from one of the incoming sides of the double-ended switchboard, all control power shall automatically transfer to the other side of the available energized source.

(7) Switchboards

(a) Main through bus shall be fully rated and non-tapered copper bus.

(b) Distribution sections shall have the same depth as the main service section.

(c) TVSS units may be located integrally with service entrance equipment.

d. Panelboards - Other:

(1) All panelboards shall be “main breaker interior” type unless the upstream circuit protective device is within sight of the downstream bus being fed.

(2) Gutter taps, sub-feed lugs, feed-thru panels, and taps of conductors inside junction boxes are unacceptable circuit feeds to panelboards.

(3) All panelboards shall be fed from a separate circuit breaker in an upstream bus. The only exception to this shall be when no more than two panelboards shall share the same feeder circuit from a dry type transformer. The second panelboard shall be connected from a feeder breaker in the first panelboard. The second panelboard shall be installed adjacent to the first panelboard or inside the same room.

(4) If multiple (three or more) 208Y/120 volt panelboards are fed from the same dry type transformer, then a 208Y/120 volt distribution panelboard shall be installed downstream from the dry type transformer. Each panelboard shall be connected to a dedicated circuit breaker in the distribution panelboard.

(5) Minimum panelboard size:

(a) Use minimum 225 Amp bus rating and main breaker, 42 poles.

(b) If the demand load is 40 Amps or less, then a 100 Amp panel, minimum 30 poles, is permitted.

(6) Mount main breakers at the top or bottom in a vertical position specifically designed for that purpose. Exceptions only apply for approved applications of 100 Amps of less and 30 poles or less.

(7) Do not use load center type panelboards except for military family housing construction and temporary lodging facility construction.

(8) Panelboards with 200 percent rated neutrals shall be used when supplying power to the following areas:

(a) Office administrative areas

(b) Cubicles or System Furniture
(c) Individual office Rooms

(d) Large open office areas

(e) Computers

(f) Electronic Equipment

(g) Electronic Test Labs

(9) When supplying panelboard feeders to panels with 200 percent rated neutrals, the neutral conductors to the panel shall have an ampacity of twice the phase conductors in the feeder.

(10) When supplying panelboard feeders to panels with 100 percent rated neutrals, the neutral conductors to the panel shall not be derated less than the phase conductors in the feeder.

(11) Column width panelboards are unacceptable.

(12) Panelboards shall not contain integral TVSS units. Any TVSS units installed at panelboards shall be separate units and installed adjacent to the panelboards.

e. Circuit Breakers:

(1) Use only bolt-on type or I-Line type.

(2) Do not use ground fault breakers. Use only individual ground fault receptacles.

(3) Magnetic only switches shall not be installed in any switchboard or panelboard. All breakers shall have thermal-magnetic characteristics.

f. Main Breakers and Feeder Breakers shall be as follows:

(1) Main and Tie Breakers in Main Switchboards – (Including Double-Ended)-

Service Entrance Rated.

(a) Insulated-case.

(b) 100% rated.

(c) Individually mounted (drawout in 2000 amp bus and above).

(d) Solid state trips with digital integral ammeter display with the following trip functions:

Main Breakers: Adjustable LT, Adjustable ST, Adjustable GF, with separate adjustable time delay settings for LT, ST, GF.

Tie Breaker: Adjustable LT, Adjustable ST, Adjustable Instantaneous, Adjustable GF, with separate adjustable time delay settings for LT, ST, GF. Same long time pickup setting as main breakers.

(e) Electrical operation with backup manual operation.

(2) Feeder Circuit Breakers in Main Switchboards – (Including Double-Ended) Service Entrance Rated.

(a) Molded-case.

(b) 80% rated.

(c) Group mounted - stationary.

(d) Solid state trips with digital integral ammeter display with the following trip functions:

Adjustable LT, Adjustable ST, Adjustable Instantaneous, Adjustable GF, with separate adjustable time delay settings for LT, ST, GF.

(3) Main Circuit Breakers in Main Distribution Panels (MDP) - Service Entrance Rated ( 800 Amp Bus).

(a) Molded-case.

(b) 80% rated

(c) Stationary mounted.

(d) Solid state trips with integral digital ammeter display with the following trip functions:

Adjustable short time pickup with adjustable delay bands, and adjustable instantaneous pickup.

(4) Feeder Circuit Breakers in Main Distribution Panels (MDP) - Service Entrance Rated ( 800 Amp Bus).

(a) Molded-case.

(b) 80 % rated.

c) Use standard thermal magnetic breakers. Breakers shall contain adjustable magnetic trip on all 225 amp breakers and larger where available.

(5) Breakers Used in Service Entrance Rated Panelboards 600 Amps and below shall be standard molded-case thermal magnetic.

(6) Circuit Breakers within a Sub-distribution Panelboard and 1000 Amps or Greater.

(a) Molded-case.

(b) 80 % rated.

(c) RMS digital solid-state trip with adjustable short time and instantaneous pickup.

(7) Circuit Breakers within a sub-distribution panelboard and 800 Amps or less may be standard molded-case thermal magnetic.

(8) If required by the project scope, breakers shall have additional metering functions for the solid-state trips.

(a) Functions shall include the following:

1. Energy (KWH, MWH)

2. Real Power (KW, MW)

3. Total Power (KVA, MVA)

4. Frequency (HZ)

(b) Provide device monitor to serve as a central location for reading and displaying all data at each solid-state trip unit and the facility meters. Connect monitor to all devices with a RS-485 network. Device monitor shall be a separate device from the facility meter.

g. Startup: Provide special startup along with training on setting and maintaining the breakers to CE shops. Use an independent testing firm registered with NETA or manufacturer's service engineer to set the adjustable devices. Include:

(1) Startup in the field.

(2) CE Shop training.

(3) O&M manuals.

(4) Schematics of electronic devices.

(5) Solid state trips tested in field with a portable test kit.

(6) Specified equipment used in the startup provided to CE shops for future maintenance.

9. ARC FLASH LABELS

a. General: All switchboards, panelboards, industrial control panel, meter socket enclosures, motor control centers and fused/non-fused disconnect switches shall have warning label as per NFPA 70 National Electrical Code (NEC) – Article 110.16 Flash Protection. In addition, the above mentioned electrical equipments shall have a label containing either the incident energy, Hazard/Risk Category (HRC) and required level of Personal Protective Equipments (PPE) as per NFPA 70E Standard for Electrical Safety in the Workplace – Article 130.5(C).

Arc Flash Analysis: This is an electrical system engineering study performed by engineers familiar with the power distribution and control equipments and the calculation methods required. The arc flash analysis will determine the incident energy potential of each piece of electrical distribution equipment in the facility. The methodology for conducting this arc flash analysis is outlined in IEEE 1584 Guide for Performing Arc-Flash Hazard Calculations.

Arc Flash Warning Labels: Develop a standard Arc Flash warning label for each Hazard/Risk Category (HRC) per NFPA 70E. Once the analysis determines a risk in the system, place the appropriate label on all equipments indicated. Labels shall includes as a minimum the equipment name, nominal system voltage, flash hazard boundary, flash hazard energy in cal/cm2 at 18 inches, PPE class and requirements, shock hazard, and approach distances (limited, restricted, prohibited).

Deliverable Items: Method of calculating and data to supporting the information for each label of a specified electrical equipment, single line diagram of power distribution from service to equipments with arc flash labels (incident energy and HRC/PPE), floor plan diagram of electrical equipment location with arc flash labels (incident energy and HRC/ PPE), graphical and numerical reports of analysis. All of the above information shall be provided in a single 3 ring binder and in electronic format such as MSWord, MSExcel and AutoCAD (drawings).

Author: Roy Crittenden, 78 CEG/CENME, 478-926-2213

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Approval: _____
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# Robins Air Force Base
# Base Facility Standards

**Title: Interior Lighting**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR
ROBINS AFB

**PART 6B – INTERIOR LIGHTING**

CRITERIA REFERENCE DOCUMENTS: The publications listed below form a part of this document to the extent referenced. The publications are referred to in the text by the basic designation only.

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)

| | |
|---|---|
| IESNA HB-9 | (2000; Errata 2004; Errata 2005; Errata 2006) IES Lighting Handbook |

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

| | |
|---|---|
| IEEE C2 | (2007; Errata 06-1; TIA 07-1; TIA 07-2; TIA 07-3; Errata 07-2; TIA 08-4; TIA 08-5; TIA 08-6; TIA 08-7; TIA 08-8; TIA 08-9; TIA 08-10; TIA 08-11; TIA 09-12; TIA 09-13; TIA 09-14; Errata 09-3; TIA 09-15; TIA 09-16; TIA 10-17) National Electrical Safety Code |
| IEEE C62.41.1 | (2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits |
| IEEE C62.41.2 | (2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits |
| IEEE Stds Dictionary | (2009) IEEE Standards Dictionary: Glossary of Terms & Definitions |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

| | |
|---|---|
| ANSI ANSLG C78.41 | (2006) For Electric Lamps--Guidelines for Low-Pressure Sodium Lamps |
| ANSI ANSLG C78.42 | (2009) For Electric Lamps: High-Pressure Sodium Lamps SECTION 26 51 00.00 40 Page 9 |
| ANSI C78.1381 | (1998) American National Standard for Electric Lamps - 250-Watt, 70 Watt, M85 Metal-Halide Lamps |

| | |
|---|---|
| ANSI C82.1 | (2004) American National Standard for Electric Lamp Ballasts - Line Frequency Fluorescent Lamp Ballasts |
| ANSI C82.11 | (2002) American National Standard for High-Frequency Fluorescent Lamp Ballasts—Supplements |
| ANSI C82.2 | (2002) American National Standard for Lamp Ballasts--Methods of Measurement of Fluorescent Lamp Ballasts |
| ANSI C82.4 | (2002) American National Standard for Ballasts for High-Intensity-Discharge and Low-Pressure Sodium (LPS) Lamps (Multiple-Supply Type) |
| ANSI/ANSLG C78.43 | (2007) American National Standard for Electric Lamps - Single-Ended Metal-Halide Lamps |
| ANSI/IEC C78.81 | (2010) American National Standard for Electric Lamps--Double-Capped Fluorescent Lamps--Dimensional and Electrical Characteristics |
| ANSI/IEC C78.901 | (2005) American National Standard for Electric Lamps - Single Base Fluorescent Lamps--Dimensional and Electrical Characteristics |
| ANSI/NEMA C78.LL 1256 | (2003) Procedures for Fluorescent Lamp Sample Preparation and the Toxicity Characteristic Leaching Procedure (TCLP) |
| NEMA 250 | (2008) Enclosures for Electrical Equipment (1000 Volts Maximum) |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2011) National Electrical Code

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|---|---|
| NFPA 90A | (2009; Errata 09-1) Standard for the Installation of Air Conditioning and Ventilating Systems |

ENGINEERING TECHNICAL LETTERS

| | |
|---|---|
| ETL 10-2 | Light-Emitting Diode (LED) Fixture Design and Installation Criteria for Interior and Exterior Lighting Applications |

UNIFIED FACILITIES CRITERIA

| | |
|---|---|
| UFC 3-530-01 | Interior and Exterior Lighting and Controls |
| UFC 3-520-01 | Interior Electrical Systems |

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

| | |
|---|---|
| Energy Star | (1992; R 2006) Energy Star Energy Efficiency Labeling System |

UNDERWRITERS LABORATORIES (UL)

| | |
|---|---|
| UL 1029 | (1994; Reprint Jun 2010) High-Intensity-Discharge Lamp Ballasts SECTION 26 51 00.00 40 Page 10 |
| UL 1598 | (2008; Reprint Jan 2010) Luminaires |
| UL 844 | (2006; Reprint Nov2008) Standard for Luminaires for Use in Hazardous (Classified) Locations |

ROBINS AFB FACILITY STANDARDS

| | |
|---|---|
| BFS Part 6K | Emergency Lighting Systems |
| BFS Part 7A | Energy Conservation |

INTERIOR LIGHTING

a. Calculate lighting levels based upon IES (Illumination Engineering Society) for maintained levels. Maintained level is defined as a calculated foot-candle level taking into consideration all depreciation light loss factors (LLF).

b. General Lighting

(1) For fluorescent, tube shall be rapid start, 4', 32W, T8, 3500K color, CRI of greater than 75, and a minimum output of 2900 lumens.

(2) When service voltage is 480Y/277 Volts, feed lights at 277 volts.

(3) Modular wiring systems are not allowed.

(4) Install a junction box and 6 feet of flexible metal conduit to all light fixture connections above suspended ceilings, acoustical or gypsum.

(5) In open office areas with systems furniture, include a light loss partition factor in calculations. Design illumination at task level shall be not less than 30 foot-candles, after applying all light loss factors and a partition factor. Include all tables from industry standards that show the source of partition factors used in the calculations. Assume the offices contain partitions with a 50 percent reflectance factor having dimensions 6 ft long by 6 ft wide by 6 ft tall. Any additional required lighting levels will be obtained using task lighting within the partitions.

(6) Lighting systems in new, retrofitted facilities shall have the correct light level for the tasks being performed and be equipped with Energy Star or FEMP designated lighting technologies. Utilize task lighting to provide light where it is needed rather than increased ambient lighting.

(7) Provide proper controls including occupancy sensors and/or daylight-responsive dimming to reduce or shut off the lights when they are not needed. Establish zoned lighting in large areas so that groups of lights may be operated independently of other groups. Interior lighting in buildings larger than 5000 $ft^2$ must be controlled with an automatic control device to shut off building lighting in all spaces. Achieve a minimum daylight factor of 2% in 75% of all spaces occupied for critical visual tasks.

c. General Patterns: In general, lighting within a facility shall be as follows:

(1) Entry way In Front Of Facility at the Exterior of the Facility:

(a) Provide uplight or downlight on both sides to light the entrance into the facility and any planters at the entryway.

(b) Fixture shall be architecturally pleasing with the location and enhance the appearance of the entryway into the facility.

(2) Entry Way or Vestibule:

(a) Small Areas: Compact fluorescent downlights.

(b) For large areas, consider a combination of cove lighting with compact fluorescent downlights, fixtures to match the hallways/corridors, and recessed metal halide in high ceilings.

(c) Pictures on walls -- Directional floods

(3) Facilities with a Built-in Service Desk:

(a) Provide down task lighting directly over the entire service desk counter.

(b) Provide switch next to entrance into the service desk area.

(4) Foyer/Halls/Corridors: Fixtures shall be 2X2 or 2X4 with refractive acrylic lens troffer. Maximum of three lamps shall be used in a fixture.

(5) Administrative Office Spaces:

(a) In small individual offices, minimum two 2 ft X 4 ft light fixtures (three tubes) shall be installed.

(b) The following fixture types are allowed where noted:

1. Nominal 5 1/2 inch deep, para-contoured housing, die formed code gauge, prime cold rolled steel. Fixture shall be 18-cell semi-

specular louvered, 2 ft X 4 ft parabolic with three 32-watt T8 four-foot fluorescent lamps.

2. 2 ft X 4 ft recessed direct/indirect lighting with three 32-watt T8 four-foot fluorescent lamps. (Use this application in small individual offices only.) Design Basis -- Lithonia AV.

3. Large office areas (500 square feet and larger) with system furniture and high ceilings (10 feet and above), consider pendant mount 8 feet long direct/indirect lighting. Support fixtures from 3/32-inch diameter cable. 8 feet length fixtures shall contain four F32T8 lamps. Fixtures shall be installed in continuous rows. All four lamps may be on the same ballast to conserve energy. The color of fixture shall be determined during design with the user. Fixture shall contain a parabolic louver that meets RP24 direct glare requirements as defined in IES publication, RP24 VDT Lighting. Parabolic louver shall be constructed of semi-specular aluminum.

4. Large open office areas (500 square feet and larger) with system furniture and ceiling heights less than 10 feet, use 2 X 4 fixtures with refractive acrylic lens.

(6) For Computer Rooms, Classrooms, Training rooms, Conference Rooms:

(a) The following types are permitted for general room lighting:

1. Nominal 5 1/2 inch deep, para-contoured housing, die formed code gauge, prime cold rolled steel. Fixture shall be 18-cell semi-specular louvered, 2 ft X 4 ft parabolic with three 32-watt T8 four-foot fluorescent lamps.

2. 2 ft X 4 ft recessed fixtures with three F32T8 lamps and injection molded absolute cut-off lens with specular silver 1/2 inch X 1/2 inch X 1/2 inch square in-line cube cell, 45 degree shielding.

3. Consider other fixtures as needed to reduce glare on a projection screen.

(b) For conference rooms: Provide supplemental dimmable incandescent fixtures in addition to the general room lighting listed above. Incandescent dimmable fixtures shall be located as follows:

1. Around the perimeter of the room at approximately 4-6 feet on center in conference rooms greater than 400 SF.

2. Incandescent at the perimeter of the room shall be switched separately from the general room lighting.

(c) Switching of General Room Lighting in Classrooms, Training Rooms, Conference Rooms, and Computer Rooms:

1. Provide switches for multiple lighting levels of the fluorescent fixtures.

2. Consider switching the room as three distinct areas: front one third, middle one third, and back one third. This applies in all cases except the computer room.

3. Consider switching with inboard/outboard lamps separately. In other words, in three tube fixtures, the outer two lamps shall be switched separately from the inner lamp.

(7) Restroom Areas

(a) Acoustical ceilings: 2X2 is preferred, with refractive acrylic lens troffer.

(b) Gypsum Ceilings: Same type fixture except use ceiling brackets provided by the manufacturer for gypsum ceilings.

(c) Over Mirrors: Provide supplemental lighting directly over all mirrors.

(8) HID Fixtures:

(a) Highbay fixtures may be used in applications where the bottom of the fixture is 25 feet and higher above the floor.

(b) Lowbay fixtures may be used in applications where the bottom of the

fixture is less than 25 feet above the floor.

(c) Metal reflectors should only be used in industrial areas where architectural aesthetics is not a concern.

(d) Uplight should be considered to minimize a “cavern effect.”

(e) Where application permits by code for the environment, provide a quick disconnect with a receptacle/plug assembly. Pendant drops shall be rigid conduit. All fixtures shall be installed at a constant elevation above the finished floor. Fixture hangars shall allow for a plumb and level installation. Fixture support shall consist of a threaded malleable iron hangar rated for 120 LBS and permit a maximum 20 degree swing. Connect fixture hangar to a threaded raceway (rigid metal conduit) with conduit supports within eighteen inches of either side of the fixture support.

(f) All lighting shall be energy saving fluorescent.

(9) Aisle Lighting in Warehouses:

(a) Use fixture with elongated narrow asymmetric or wide asymmetric lighting pattern. Use low bay or high bay depending upon height. Install light fixtures between all isles or racks and on each side.

(b) Conduit shall be installed perpendicular to the isles or racks. Fixture support shall be malleable iron hangar rated for 120 LBS and permit 20-degree swing. At the fixture ballast, provide quick disconnect and receptacle/plug assembly. Pendant drops shall be rigid conduit.

(c) Design for a maintained level of 75 foot-candles.

(d) All lighting shall be energy saving fluorescent.

(10) Mechanical and Electrical Rooms:

(a) Provide open industrial fluorescent lighting F32T8 lamps. Provide clear guards or a screen over all lamps. Fixture shall be of a type that requires a forced movement along the longitudinal axis of the lamp for insertion and removal of the lamp.

(11) Janitor Rooms: Provide fixture with a wrap-around lens. Switch fixture inside room.

(12) Canopies:

(a) Consider wrap around fixtures (four feet) with two F32T8 fluorescent lamps.

(b) Design using 20 foot-candles at floor level if not a loading dock.

(13) Loading docks:

(a) Consider wrap around fixtures (four feet) with two F32T8 fluorescent lamps.

(b) Design using 50 foot-candles at floor level.

(14) Switching - General

(a) Circuit Breakers shall not be used to switch any lighting circuits.

(b) Provide switches at each doorway to control all lighting spaces within the room or area.

(c) Classrooms, training rooms, conference rooms, and computer rooms: See above.

(d) When required by project scope, provide a low voltage relay controller next to panelboards to control lighting. Panelboards with lighting relays are unacceptable.

(e) Occupancy Sensors - Provide these in private or small offices and restrooms (types specially suited for restrooms), as a minimum. Provide in other suitable areas for energy conservation. Locate the switches to avoid nuisance activation by personnel walking by the doorway and to avoid being covered by an open door or furniture.

(15) Interior Sports Lighting:

(a) All interior sports lighting shall be based on Class of Play Type II per IES.

(b) Lamps shall be metal halide.

(16) Spare Parts: The Contractor shall turn in the following after final inspection:

(a) 10% of each type of lamp for spare stock.

EMERGENCY AND EXIT LIGHTING

a. General:

(1) Facilities over 25,000 square feet shall use a small permanent generator and/or an Emergency Lighting Inverter (uninterruptible power supply) to feed the circuits in the emergency system.

(a) In areas with metal halide lamps, selected overhead metal halide fixtures shall be connected to the emergency system to provide the emergency lighting. Connect the entire overhead metal halide fixture, including quartz lamp if provided, to the system. Quartz lamps may be used in selected fixtures to provide initial foot-candles until the metal halide lamp strikes and starts to illuminate.

(b) In areas with fluorescent lighting, connect selected fixtures to the emergency system for emergency lighting. Connect the entire fixture to the system. Exit signs within the facility shall be connected to the system.

(c) Emergency lighting fixtures shall not be switched except by branch circuit breakers in the emergency system.

(d) Emergency lighting located within conference rooms should have an internal battery pack located within the fixture to allow the entire fixture to be switched off for presentations.

(2) Wall packs with integral battery units are not acceptable within the facility. For facilities less than 25,000 SF, emergency lighting shall be provided with integral battery packs in the fixtures.

(3) Clearly mark the emergency fixtures with a label designated “emergency” and a printed label with the circuit number, so Shop personnel can find them easily. Install a laminated plastic nameplate on the fixture. Nameplate shall have an orange background with white letters (minimum ¼ inch letters), which describe the emergency lighting circuit number. All raceways shall be marked with a 3 inch orange tape band every ten feet. All junction boxes used in the wiring shall have orange covers.

(4) Install an emergency light in each electrical and mechanical room.

(5) Place a laminated drawing of the system near the emergency unit, or near the main electrical panel for a system of individual fixtures, but always on the building interior.

b. Exit Signs

(1) For facilities greater than 25,000 SF, exit signs shall be connected to a central emergency unit.

(2) For facilities less than 25,000 SF, exit signs shall contain an integral battery for 90 minutes of illumination.

(3) All exit signs shall be LED type. Exit signs in lobby or vestibule shall be clear with red lettering.

(4) Self-illuminating or reflective types are not allowed.

<<<END OF SECTION>>>

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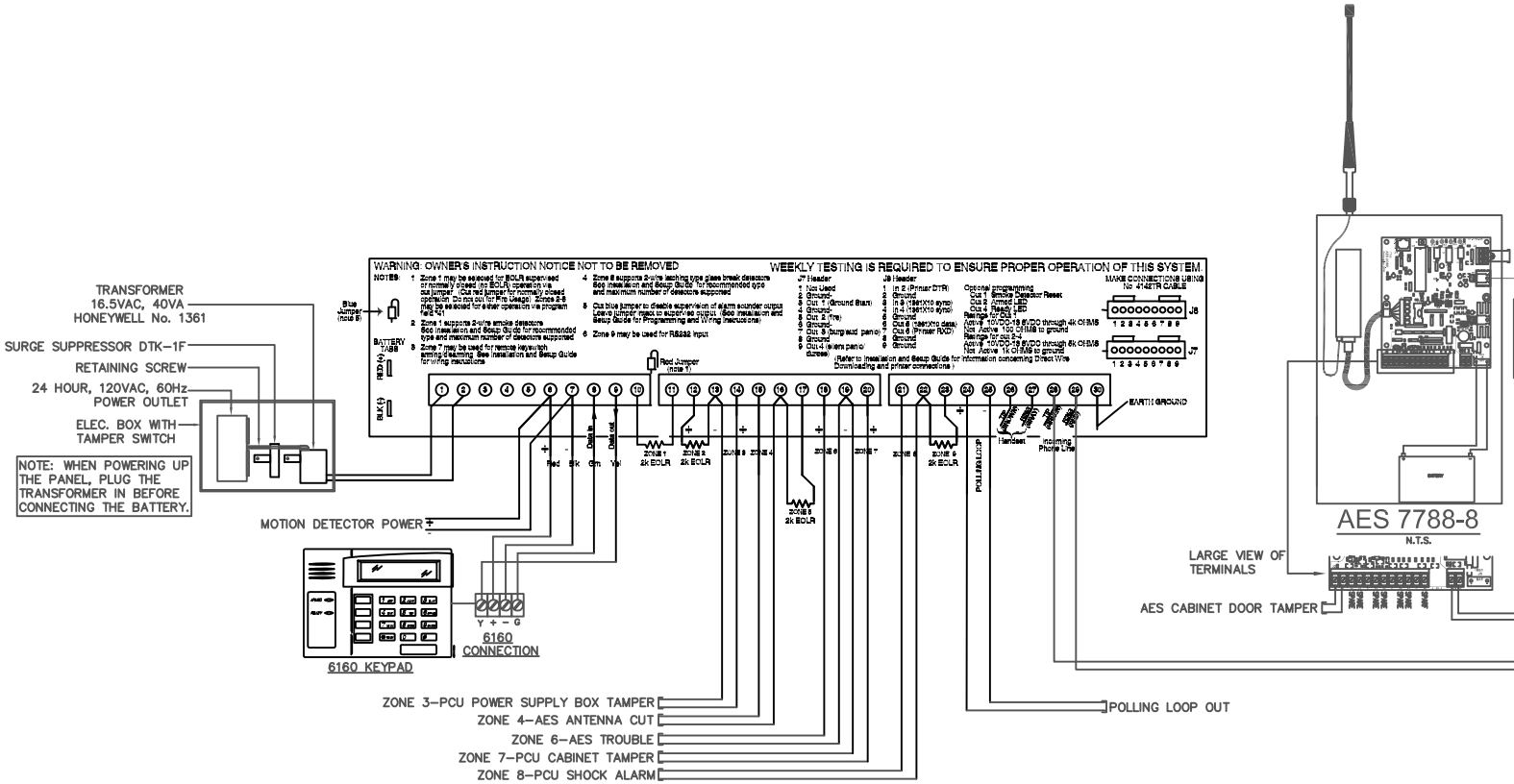
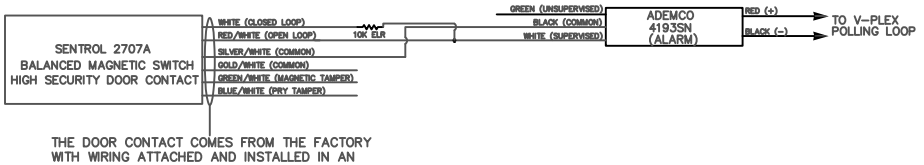
Approval:_____
Stefanie Dawson, 78 CEN/CENMP, 478-327-2948




## TYPICAL VISTA-128BP WITH ATTACK PROOF ENCLOSURE

ATTACK PROOF ENCLOSURE PART NUMBER: VISTA-ULKT

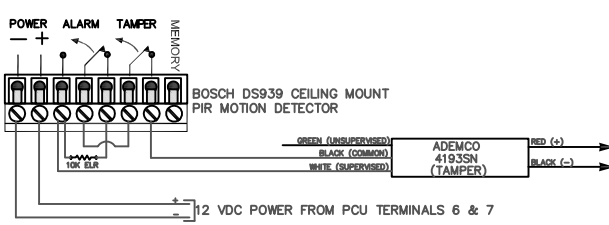
N.T.S.




## 4193SN SERIAL MONITOR MODULE
## MONITORING HIGH SECURITY DOOR CONTACT

NOT TO SCALE

ONE ZONE IS SUPERVISED, ONE ZONE IS NON-SUPERVISED. THE NON-SUPERVISED ZONE IS NOT USED. THE ZONE MONITORING THE DOOR CONTACT ALARM CONTACTS IS PROGRAMMED AS A PERIMETER ZONE. THE TAMPER ZONES ARE PROGRAMMED AS 24-HOUR ZONES.




## 4193SN SERIAL MONITOR MODULE
## MONITORING MOTION DETECTOR

# Robins Air Force Base
# Base Facility Standards

**Title: Fire Alarm and Mass Notification Systems**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR
ROBINS AFB

**PART 6C – FIRE DETECTION AND ALARM SYSTEMS, INDIVIDUAL BUILDING MASS NOTIFICATION SYSTEMS**

1.0 CRITERIA REFERENCE DOCUMENTS:

NFPA 70, National Electrical Code

NFPA 72, National Fire Alarm and Signaling Code

NFPA 101, Life Safety Code

UFC 3-600-01, Fire Protection for Facilities

UFC 4-21-01, Design and O&M: Mass Notification Systems

ETL 01-18, Fired Protection Engineering Criteria – Electronic Equipment Installations

BFS 4D - Elevators and Lifts

a. General

(1) All fire alarm and mass notification circuits shall be designed and installed as addressable Class A systems.

(2) For all new systems with combined FA and mass notification:

The combined system shall use the same speakers for notification with white/clear strobes marked "FIRE" for fire alarm and amber strobes marked "ALERT" for the mass evacuation system. Separate circuits shall be provided for the FA strobes and the mass evacuation strobes.

(3) All critical components for the system shall be located in a dust free and conditioned space not to exceed 80 degrees. This shall include any circuitry boards in the control panels, amplifiers, remote or supplemental located amplifiers, batteries for any part of the system, radio transmitters, etc.

b. Raceways

(1) In general, all FA and MNS wiring shall be installed in an overhead metallic raceway system.

(2) Acceptable metallic conduit raceways shall consist of Rigid Metallic Conduit (RMC), Electrical Metallic Tubing (EMT), ), Intermediate Metal Conduit (IMC), Flexible Metallic Conduit (FMC) or Liquid Tight Flexible Metallic (LTMC).

Permitted uses of conduits listed above: EMT shall be used for the raceway inside buildings unless otherwise not permitted by NFPA 70 ( such as in hazardous locations), RMC and IMC may be used where subject to wet applications and hazardous locations, LTMC shall be used at all risers inside fire protection rooms, FMC shall be permitted where flexibility is required ( such as ceiling mounted devices on acoustical tile ceilings, inside existing concrete masonry walls, and on ductwork). Conduit installed underground outside building perimeter shall be PVC SCH 40. PVC shall not be used above ground. Flexible conduits to devices shall be limited to 6 feet unless special permission is granted.

(3) The minimum size of conduit shall be ¾", except that conduit carrying 120VAC power from a circuit breaker panel to the FA or MNS shall be permitted to be ½".

(4) EMT and flexible conduit shall be factory coated red. RMC and IMC shall be painted red if factory coating is not available.

(5) Raceway shall be installed in accordance with NFPA 70 and NFPA 72.

(6) Raceway fill shall be in accordance with NFPA 70. 40 percent fill shall not be exceeded. Provide fill calculations with submittal.

c. <u>General Installation Guidelines</u>:

(1) Install wiring with no splices between devices.

(2) Do not connect notification devices to the style 6 wiring loop using addressable modules. Indicating appliance circuits shall be connected directly to the FACP terminals or to expansion power supply panels.

(3) Supply and return homerun wiring for an area shall be placed in separate raceways. In other words, wiring for other areas shall not be ran with or included in the same raceways.

(4) Separate raceways shall be provided for the SLC loop.

(5) In general, raceways shall be installed overhead for easy identification and future maintenance. Raceways may be installed under the slab only in special cases upon approval.

(6) When replacing an existing system with new wiring, devices, and panels, replace the raceway system to meet NFPA separation requirements for supply and return of Class A wiring.

d. Facilities with Releasing Systems

(1) Provide separate raceways for the releasing system. Mark the raceways for the releasing system with a 3 inch yellow band every ten feet.

(2) Provide a keyed disconnect switch for each riser next to the releasing alarm control panel. Switches shall disconnect the wiring to the solenoids without the use of any software programming.

(3) Provide a dedicated radio transmitter for the releasing panel to transmit contact ID.

e. Installers Quality Control --- Edit Specifications as indicated below:

(1) Provide complete shop drawings prior to any installation. Shop drawings to be drawn on CAD and signed by a NICET Level IV Fire Alarm Technician.

(2) Supervisor: The installing firm shall provide a factory trained authorized representative of the manufacturer with a NICET Level 3 (or higher) technical training for the project. This individual shall supervise the installation of the system.

(a) Note: "Supervise" means to provide sufficient field visits during a project for adequate quality control.

(3) A factory trained authorized Technician from the manufacturer or a NICET Level II (or higher) Technician shall make terminations of the field devices.

(4) A factory trained authorized Technician from the manufacturer shall terminate all cabinets and panels, and program the system.

(5) Certification: Factory trained authorized representative of the manufacturer or a NICET level 3 (or higher) Fire Alarm Technician shall certify the system in accordance with the design, specifications, shop drawings, and NFPA 72. This individual must be present at all inspections and testing of the system.

f. Wiring:

(1) Wiring shall be in accordance with NFPA 70, NFPA 72, and as recommended by the manufacturer of the Fire Alarm System.

(2) Signaling Line circuits will be 18 AWG at a minimum, Type FPLR.

(3) Notification appliance circuits for strobes will be No. 14 AWG (1.63 mm) at a minimum, Type THHN/ THWN.

(4) Speaker circuits will be No. 16 AWG size twisted and shielded at a minimum, Type FPLR conductors.

(5) Initiating Device circuits will be No. 14 at a minimum, Type THHN/ THWN.

(6) Actual size of conductors to be determined by voltage drop calculations and as recommended by the manufacturer.

(7) All field-wiring colors shall be the same throughout the circuit to which it is connected. Develop a color scheme and show on shop drawings, such as different colors for each NAC circuit.

(8) Install MOV-type surge arresters on both ends of wiring that enters/ returns from the building.

g. Close Out Documents:

(1) Provide as-built drawings on CADD. At completion of project, provide a full size (24“ X 36“) laminated drawing of the system near the FACP which shows the building floor plan and the initiating devices only. This drawing shall be used by the Fire Dept for location of devices in an emergency situation.

(2) Place a full set of the shop drawings (minimum size 24“ X 36“) in a 4 inch PVC tube with a cap mounted with metal straps on the wall next to the Control Panel for the maintenance shops.

(3) Provide a full set of O&M manuals in a cabinet next to the control panel.

h. Detection:

(1) Smoke Detectors

(a) Install duct mounted smoke detectors in HVAC ducts, same manufacturer as the alarm control panel, and fed from the 24 volt DC fire alarm panel, not from the HVAC controls.

(b) In dormitory rooms, provide local alarm smoke detectors and central alarm heat detectors.

(c) Provide a smoke detector above the control panel within 12 inches of ceiling, if possible.

(d) Duct detectors shall send a supervisory signal to the Fire Dept and disable the associated air handler unit only.

(2) Heat detectors:

(a) All areas that are not protected by an automatic wet pipe sprinkler system shall contain heat detectors.

(3) Manual Pull Stations

(a) Use only addressable types for addressable panels, where available.

(4) Wet Pipe Sprinkler System:

(a) Provide Vein Type Flow Switch.

(b) Flow switch shall have 0-90 second field adjustable delay.

(5) PIV valves, OS & Y valves, etc: Provide a supervisory tamper on all valves that could affect correct operation of system.

(6) Elevators: See BFS 4D - Elevators and Lifts for fire alarm requirements for these types of equipment.

i. Notification:

(1) Mechanical, Communications, Electrical Rooms, and Other Spaces used for Maintenance: Provide visual and audible notification in these spaces.

(2) Do not provide a water motor gong or alarm.

(3) For areas with voice:

(a) Provide speakers in all spaces to meet the intelligibility requirements of UFC 4-021-01. If a room has a door, then the voice intelligibility will be measured in the room with the door closed.

(b) All spaces, including individual offices, shall have speakers as needed to provide acceptable intelligibility. For interior use in administrative spaces, speakers should not be tapped above ½ watt in low ceiling areas of 10 feet or less unless a special exception is allowed. Note: Most spaces in low ceiling areas of 10 feet or less will use either ¼ watt or ½ watt.

(c) Industrial spaces with high ceilings and high ambient noise, such as hangars, use 15 watt loudspeakers. Lower ceiling industrial areas may use 8 watt speakers depending on design and layout.

(d) Speakers should not be used at a tap setting more than half of the maximum allowed wattage. Use speakers with adjustable taps.

(e) In open spaces with drop ceilings, use ceiling mounted speakers evenly spaced throughout for a uniform sound distribution.

(f) For speaker circuits, use of 70 volt systems is encouraged to reduce voltage drop for large facilities.

j. Control Panels:

(1) For New Systems with Fire Alarm and Mass Notification:

A single manufacturer shall provide a combined system, which consists of the following: FA and MNS controls, amplifiers, addressable relays, and remote power supplies for NAC circuits. Acceptable manufacturers are: Notifier, Edwards, and Simplex.

(2) For New Systems with Fire Alarm Only:

Acceptable manufacturers are: Notifier, Edwards, Simplex, and FireLite.

(3) Batteries: Provide sealed gel-type for best life and reduced maintenance.

(4) Provide a factory installed Digital Alarm Communicator Transmitter (DACT) capable of contact ID format, compatible with the radio transceiver.

(5) All critical points in the system must transmit using contact ID.

(6) All new panels and sub-panels in the facility must transmit contact ID (not just monitor for General Alarm, General Trouble, and General Supervisory).

(7) In buildings with multiple control panels, all panels shall be the same brand and manufacturer and be networked together so all panels function together as one system.

(8) Provide connectivity as required by BFS Part 4D – Elevators & Lifts.

k. Fire Alarm Reporting System, Radio Type Transmitter

(1) Provide an AES IntelliNet 7788F Fire Alarm Radio Transmitter. Provide startup services thru the AES authorized distributor.

(2) Alarm Installer will provide all connections between the alarm panel and the radio transmitter. CE Alarm Shop personnel will program the system cipher code into the radio.

(3) The FACP shall transmit Contact ID thru the AES Radio System.

(4) The AES 7788F must be mounted within three feet of FACP.

(5) In addition to contact ID, provide hardwired inputs from the alarm control panel to the AES inputs as follows:

Zone 1: General Alarm
Zone 2: General Trouble
Zone 3: General Supervisory
Zones 4-7: Not Used
Zone 8: AES tamper switch

(6) Mount a tamper switch in the radio transmitter cabinet, connected to the AES input zone 8.

(7) For existing panels: If for any reason the FACP cannot transmit Contact ID, then the FACP must transmit Alarm, Trouble, and Supervisory by using the 8 zone inputs on the radio transmitter.

(8) Multiple building fire alarm control panels networked together will only require one transmitter.

L. Individual Building Mass Notification Interface, Radio Type Transceiver

(1) For new systems with mass notification, provide an interface radio transceiver and antenna that will communicate with the Base-Wide Federal Signal "Big-Voice" system.

(2) Contractor shall include all programming, setup and field work necessary at the jobsite and the head-end at the Command Post for the radio interface to communicate with the Command Post.

(3) Pre-recorded messages for the Big Voice system are provided on a chip within the Federal Signal interface. Contractor should inform the Federal Signal representative that the Big Voice interface will be for Robins AFB to ensure the correct messages will be included in the radio transceiver. Note: These messages are used by the Command Post and are different from the pre-recorded messages that are within the local ACU Unit used by the building user.

m. System Setup and Programming Details For Systems with Mass Notification:

(1) Pre-recorded messages shall be listed in the order on the main panel and all LOC(s) as listed in this standard.

(2) Fire Alarm Event: When a Fire alarm occurs, the clear strobes turn on and the FA message plays.

(3) Mass Notification Event: When a Mass notification occurs, the amber strobes turn on and the respective MNS message plays.

(4) Simultaneous Fire and Mass Events:

In this case, the MNS takes precedence over the fire alarm.

Send a supervisory signal labeled "MNS Override" to the Fire Dept when simultaneous Fire and Mass events occur. Any active fire alarm point(s) is also to be sent to the Fire Dept during this time.

MNS cannot override the fire alarm message more than 10 minutes. After 10 minutes if someone has not manually ended the override, the MNS message must automatically end.

(5) Microphone and Strobes: The microphone at the panel and LOC locations may be used for general paging. Therefore, the use of the microphone does not change the state of the strobes.

(6) Microphone and Audible: The use of the microphone will temporarily interrupt the current audible state of the system.

(7) Microphone Use: The use of a microphone will not send any signals to the Fire Dept.

(8) Local activation of the pre-recorded messages or the microphone shall not send any signals to the Fire Dept.

(9) Remote activation of the MNS system by the Command Post shall not send any signals to the Fire Dept.

n. <u>Messages For The Individual Mass Notification ACU Unit shall be as follows:</u>

The installer will be responsible for developing the recording of the below messages as needed for the control panel. Messages are expected to be recorded in a professional manner to avoid background noise. Messages shall be in a female voice.

(1) Message #1: Delta Alert. Five seconds of wail are played, followed by the message:

*"Attention, attention, Robins Air Force Base is in Force Protection Condition Delta. All personnel immediately implement FPCON Delta actions."*

(2) Message #2: Charlie Alert. Five seconds of wail are played, followed by the message:

*"Attention, attention, Robins Air Force Base is in Force Protection Condition Charlie. All personnel immediately implement FPCON Charlie actions."*

(3) Message #3: Bomb Threat Warning. Horn sound for 5 seconds followed by the message:

*Attention, attention. A bomb threat alert has been issued for this building. All personnel are to evacuate immediately using the nearest exit. Further instructions will be issued outside the building by emergency response teams.*

(4) Message #4: Terrorist Threat Warning. Horn sound for 5 seconds followed by the message:

*"May I have your attention, please? A terrorist threat has been received. Effective immediately, we are operating secure and lockdown procedures. All personnel should remain calm and stay where you are. Please await further instructions."*

(5) Message #5: Severe Weather Warning. One round of code 3 horn is played, followed by the message:

*"Your attention, please. Robins Air Force Base has issued a severe weather warning. Take required actions and tune into local radio or television for the latest update."*

(6) Message #6: All Clear. No alerting tone is used. The message played is:

*"May I have your attention, please? All clear. The emergency has ended."*

( 7) Message #7: Building Test. A 1-kHZ tone is sounded for 5 seconds, followed by the message:

*"May I have your attention, please? This is a test of the building mass notification system. Repeat, this is only a test."*

(8) Message #8: (Not Used).

o. Testing

(1) The installing firm shall test the entire system completely in the Preliminary Test.

(2) The installing contractor shall attend one of the outage meetings regularly scheduled on Wednesdays to notify the Government (2) two weeks before the radio antenna is to be turned on for testing purposes. After the Base turns on the transmitter for testing, the Contractor shall then verify receipt of all signals received at the Base Central Reporting System. The Contractor should provide a complete check-off list showing all points have been received and request a date for the final acceptance test, if not done so already. The Contracting Officer's Technical Representative and the Fire Dept will attend the final acceptance test. After all deficiencies noted have been corrected, a follow on test will be required to verify correction of all items.

(3) Testing shall be in accordance with NFPA 72 and UFC 4-21-01 (for voice systems). Provide a copy of the NFPA 72 inspection report and a Certificate of Completion to the Fire Dept. Leave copies at the panel.

p. Training

Training course shall be provided for the operations and maintenance personnel.

(1) The training course shall be conducted in the building where the system is installed and in a classroom environment on Robins AFB.

(2) Provide for job-specific Operation and Maintenance Training. This shall consist of a review of the installed system, shop drawings, O & M Manuals, basic software programming techniques, and project code. This training is expected to last one 8 hour day for up to 10 people.

(3) Robins AFB Alarm Shop has been certified to work on Simplex, Edwards, and Notifier systems. However, if the Contractor installs a system other than what is listed above or a version of a software that is newer than the prior training thus requiring new software training to have full access to the software, then the project will require new software training at Robins AFB for up to (2) two individuals. At

the completion of the training, all individuals that meet the requirements for the software training shall be given full access rights to software keys, configuration disc, and the existing program for the installed panel to maintain the system. Length of the training shall be determined by the manufacturer.

Author: Roy Crittenden, 78 CEG/CENME, 478-926-2213

Reviewer: Roy Crittenden, 78 CEG/CENME, 478-926-2213

Approval:_____
Stefanie Dawson, 78 CEN/CENMP, 478-327-2948

# Robins Air Force Base
# Base Facility Standards

**Title: AUXILIARY POWER**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 6D – AUXILIARY POWER
[Emergency Generators/Uninterruptible Power Supplies]

CRITERIA REFERENCE DOCUMENTS: The publications listed below form a part of this document to the extent referenced. The publications are referred to in the text by the basic designation only.

AFI 32-1062 Electrical Power Plants and Generators

AFI 32-1063 Electrical Power Systems

ETL-10-7 Connection Methods for Standby Generators – 600 Volts or Less

UFC 3-520-01 Interior Electrical Systems

UFC 3-540-04N Diesel Electric Generating Plants

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

| | |
|---|---|
| IEEE 115 | (2009) Guide for Test Procedures for Synchronous Machines: Part I Acceptance and Performance Testing; Part II Test SECTION 26 32 13.00 20 Page 6 Procedures and Parameter Determination for Dynamic Analysis |
| IEEE C2 | (2007; Errata 06-1; TIA 07-1; TIA 07-2; TIA 07-3; Errata 07-2; TIA 08-4; TIA 08-5; TIA 08-6; TIA 08-7; TIA 08-8; TIA 08-9; TIA 08-10; TIA 08-11; TIA 09-12; TIA 09-13; TIA 09-14; Errata 09-3; TIA 09-15; TIA 09-16; TIA 10-17) National Electrical Safety Code |
| IEEE C50.12 | (2005) Standard for Salient Pole 50 HZ and 60 Hz Synchronous Generators and Generation/Motors for Hydraulic Turbine Applications Rated 5 MVA and above |

INTERNATIONAL CODE COUNCIL (ICC)

| | |
|---|---|
| ICC UBC | (997; Erratas Vol 1, 2 & 3 01/2001; Vol 1 & 2 03/2001; Vol 2 10/2001) Uniform Building Code |

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

| | |
|---|---|
| NETA ATS | (2009) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems |

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

| | |
|---|---|
| IEC 60034-2A | (1974) Rotating Electrical Machines Part 2: Methods for Determining Losses and Efficiency of Rotating Electrical Machinery from Tests (Excluding Machines for Traction Vehicles) |

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

| | |
|---|---|
| ISO 3046 | (1986; Am. 1) Reciprocating Internal Combustion Engines - Performance |
| ISO 8528 | (1993; R 2005) Reciprocating Internal Combustion Engine Driven Alternating Current Generator Sets |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

| | |
|---|---|
| NEMA C50.10 | (1990) Rotating Electrical Machinery - Synchronous Machines |
| NEMA ICS 6 | (1993; R 2006) Enclosures |
| NEMA MG 1 | (2009) Motors and Generators |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 30 | (2008; Errata 08-1) Flammable and Combustible Liquids Code |
| NFPA 37 | (2010; TIA 10-1) Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines |
| NFPA 70 | (2011) National Electrical Code |

U.S. DEPARTMENT OF DEFENSE (DOD)

| | |
|---|---|
| MIL-DTL-5624 | (2004; Rev U; Notice 1 2008) Turbine Fuel, Aviation, Grades JP-4 and JP-5 |
| MIL-STD-461 | (2007; Rev F) Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment |

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

| | |
|---|---|
| CID A-A-52557 | (Rev A; Notice 1) Fuel Oil, Diesel; for Posts, Camps and Stations |

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

| | |
|---|---|
| 40 CFR 60 | Standards of Performance for New Stationary Sources |

*BFS Part 7A –Energy Conservation*

*BFS Part 7C – Sustainable Design & Development*

**GENERATORS, TRANSFER SWITCHES, AND FUEL TANKS**

a. Generators: Base actual size on load analysis for 60-80% loading, based upon field readings when possible.

b. Fuel Tanks:

(1) Provide tank large enough for generator to run 72 hours at 100% rated load. Exception: Tank may be allowed to be smaller (approx 12 hour runtime) when the generator set is used as backup source for emergency lighting only.

(2) Fuel tank shall be above ground, similar to Convault construction. The fuel tank shall be encased with secondary 3000-PSI concrete container. Concrete sub-base tanks are not acceptable. Tank may be allowed to be skid-mounted when the generator set is used as a backup source for emergency lighting only. In this case, a weatherproof enclosure shall cover the generator set and the fuel tank

(3) A day tank is not required. The fuel shall be fed directly to the diesel fuel pump intake line.

(4) Include a high level alarm in the fuel tank to prevent overflow.

(5) Include an interstitial leak monitoring system to monitor and prevent tank leakage from the tank into the tank enclosure.

(6) Copper tubing is not allowed. Use only threaded black steel.

(7) Install a ¾" X 10' ground rod in a ground well. Extend a #1/0 copper conductor from the ground rod to the tank.

(8) Include on all four sides of the fuel tank the following markings:

(a) Flammable

(b) No Smoking within 50 Feet

(c) Diesel Fuel

(d) Capacity of Tank

(9) If the top of the tank is greater than 42" above finished grade, include steps.

(10) A 3.0-PSI anti-siphon check valve shall control fuel feeding into the diesel fuel pump.

(11) For Above Ground Storage Tanks: Provide a ball cut-off valve on each side of the supply and return fuel line. Include normally closed solenoid valve in fuel supply line - mounted as close to fuel tank as practical - with a three valve bypass line around the solenoid valve. Solenoid valve should be energized (opened) when the Generator's start cycle is initiated.

d. Transfer switches:

(1) All new or replacement transfer switches shall be four-pole (switched neutral). Installation of three-pole transfer switches for new installations requires MAJCOM approval.

(2) Provide maintenance capability for all transfer switches. Use bypass feature for critical facilities per design guidance.

(3) Automatic transfer switches and controls shall be installed in electrical rooms

and not in areas where steam piping or other high humidity "generators" are present. Transfer switches shall not be installed outdoors unless service entrance rated and incorporating an approved NEMA outdoor classification. Service entrance rated transfer switches shall have ground fault protection installed.

(4) All transfer switches shall be of the automatic type.

e. Generator SCADA Reporting System, Radio Type:

(1) Provide a Remote Transmitting Unit (RTU) at the generator set for the base SCADA System. The RTU shall be compatible and capable of interfacing with the base SCADA system manufactured and programmed by ACS of Atlanta, Georgia (ACS/EFACEC). The RTU unit shall be a battery back- up radio controlled, and transmit the following points to the central base monitoring system: start/stop; volts/phase; amps/phase; KW, KVAR; breaker status as open/close; water temp and oil pressure.

Author: Roy Crittenden, 78 CEG/CENME, 478-926-2213

Reviewer: Jeff Hooper, 78 CEG/CENMP

Approval: _____
Stefanie Dawson, 78 CEG/CENMP, 478-327-2948

# Robins Air Force Base
# Base Facility Standards

**Title: Lighting Protection**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 6E – LIGHTNING PROTECTION

**CRITERIA REFERENCE DOCUMENTS**:

The publications listed below form a part of this document to the extent referenced. The publications are referred to in the text by the basic designation only.

NFPA 70 (2011), National Electrical Code

NFPA 780 (2011), Standard for the Installation of Lightning Protection Systems

AFI 32-1065, Grounding Systems

ETL 11-12, Grounding, Bonding, Testing, and Recordkeeping for Communications Facilities

ETL 01-1, Reliability and Maintainability (R&M) Design Checklist

UFC 3-501-01, Electrical Engineering

UFC 3-575-01, Grounding/Lightning Protection

DOD 6055.9_STD, Lightning Protection

MIL-HDBK-1004/6, *Lightning Protection*

UL 96A, *Standard for Installation Requirements for Lightning Protection Systems*.

**LIGHTNING PROTECTION**

a. LISTING: All electrical devices and components shall be listed for their intended use by UL or FM.

b. Mandated Need: Provide on all facilities with explosives or hazardous materials. Ground in accordance with Chapter 7, Lightning Protection, DOD 6055.9_STD and AFI 32-1065, Grounding Systems.

c. Determined Need: Use "NFPA 780 Risk Determination.xls" included as part of the BFS for go/no-go decision on whether to install LPS. The Excel file is based upon NFPA 780 for Lightning Protection. Use value of Lightning Flash Density = 5.

d. Documentation: Present all calculations in the design analysis.

e. Default Design (especially for buildings under 4,000 square feet and all buildings containing explosives or significant quantities of hazardous materials):

(1) Design per UL and NFPA 780.

(2) Conductors:

(a) Use only copper, except on galvalume or other aluminum roof materials.

(b) All conductors on roofs shall be treated as main conductors.

(3) Install resettable Transient Voltage Surge Suppression (TVSS) on the service entrance of each protected facility. Assume one service entrance per facility unless field checking or RAFB record drawings indicate otherwise. Our specification master is labeled 16672, Transient Voltage Surge Suppression.

(4) Installation:

(a) Methods shall conform to UL 96A.

(b) Components shall conform to UL 96.

(c) Contractor shall obtain a UL letter of findings for the facility. The UL letter of findings shall be provided to the Government directly by UL after inspection by UL personnel. The Contractor shall make all corrections listed in the UL letter of findings.

(d) Use adhesive and bolted connections on metal roofs, installed to minimize potential roof leaks due to penetrations.

(e) Thru roof penetrations are not allowed except at downlead locations at the perimeter of the facility. If possible, locate penetrations at soffits.

(f) All down conductors shall be concealed in the wall with CPVC sleeve.

(g) If the facility contains a structural steel support system, do not use the structural steel for the downlead connections. Use UL Listed Class conductors installed in PVC concealed in the walls.

(h) A counterpoise with ground rods shall be installed around the entire facility. Counterpoise shall be minimum #1/0 bare copper and installed 2 feet below grade per NFPA 780. All below grade connections shall be exothermic type.

f. . Design for all other buildings (at this time there is no waiver currently in force from HQ AFCESA for the EASE system; some existing facilities have the EASE system installed and must be maintained as such, but no new EASE systems are permitted at this time):

(1) Existing Facilities Only that need EASE systems repaired…Use the Electronically Activated Streamer Emission (EASE) system: Design basis is Prevectron IV by National Lightning Protection Corporation.

(2) Use of conventional Franklin multi-rod system is permitted instead of EASE if less expensive and acceptable to user of the facility.

(3) Design per manufacturer's requirements.

(a) Our specification master is labeled 16671- Lightning Protection – EASE for existing systems only.

(b) Install resettableTransient Voltage Surge Suppression (TVSS) on the service entrance of each facility within the protected radius if not previously installed. Assume one service entrance per facility unless field checking or RAFB record drawings indicate otherwise. The RAFB specification master is labeled 16672, Transient Voltage Surge Suppression.

(4) Existing Facilities: For repair projects only where EASE systems currently exist…Mount each EASE device on a pole or mast 15' – 20' horizontally to the side of the nearest building roof edge. Consider roof mounting for very tall facilities.

(5) Design Criteria: State on drawings:

(a) Soil resistivity is 25,000 Ohm-cm, unless actual values at the site are known.

(b) The highest elevation of any object on each building.

(7) Shielding Ground Bed: Provide vegetation as first choice and fencing as second choice over the top of the ground bed to prevent personnel from standing over the ground bed and being harmed by voltage gradients in the soil during a lightning strike.

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Reviewer: Jeff Hooper, 778 CES/CEPG, 478-468-5923

Approval: _____
Stefanie Dawson, 78 CEG/CENMP, 478-327-2948

# Robins Air Force Base
# Base Facility Standards

**Title: Communications**

**Date: 8 January 2014**

**BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA**
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

**PART 6F – COMMUNICATIONS**

Revised 1/08/2014

This section is maintained and updated by the
Communications Directorate's Plans and Programs Branch (78 ABW/SCXP)
468-COMM (2666)

**SECTION 1**

**1.1. Purpose.** This section contains the communications Premise and Outside Plant requirements for Military Construction (MILCON) projects, Non-MILCON Construction Projects, building renovations and Simplified Acquisition of Base Engineer Requirements (SABER projects). All Plans for construction and renovations projects that require communications must be reviewed and approved by the Base Communications and Information Systems Officer (BCSO) or designated representative. The Communication Directorate (SC) Plans and Programs Branch (78 ABW/SCXP) is the SC focal point for this approval. Be sure to include 78 ABW/SCXP in all planning, designs and review meetings.

**1.1.1. Request for Proposal (RFP)/Construction Projects.** The information provided in this document will be incorporated in all RFP scope of work and contracts for construction and renovations projects.

**1.1.2. Conflicts.** The Base Communications and Information Systems Officer is responsible for all base communications and is the final authority on any communications issues and conflicts.

**1.2. Standards.** All designs, plans and work product will be in accordance with the "*TELECOMMUNICATIONS BUILDING CABLING SYSTEMS PLANNING AND DESIGN"* UNIFIED FACILITIES CRITERIA (UFC 3-580-01) AND THE ENGINEERING TECHNICAL LETTER (ETL) 02-12: "*COMMUNICATIONS AND INFORMATION SYSTEM CRITERIA FOR AIR FORCE FACILITIES",* with the exceptions identified in this document.

**2. MILCON Communications**.

**2.1. General**. All MILCON design and construction will provide all wiring, cabling, fiber optic cables (FOC), conduits, ducts, manholes, and pathways from the facility's wall outlets to the point where the new facility will receive dial tone and data connectivity, and will include:

2.1.1. All termination devices (cross-connects, patch panels, distribution frames, network protectors).

2.1.2. Communications equipment rooms (CER) and telecommunications closets (TC) as required.

2.1.3. Pathways such as cable trays and stubbed up, conduits duct banks, manholes and handholes.

**NOTE**: All communication design, installation, termination and testing must be performed by certified telecommunications professionals and technicians.

**2.2.1. Local Area Network.** For Local Area Network (LAN) connectivity, the MILCON contractor will provide twelve (12) strands of individual 9/125 micron single mode fiber optic cable (FOC) to the nearest Information Transfer Node (ITN) identified by the BCSO's representative. Install the FOC in MaxCell inner-duct. The MILCON contractor will terminate both ends of the FOC in rack mounted fiber distribution panel using SC connectors.

**2.2.2. Telephone Dial Tone.** For telephone dial tone, the MILCON contractor will provide a copper outside plant cable to the nearest Expansion Port Network (EPN) identified by the BCSO's representative.

**2.3. Communication Equipment Room (CER) Power Requirements.** Provide a minimum of two dedicated un-switched 20-amp NEMA 5-20 duplex receptacle power outlets or equivalent on three CER walls and the bottom of all equipment racks. Provide L5-30 outlets at the bottom of the equipment racks if required by SC. Each equipment outlet will be on a separate branch circuit. Provide additional 120-VAC convenience outlets for maintenance and housekeeping. Backup all electrical loads in the CER with standby generator power where available.

**2.4. Telecommunication Room (TR) Power Requirements.**
Provide a minimum of two dedicated un-switched 20 amp NEMA 5-20 duplex receptacle power outlets or equivalent on three TR wall and the bottom of all equipment racks. Provide L5-30 outlets at the bottom of the equipment racks if required by SC. Each equipment outlet will be on a separate branch circuit. Provide additional 120-VAC convenience outlets for maintenance and housekeeping. Backup all electrical loads in the TR with standby generator power where available.

**2.5. Telecommunication Outlet**.
Per UFC 3-580-01, EXCEPT USE CAT 6 FOR outlet/connectors

**2.6. Copper Voice and Data Horizontal Cables.** All data and voice horizontal cables will be Category 6.

**2.7. Copper Termination.**
All copper terminations will be in accordance with TIA/EIA T568B.

**2.8. Fiber Optic Cable Terminations**.
All Fiber Optic Cabling will be terminated using SC connectors.

**2.9. Air Force Family Housing.**
For Government Communications use Category 6 Horizontal Cables.

**2.10. Public Address Systems (PA).** PA Systems will not be installed in the CER or TRs unless approved by the BCSO. Under no circumstances will PA microphones be installed in CER or TCs. These must be installed in an area accessible to the occupying organization.

**2.11. Acceptance Documentation and Records.** An "as-built" set of drawings and electronic copies in micro-station and .pdf Adobe format will be provided to the BCSO showing, but not limited to: all cable routes, outlet locations and identification markings and communication room/closet locations. Site drawing showing the route of all manhole and duct systems installed in support of the MILCON.

**2.12. Telecommunications System Management Records.** Telecommunications system labeling, management records, and drawings must comply with TIA/EIA-606. Existing base standard numbering practices may be used as long as they incorporate the following requirements: all outlets, patch panel positions, and cables must be labeled as to their function with a unique identifier code; and as-built drawings and management records must show the location of all outlets, equipment, and cabling. These records must be provided as a deliverable item under any construction procurement contract. They will form part of the base Communications and Information Systems Installation Records (CSIR) and must be delivered to the BCSO CSIR manager upon contract completion.

**3. Construction, Additions and Renovations Projects**.

**3.1. General.** All construction, additions and renovations designs, plans and contracts that will require communications or information systems must be approved by the BCSO or designated representative. Contracts must be approved before being advertised for award. The communications organization's Plans and Implementation Branch (SCXP) is the focal point for this approval. Be sure to include this office in all planning and review meetings. The occupying organization will provide funding to the BCSO for all equipment, cables, cross connects, jumpers and programming, identified by the BCSO representative as required, to provide communications for users in the new facility.

**3.2. Communications Spaces.** All new construction, additions and renovations must provide a CER or TC as part of the project. The CER/TC will be appropriately sized to support the facility size and number of users. The CER/TC will be to the specifications outlined in the section 2.3., *Facility Communications Space Requirements*. Areas being converted to administrative space must include a CER/TC.

**3.3. Telecommunications Distributions Systems.** All new construction, additions and renovations must include a telecommunications distribution system.

**3.3.1. Interior Raceways**. Install a complete raceway between each telecommunications outlet and the CER/TC. Use cable trays in administrative areas and when possible. Use conduit when it is not feasible to use cable trays or where code prohibits the use of cable trays. Provide outlet boxes and stubbed up conduits where telephone, data or cable TV connectivity is required. Provide power polls for access to system furniture. Install two each four-inch conduits with pull ropes, between TCs and the CER.

**3.3.2. Entrance Conduits.** Install at lease two each two-inch entry conduits with pull ropes to the nearest communications manhole for new facilities. Include hand-holes if required due to distance. Install the same for exiting facilities if required.

**3.3.3. Communications Wiring.** Typically premise wiring for minor construction, renovations and SABER projects is done by the 78 ABW/SC base telecommunications contractor (BTS). On the rare occasion where plans for projects/contracts deviate from the above, it must be approved by the BCSO. If approved, the installing contractor must adhere to all criteria listed in Section 2 of this standard.

**3.4. Telecommunications Cabling.** Unless otherwise approved by the BCSO, all LAN and voice cabling will be installed by the base telecommunications contractor. When planning occupancy dates provide a minimum of 20 working days after the construction, renovation and system furniture installation is totally completed, for BTS to complete the communications wiring.

**3.5. Acceptance Inspection**. All communications systems installed by the construction contractor or their sub-contractors, must be accepted by the BCSO before the facility can be added to the base infrastructure, or telephone or LAN equipment can be installed in the new facility. To schedule acceptance inspection, contact the 78 CS/SCX Plans and Programs Branch (contact numbers on **PART 6F – COMMUNICATIONS page one)**

End

Author: Roger K Vann

Reviewer: Jackie Barron 472-2022, Karen Pless 478-2018

Approved By:

X

Roger K Vann
Base Comm Planner, 78 ABW/ SCXP, 472-2019

# Robins Air Force Base
# Base Facility Standards

**Title: Exterior Lighting**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR
ROBINS AFB

**PART 6G – EXTERIOR LIGHTING**

CRITERIA REFERENCE DOCUMENTS: The publications listed below form a part of this document to the extent referenced. The publications are referred to in the text by the basic designation only.

AFI 32-1063, Electric Power Systems
AFJMAN 32-1082, Facilities Engineering – Electrical Exterior Facilities
ETL 10-18, Light-Emitting Diode (LED) Fixture Design and Installation Criteria for Interior and Exterior Lighting Applications
UFC 3-530-01, Including Change 1; Design of Interior and Exterior Lighting Systems and Controls

UFC 3-501-01, Electrical Engineering

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

| | |
|---|---|
| AASHTO LTS-5 | (2009; Errata 2009; Amendment 2010) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals |

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)

| | |
|---|---|
| IESNA RP-8 | (2000; Errata 2004; R 2005; Errata 2007) Roadway Lighting |

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

| | |
|---|---|
| IEEE 81 (1983) | Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System |
| IEEE C135.1 (1999) | Standard for Zinc-Coated Steel Bolts and Nuts for Overhead Line Construction |
| IEEE C135.30 (1988) | Standard for Zinc-Coated Ferrous Ground Rods for Overhead or Underground Line Construction |

| | |
|---|---|
| IEEE C2 | (2007; Errata 06-1; TIA 07-1; TIA 07-2; TIA 07-3; Errata 07-2; TIA 08-4; TIA 08-5; TIA 08-6; TIA 08-7; TIA 08-8; TIA 08-9; TIA 08-10; TIA 08-11; TIA 09-12; TIA 09-13; TIA 09-14; Errata 09-3; TIA 09-15; TIA 09-16; TIA 10-17) National Electrical Safety Code |
| IEEE C62.41.1 | (2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits |
| IEEE C62.41.2 | (2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

| | |
|---|---|
| NFPA 70 | (2011) National Electrical Code |

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

| | |
|---|---|
| TIA-232 | (1997f; R 2002) Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange |

*BFS Part 7A –Energy Conservation*
*BFS Part 7C – Sustainable Design & Development*

EXTERIOR LIGHTING – GENERAL
a. Parking Lot Lighting

(1) General requirements:
(a) Use aluminum poles.

(b) Calculate lighting levels based upon IES (Illumination Engineering Society) for maintained levels for parking lots - design for 2.0 FC average

with no point less than 1.0 FC.

(c) Fixtures shall be controlled by individual photocells on each fixture. Photocells shall activate at 3 foot-candles of ambient light.

(d) Feed at 277 V when practical. If feasible, feed by panelboards mounted adjacent to padmounted transformers. Otherwise, feed from adjacent buildings served by the parking lots.

(2) Primary standard is high mast lighting for parking lots with more than two rows of spaces or at least two driving lanes.

(a) Use 100' poles equipped for up to 12 fixture heads, even if fewer heads are used. Provide raceway and branch circuit wiring sufficient for all 12 fixtures. Holophane is base preference.

(b) The manufacturers do not have recommended foundation designs, so require the contractor to provide a submittal showing their proposal to withstand a 90 mph wind with 12 luminaires on the top of the pole. (NOTE: We have had some installations with a 17' deep hole 4' in diameter, with bolts 72 inches long, and a 14' cage 3.5' in diameter for concrete reinforcement. The bolts were 2" in diameter, and the rebar was sized at no. 5. The installation included a vertical I-beam 14' long.)

(c) Fixtures are specially made for this purpose and have 1000 W HPS lamps.

(d) Have the manufacturer provide a printout showing the FC point-to-point calculations for the lot layout.

(e) Include stainless steel hoisting cables with a mechanism that is operated by an electric drill for lowering the fixture set to ground level for maintenance.

(f) Also provide double aircraft warning lights on poles located north of Fifth Street.

(g) Voltage level is 480 V.

(3) Secondary standard is for shorter poles with cobra heads.

(a) Provide 25’ poles with screw-in bases and 6’ or 8’ arms as applicable.
(b) Foundations shall be constructed as follows: 16 inch diameter helix made from hot rolled steel per ASTM A635; base plate size 15 inch diameter bolt circle and constructed of hot rolled steel; shaft size approximately 7 ft 6 inches constructed of steel pipe per ASTM A53. Entire finish shall be hot dipped galvanized per ASTM A123. Design Basis --- Chance Cat # XT112-0284

(c) Fixtures shall be cobra head type with 250W HPS lamps. Use “wide area” lenses and fixtures. Shoebox type fixture heads are unacceptable due to difficulty in maintenance and high first cost.

(d) Voltage level is 277 V.

(4) Last preference, discouraged due to difficulty of maintenance and higher initial cost, is for shorter poles with rectangular box shaped fixtures on short horizontal arms.

(a) Only use these along paths and sidewalks near administrative facilities where a high degree of aesthetics is desirable. These must meet the balanced goals of architectural compatibility, energy budgets, and sustainability.

(b) Provide on poles no taller than 10’ due to maintenance difficulty.

(c) Poles may be colored with anodized aluminum if this better meets the architectural compatibility requirements.

(d) Foundations shall be constructed per manufacturer recommendations. If possible, use screw-in bases and foundations such as for parking lot 25’ poles, but sized smaller as required.

b. <u>Street Lighting</u>

(1) General requirements:

(a) Only provide where adjacent parking lot lighting is insufficient for street level.

(b) Calculate lighting levels based upon IES (Illumination Engineering Society) for maintained levels - design for 1.0 FC with no point less than 0.5 FC.

(c) Fixtures shall be controlled by individual photocells on each fixture. Photocells shall activate at 3 foot-candles of ambient light.

(d) Feed at 277 V. If feasible, feed by panelboards mounted adjacent to padmounted transformers.

(2) Primary standard is high mast lighting as described above.

(3) Secondary standard is for shorter poles with cobra heads as described above.

c. Sidewalk Lighting: Any sidewalk that is not adequately lighted by the parking lot lighting and branches into the entryway of the facility shall be lighted with sidewalk lighting. Design Basis -- Lithonia KBR6 series with 70-watt metal halide lamps.

d. Exterior Doors: Provide fixtures above or next to all exterior doors. Select light fixtures at the main entrance that will accent the architecture.

e. Facility Site Lighting: If security is a concern or parking lot is adjacent to a wall, provide wall pack metal halide fixtures spaced to provide 2.0 FC average to the area.

f. Exterior Storage Area Lighting: Provide lights around the perimeter of the entire storage area.

(1) For most applications, consider a 30 ft tall, round, tapered aluminum pole with two-floodlight type lighting fixtures mounted on 2 tenons 180 degrees apart with 400 watt HPS with a NEMA type 6 X 5 light distribution.

(2) Install pole on a screw-in base.

(3) Poles shall withstand steady wind velocity of 80 MPH and have a 1.3 gust factor based on the effective projected area of the fixtures and brackets provided.

(4) Poles shall be one piece, spun construction, with cast aluminum base, ground lug, handhole, and sanded satin aluminum.
(5) Poles shall be spaced to provide 10 foot-candles.

EXTERIOR LIGHTING, SPORTS: All lighting shall be metal halide. Calculate lighting levels based upon IES (Illumination Engineering Society) for maintained levels.

a. Baseball and Softball Fields: Lighting levels shall be based on Class of Play Type II per IES. Layout poles shall be as recommended by the IES standard.

b. Tennis Courts - Lighting levels shall be based on Class of Play Type II per IES. Layout of poles shall be as recommended by the IES standard.

c. Type: All lighting shall be metal halide.

d. Poles - All pole construction shall be concrete set in a concrete base.

**<<<End of Section>>>**

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Approval: _____
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# Robins Air Force Base
# Base Facility Standards

**Title: Medium Voltage Electrical Distribution**
**Date:** ***22 November 2013***

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)
FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 6H – Medium Voltage Electrical Distribution

CRITERIA REFERENCE DOCUMENTS: The publications listed below form a part of this document to the extent referenced. The publications are referred to in the text by the basic designation only.

NFPA 70 (2011), National Electrical Code

UFC 1-200-01, General Building Requirements

UFC 3-501-01, Electrical Engineering

UFC 3-550-01 Exterior Electrical Power Distribution

*BFS 7A – Energy Conservation*

*BFS 7C –Sustainable Design & Development*

*LISTING: All electrical devices and components shall be listed for their intended use by UL or FM.*

EXTERIOR POWER

a. Underground: Feed all new facilities underground.

(1) All primary underground feeders and secondary feeders from the transformer to the service entrance shall be installed in concrete-encased duct as described below.

(2) Designer shall use double-ended main switchboard on a transformer capacity of 2,000 KVA and larger. In other words, if the load requires 2,000 KVA or larger transformer capacity, the designer shall use two transformers (e.g., two 1,000 KVA) with a double-ended switchboard construction. Double-ended design shall have a main breaker on each side and a tie breaker.

(3) Air switches shall be provided and installed in order to comply with the Electrical Standards. Each exterior transformer shall be connected to a separate air switch compartment. Transformers shall not be looped to feed downstream exterior transformers.

b. Equipment Pads:

(1) Size pads to extend beyond transformer/switch 6” on all sides.

(2) Precast pads are not allowed. Equipment pads shall be poured on site with 3000 PSI and reinforcing steel.

(3) Pads shall have no openings to the dirt below. This is to keep fire ants out. Seal all openings and windows in pads with concrete.

(4) Use a counterpoise around the pad with #4/0 bare copper conductors. Add one ¾" X 10' copper clad ground rod at all four corners. Extend a separate #4/0 bare copper conductor, in a PVC sleeve, to each equipment section (in the primary and secondary sections of padmount transformers and all four sections of padmounted switches). All connections below grade shall be exothermic type. Show detail on drawings.

c. Duct Bank:

(1) For main 15 KV lines (from manhole or switch to manhole), run 4-way 5 inch PVC (Sch. 40 or Type DB) concrete-encased, as a minimum. No EB (thin wall) will be accepted.

(2) Minimum size conduit from manhole to transformer shall be 2-4" PVC (Sch. 40 or Type DB) concrete-encased. No EB (thin wall) will be accepted.

(3) For last turn up into a pad, use Sch. 80 PVC if concrete is not encasing the last piece.

(4) Provide pull wires (nylon, Greenlee #430, 210 tensile strength) in each empty conduit.

(5) Use sweeping bends if only one turn of less than 90 degrees.

(6) Turns of 90 degree or more for 500 MCM, 15 KV shall have a manhole at the turn. Handholes are allowed for two runs (single-phase or three-phase) of #2, 15 KV only.

(7) Run neutral with phase conductors in each conduit.

(8) Use metallic backed warning tapes above all 15 KV duct banks. Show detail section for duct on drawings.

(9) Install low-voltage underground secondary conductors in RGS or PVC conduit sized and at the required depth per the NEC. Concrete-encasement is not required.

d. Cable: Main line is defined as cable running from switch to switch or riser pole to switch.

(1) Primary cable shall be 1/C, 15 KV, copper, EPR (MV-90), shielded with 100% insulation.

(2) Neutral conductor shall be 600 volt with XHHW insulation.

(3) Main line - 500 MCM, with #4/0 neutral.

(4) Transformer feeders shall be 3 1/C #2 EPR with #2 XHHW neutral, except for 2,000-2,500 KVA which shall use 4/0 conductors.

e. Manholes and Handholes:

(1) Primary manholes:

(a) Use minimum size 8' x 8' x 7'.

(b) Place no more than 450' apart.

(c) Provide four 5" cast-in-place inserts on each inside wall.

(d) A manhole shall be provided at each switch location. Connect to manhole with one 5" duct entering each switch section.

(2) Primary (for #2, 15 KV cable only) and secondary handholes shall be 4' X 4' X 4'. All sides and bottom shall be concrete.

(a) 500 MCM, 15 KV cable shall be installed in manholes only.

(b) Turns of 90 degrees or more shall use secondary handholes or runs greater than 300'.

(3) Provide sumps.

(4) Provide circular metal covers and not removable tops, since these often require power equipment to remove.

(a) Provide minimum clear opening of 32".

(b) Provide H20 wheel loading.

(5) Core drill all existing manholes/handholes.

f. Connections:

(1) Use no primary cable T-splices! This includes inside manholes and handholes.

(2) Use only padmounted air switches for primary connections.

(3) Exterior transformers shall not be looped to connect downstream transformers. Each transformer shall be connected to a dedicated air switch compartment.

g. <u>Padmount Air Switch Features</u> - Design basis is S&C PMH-10

(1) 4-way, Air type.

(2) Live front, rated 600 amps with viewing window.

(3) Gang switched.

(4) No mechanical interlocks. \

(5) Switches shall be factory painted Brown, Robins AFB #48.

(6) Furnish with the following options:

(a) Dual-purpose front barrier

(b) Grounding stud

(c) 18-inch carbon steel base spacer, noncompartmented to match enclosure.

(7) Furnish 6 locks and one key for each switch installed. Use locks manufactured by Best Lock Corporation, lock number 21B720L-R with core number 8A59, short shank. Keys provided shall be blank and uncut, also manufactured by Best Lock Corporation.

h. Riser Pole Connections When Specified.

(1) Use 5" rigid steel for 500 MCM and 4" rigid steel for #2.

(2) Make transition from overhead riser to underground with rigid steel elbow.

(3) Use fiberglass arms only on pole.

i. Service Entrance Transformers (General Requirements):

(1) Primary transformers shall not be installed indoors.

(2) Individual transformer sizes shall not exceed 2500 KVA.

(3) A separate transformer shall feed each facility or building.

(4) Designer shall use double-ended main switchboard on a transformer capacity of 2000 KVA (two 1000 KVA) and larger. Each transformer, service lateral, and side of the double ended main switchboard shall be sized for 25% spare capacity over the calculated demand, or at 20% spare capacity of the equipment rating.

(5) All new facilities shall be fed with 480/277 volts, unless special permission is granted by Civil Engineering at Robins AFB. On facilities with 480/277 volts and 208/120 volts, service into the facility shall be 480/277 volts with interior dry type step down transformers to supply the 208/120-volt system. Using separate exterior transformers to supply the 480/277-volt system and 208/120-volt system is not acceptable.

(6) Voltages: Primary - 12,470V Delta, Secondary - 480/277 volts.

(7)Feeder conductors from service entrance transformer to main switchboard shall be color coded insulated conductors so that the conductor phase connection is readily identifiable in any part of the installation. Where color coding is not available in the larger size conductors, the conductors shall be color coded by use of color tape, half lapped for a minimum of 3 inches and shall be tested to prevent phase crossover prior to terminations at service entrance transformer and main switchboard.
Phase conductors shall be color coded for all three phase as follows:
120/208 or 240 Volts, Phase A - Black, Phase B - Red, Phase C - Blue.
277/480 Volts, Phase A - Yellow, Phase B - Brown, Phase C – Orange

(8)Pad mount transformers shall be factory painted Brown, Robins AFB #48.

(9)Furnish 1 lock and one key for each transformer installed. Use locks manufactured by Best Lock Corporation, lock number 21B720L-R with core number 8A59, short shank. Keys provided shall be blank and uncut, also manufactured by Best Lock Corporation.

(10)Unless stated elsewhere, the standard average winding temperature rise of 65 degrees, OA Class should be provided. Do not use forced air cooling to provide KVA capacity for demand load or spare capacity.

(11) Dry type primary transformers are not allowed.

(12) Transformers shall have an insulating fluid of the less flammable type, either a high fire point fluid or a silicone fluid.

j. Service Entrance Transformers (Construction Types):

(1) Use low profile utility type in residential areas.

(2) Pad Mount Transformer Standards:

(a) Pad mount construction may be used for applications rated at 1500 KVA and less. Due to the fusing arrangement specified herein, dead-front transformers rated 2000 – 2500 KVA are not readily available in pad mount construction. For larger transformers above 1500 KVA, use fused load interrupter switch with liquid filled substation transformer.

(b) Dead-front construction.

(c) Loop-feed construction with universal bushing wells. Install primary cable feed on one side with surge arrestors on the loop feed bushings.

(c) Load-break connectors

(e) Load-break on-off primary switch

(e) Fuses (Side-wall mounted "Bay-O-Net" oil-immersed expulsion fuses in series with coordinated oil-immersed current limiting fuses). Bay-O-Net fuses are to be externally replaceable with a hot stick without opening the transformer tank.

(g) External tap changer.

(h) 9 KV Lightning/surge arresters.

(i) Parking stands
(j) Four 2-1/2% high voltage taps, two above and two below rated voltage.

(k) Sufficient clearance for access to drain plugs.

(l) Full height isolating barriers between high voltage and secondary section.

(3) Fused Load Interrupter Switch with Substation Transformer

(a) Medium voltage fused switch and transformer shall be located on the exterior of the facility. New facilities shall be designed with the service entrance equipment located inside the main electrical room.

(c) Provide current limiting fuses in the Fused Load Interrupter Switch.

k. Walk-In Enclosures:

(1) Use exterior walk-in enclosures for equipment when renovating an existing facility with insufficient space inside electrical rooms to install new equipment. New facilities shall be designed with adequate interior floor space inside the facility electrical rooms for the new electrical equipment.

(2) Thermally insulate the walk-in housing.

(3) Provide ventilation fans, lights receptacles, and heating and air conditioning. Provide power from a small panelboard inside the enclosure.

(4) Feeder busway (if permitted) attached to a walk-in enclosure shall have the connection to the walk-in enclosure on the upper wall sides, not the top or roof.

(5) The same manufacturer shall manufacture the housing, transformer, and switchgear.

l. Facility Metering (SCADA and Other Central Systems)

(1) Provide metering and data recorders as needed for monitoring of all power, water, and gas utilities.

(2) Each transformer will require a separate meter mounted on a stand next to the transformer. Each data recorder has capability for four metering points. Each facility transformer will use a dedicated metering point on the data recorder. Provide the quantity of data recorders as needed to meet the data collection requirements.

(3) The Electrical Contractor shall provide the material and installation of the metering and data recorders at the transformers and throughout the system to provide a complete and operational installation. The RAFB standard electrical meter is an A3 ALPHA Meter, Type A3T, as manufactured by Elster Electricity LLC. See attached catalogue sheets for details.

(4) The Electrical Contractor shall provide a 1 1/2-inch conduit from the bottom of the transformer to the metering cabinet.

(5) The Electrical Contractor shall provide a 1 -inch conduit from each metering cabinet to the telephone backboard. The electrical Contractor will need to install a 4 pair cable from each data recorder (located in the metering cabinet) to the telephone backboard.

(6) Other metering functions shall be connected to the data recorder, such as monitoring of data pulses from water meters and gas meters. Each meter will occupy a data point in the data recorder. Provide data recorders as needed to monitor all points in the facility.

(7) This metering shall be in addition to the multifunction metering requirements listed elsewhere for service entrance switchboards.

m. Exterior Service Entrance Feeders

(1) Secondary Cables

(a) Run underground.

(b) Use single conductor copper with THWN insulation.

(c) Use no conductors larger than 500 MCM.

(2) Feeder busway may be used for liquid filled substation type transformers rated 2000 – 2500 KVA. However, their use is discouraged and considered only upon request.

**<<<End of Section>>>**

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# Robins Air Force Base
# Base Facility Standards

**Title: Intrusion Detection Systems (IDS)**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 6I– INTRUSION DETECTION SYSTEMS (IDS)

CRITERIA REFERENCE DOCUMENTS: The publications listed below form a part of this document to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)
ASTM B 32 (2004) Standard Specification for Solder Metal
ASTM D 709 (2001; R 2007) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
IEEE Std. 100 (2000) the Authoritative Dictionary of IEEE Standards Terms

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
NEMA ICS 2 (2000; Errata 2002; R 2005; Errata 2006)

STANDARD FOR INDUSTRIAL CONTROL AND SYSTEMS
Controllers, Contractors, and Overload Relays Rated Not More than 2000 Volts AC or 750 Volts DC: Part 8 - Disconnect Devices for Use in Industrial Control Equipment
NEMA ICS 6 (1993; R 2006) Standard for Industrial Controls and Systems Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA 72)
NFPA 70 (2007) National Electrical Code, Article 725, 800

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
47 CFR 15 Radio Frequency Devices

UNDERWRITERS LABORATORIES (UL)
UL 2050 Industrial Intrusion Detection Standard
UL 1076 UL Standard for Safety Proprietary Burglar Alarm Units and Systems
UL 1610 (1998; Rev thru Aug 2005) Central-Station Burglar-Alarm Units
UL 1635 (1996; Rev thru Aug 2005) Digital Alarm Communicator System Units
UL 1638 (2001; Rev thru Nov 2003) Visual Signaling Appliances - Private Mode Emergency and General Utility Signaling
UL 464 (2003; Rev thru Oct 2003) Standard for Audible Signal Appliances
UL 609 (1996; Rev thru Mar 2005) Local Burglar Alarm Units and Systems
UL 634 (2000) Connectors and Switches for Use with Burglar-Alarm Systems
UL 639 (2007) Intrusion Detection Units
UL 681 (1999; Rev thru Jan 2001) Installation and Classification of Burglar and Holdup Alarm Systems
UL 796 (2006; Rev thru Jun 2007) Printed-Wiring Boards
UL 827 Standard for Central-Station Alarm Services
UL 864 Standard for Control Units for Fire-Protective Signaling Systems

1. Intrusion Detection Systems Approval

a. This standard covers Intrusion Detection Systems (IDS) consisting of Commercial Off the Shelf (COTS) equipment which is limited to a full range of interior point protection devices, duress sensors, volumetric (space) protection sensors, alarm signal data communications media, and alarm reporting and monitoring systems. System requirements shall conform to this standard for Intrusion Detection Systems (IDS) installed at Robins Air Force Base. IDS installed at Robins Air Force Base shall meet or exceed National Industrial Security Program and UL 2050. All firms or contractors must be listed with UL under National Industrial Security Systems. All IDS must be approved by the 78 Security Forces Electronic Security Specialist (78SFS/ESS) before any purchasing or contracting for installation of an Industrial Intrusion Detection System. A drawing showing the proposed area and layout of intrusion detection devices must be submitted for this approval process. If there are questions concerning system design, Contact the 78 CEG/CENMP. 78 Security Forces should be consulted for the amount of coverage needed for a given area. Comments and suggestions on this guide specification are welcome and should be directed to the 78 CEG/CENMP. Compliance to this specification is mandatory and shall not be deviated from without written permission from the 78SFS/ESS.

b. The following information shall be shown on the project drawings:

(1) Protection Plans: Location of security devices, control units, alarm display equipment, electrical power closets, and communications closets.
(2) Site Plan: Show Entry Control Point (ECP) and all exit doors in the proposed protected area.
(3)Assessable Portals: Show any windows, air vents, and crawl spaces that can be used to gain access to the area.
(4) Solid Walls: Use distinguished lines for all exterior walls, fire walls, and temporary walls that are located in the area.
*(5)* Sensitive Areas: Show within the space the area of most concern. (Safes, server racks, weapon storage, or high level work areas).

2. References: See above.

3. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. Items of equipment shall essentially duplicate equipment that have been in satisfactory use at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

a. Definitions:

(1) Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std. 100.

(2) Active mode: That in which some type of signal is continuously sent across the link, resulting in simple link breaks being readily detected.

(3) Element: Constituent part of a complex signal such as AC or DC voltage or current, AC phase, or frequency duration.

(4) Fail Secure: Capability to monitor for system functions and to report an alarm when a failure is detected in a critical system function.

(5) Installer: Either the Contractor or a subcontractor with whom the Contractor has a firm contractual agreement.

(6) Intruder: Animate object at least 48 inches in height, 75 pounds in weight 4 cubic feet in volume, moving through protected zones or portals at a velocity of 0.1 to 10 feet per second.

(7) Sensor zone: Geographic position for which an intrusion must be identified and displayed and may be the combination of multiple detection devices.

*(8)* In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

b. System Descriptions:

Provide new Intrusion Detection System (IDS), including associated equipment and appurtenances. Provision of Intrusion Detection System shall include supervising installation of rigid or flexible conduit for Intrusion Detection System during site preparation, running system wires and cables, and system component installation, component testing, and system checkout. Each system shall be complete and ready for operation. Equipment, materials, installation, workmanship, inspection, and testing shall be as specified herein. Premise Control Unit shall be manufactured by Honeywell, shall be model number Vista 128BP or Vista 250BP, and shall use an AES 7788-8 transceiver with a 7094 IntelliPro Digital Dialer Interface installed. The Premise Control Unit shall have a telephone backup line installed and shall be supervised by the AES 7094 for line-cut. New equipment shall be compatible with and shall operate accurately and reliably with the Base Central Station.

4. Submittals:

*NOTE: Government approval is required for all submittals. Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.*

a. Submittal Procedures:

The Contracting Officer's Technical Representative will review and approve submittals requiring special review in this section. Drawings and descriptive data shall be approved prior to procurement, fabrication, and installation. A schedule of required submittals shall be prepared to be integrated with the overall construction management schedule to ensure adequate review and necessary corrective work before installation. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. Submittals shall include the nameplate data, size, and capacity. Submittals shall also include applicable federal, military, industry, and technical society publication references.

b. Quality Assurance:

(1) Drawings: Provide one hard copy for review of proposed protection. At the end of the project provide one hard copy of the as-built and one digital copy in DWG format.

(2) Intrusion Detection System Components: Provide drawings that clearly and completely indicate the function of each component of the IDS. Indicate termination points of devices and indicate interconnections required for operation of the system. Indicate interconnection between modules and devices. In addition, provide a layout drawing which shows spacing of components, location, and details of mounting and positioning.

(3) Overall System Schematic: The overall system schematic shall indicate the sequence of operation, the relationship of integrated components on one diagram, and show power source, system controls, impedance matches, plus number, size, identification, and maximum lengths of interconnecting wires. Drawings shall not be less than 11 by 17 inches.

(4) Experience and Qualifications: Only UL certified installers will be allowed to install devices on an Intrusion Detection System at RAFB.

(a) Installer's Qualifications: Prior to installation, submit data for approval by the Contracting Officer's Technical Representative of the installer's experience and certified qualifications under UL National Industrial Security Program. Show that the installer who will perform the work has a minimum of three years experience successfully installing Intrusion Detection Systems of the same type and design as specified herein. Include names, locations, and points of contact of at least five installations of the same type and design as specified herein where the installer has installed such systems. Indicate the type of each system and certify that each system has performed satisfactorily in the manner intended for a period of not less than one year.

(b) Instructor's Qualifications: Prior to installation, submit data of the instructor's experience and certified qualifications. Show that the instructor, who will train operating and maintenance personnel, has received a minimum of 24 hours of Intrusion Detection System training from a technical organization such as the National Burglar and Fire Alarm Association, and has two years experience installing Intrusion Detection Systems of the type specified.

(5) IDS Operational Test Plan: Submit for approval at least 30 days prior to commencement of formal operational testing. Include detailed procedures for operational testing of each Intrusion Detection System component and subsystem, and for performance of an integrated system test.

(6) IDS Equipment: Submit manufacturer's certification of UL listing.

c. Regulatory Requirements:

(1) Reference Standard Compliance: Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.

(2) Independent Testing Organization Certificate: In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard Provide only UL listed ESS equipment for Both exterior and interior ESS sensors, access control, and closed-circuit television (CCTV) components.

d. Standard Products:

(1) Materials: Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design, and workmanship.

(2) Product Service Period: Products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two year period shall include applications of equipment and materials under similar circumstances and of similar size.

(3) Market: The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the two year period.

(4) Single Manufacturer: Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

(a) Alternative Qualifications: Products having less than a two year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

(b) Material and Equipment Manufacturing Date: Products manufactured more than two years prior to date of delivery to site shall not be used, unless specified otherwise.

e. Warranty:

(1) Service Organizations: The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of one year after acceptance.

(a) Service Time: During the one year period the installing company shall provide 24 hour repair service of the Intrusion Detection System.

(b) Response Time: The contractor shall respond within four hours on being notified that repairs are needed to the affected Intrusion Detection System.

(c) Qualifications of Responder: The responding alarm technician must be qualified to service the Intrusion Detection System.

5. Products

a. IDS Subsystems:

(1) Integration Requirements: provide a complete integrated Intrusion Detection System consisting of the following major subsystems:

(a) Detection

(b) Arm/disarm multiple function Security Control Pad

(c) Communications

(d) Assessment

(e) Alarm reporting

(f) Power

b. Integrated System Functional Requirements:

(1) Functional Requirements: Ensure that the Intrusion Detection System is fully integrated with the physical security and other elements of the overall facility security system. Except for multiple function Security Control Pads, other subsystems may be housed in a single enclosure. Specific subsystem functional requirements are as follows:

(a) Detection subsystem: Subsystem shall consist of sensors to detect intrusion attempts and provide means to indicate a tamper condition.

(b) Arm/disarm multiple function Security Control Pads: Subsystem shall consist of electronic digital Security Control Pad to monitor and control personnel movement through normal access routes in and out of the facility and between protected areas within the facility.

(c) Communications subsystem: Subsystem shall consist of elements required to ensure that pertinent data is transferred from the point of origin to the point where appropriate actions can be taken.

(d) Assessment subsystem: Subsystem shall consist of electronic devices required to visually and audibly verify the validity of Intrusion Detection System alarms.

(e) Alarm reporting subsystem: Subsystem shall consist of electronic devices to control, process, integrate, and annunciate Intrusion Detection System data at the Law Enforcement Center.

(f) Power subsystem: Subsystem shall consist of components required to ensure continuous operation of the entire Intrusion Detection System for 24 hours of power loss.

c. Intrinsically Safe:

*NOTE: Do not locate control communicator within a hazardous area. If point sensors and volumetric sensors are required in hazardous areas, clearly identify their location on the plans.*

(1) System components located in areas where fire or explosion hazards may exist due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or filings shall be rated and installed according to NFPA 70. Classification of area and corresponding equipment ratings and installation procedures shall be as defined and specified in Chapter 5 of NFPA 70.

d. Integrated System Performance Requirements:

(1) The installed and operating Intrusion Detection System shall be integrated into the overall protected area to detect intrusion and shall perform as an entity, as specified below.

(a) Detection Coverage: Provide and adjust sensors so that coverage is overlapping and maximized without mutual interference. Intrusion Detection System coverage shall include the facility perimeter and critical spaces within the facility.

(b) Detection Resolution (Sensitivity): Sensitivity shall be capable of the following requirements:

1) Locating intrusions at individually protected assets or at an individual portal.

2) Locating intrusions within volume/areas to within the coverage on any single volumetric sensor.

3) Locating failures or tampering at individual sensors.

(2) Detection Alarm and Reporting Capacity: The Intrusion Detection System shall have the capacity to collect, communicate, and display a minimum of 128 programmable sensor zone alarms and to enable control of one or more response devices in each of the sensor zones. When a sensor zone includes a combination of multiple detection devices, the system shall maintain the capability to identify individual detection devices in an alarm state. A single alarm shall be annunciated within approximately 2 seconds after sensor transducer or other detection device activation.

(a) Alarms: Alarm shall include, but not be limited to, the following:

1) Intrusion detection

2) Tamper detection

3) Fail secured operation

4) AC power loss detection

5) Low battery in control communicator

(b) Intrusion Detection: Sense and respond with visible and audible signals the activation of detection sensors.

(c) Tamper Detection: Tamper protection can be physical protection, line supervision, encryption, and tamper alarming of enclosures and components.

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*NOTE: Each tamper loop requires a dedicated sensor zone in the control communicator. Do not use one tamper loop for an entire building since it would be difficult to trace the violated device or box. Instead, zone tamper loops by areas and devices to more conveniently locate a violated device or area. All tamper points shall be labeled with an odd number.*

e. Tamper Requirements: All intrusion detection, access control, assessment systems, and their associated data transmission media must be protected commensurate with the classification of asset being protected.

(1) Enclosures: All intrusion detection sensors and access control readers must have tamper resistant enclosures and integral tamper protection switches.

(a) All enclosures, cabinets, housings, and boxes, having hinged doors or removable covers that contain processors or connections must have tamper protection switches.

(2) Tamper Signals: All tamper alarm signals must be monitored continuously (24hr.) whether the system is in the access or secure mode of operation.

(3) Tamper alarms shall be annunciated to be clearly distinguishable from intrusion detection alarms.

(4) Tamper switches on doors which must be opened to make normal maintenance adjustments to the system and to service the power supplies shall be normally closed, automatic-reset type.

(5) Tamper switches shall have the following features:

(a) Inaccessibility until the switch is activated

(b) Under electrical supervision at all times, irrespective of the protection mode in which the circuit is operating

(c) Spring-loaded and held in the closed position by the door or cover protected.

(d) Wired to break the circuit when the door or cover is disturbed.

(e) Fail Secure: Provide a fail secure capability in critical elements of the Intrusion Detection System, including, but not be limited to, the capability to monitor communication link integrity and to provide self-test. When diminished functional capabilities are detected, the system shall provide annunciation of the fault. Fail secure alarms shall be annunciated to be clearly distinguishable from other types of alarms.

(f) Line Fault: As a minimum, fault isolation at the systems level shall have the same geographic resolution as provided for intrusion detection.

Communication links of the Intrusion Detection System shall have an active mode for line fault detection. The system shall be either a static system or a dynamic system. In a static system, the "no-alarm" condition shall always be represented by the same signal, which shall be different than the signal originally transmitted. The dynamic system shall represent "no-alarm" with a signal which continually changes with time.

(6) Power Loss: Provide the capability to detect when a critical component of the system experiences temporary or permanent loss of power and to declare an alarm. The alarm shall be annunciated to clearly identify the component experiencing power loss.

(7) Electrical Power: Electrical power shall be obtained by the normal commercial or base electrical distribution system. Power shall be continuously monitored and, if interrupted, automatic switching from primary to emergency backup sources shall be accomplished without interruption or degradation of critical system function. Intrusion alarms shall not be generated by power switching; however, an indication of power switching and on-line source shall be provided at the alarm monitor. Upon restoration of primary power, the system shall automatically switch back to the primary source. Low voltage condition of an on-line battery and battery charger circuit failure shall be detected and reported as a fault condition.

(a) Primary Power: Furnish 120 volt AC service, transformed through a hard wired two-winding isolation transformer and stepped down to 16.5 volts AC for system operation.

(b) Provide a dedicated circuit to power the Intrusion Detection System from a panel board at the location indicated.

(c) Label the circuit breaker in that panel board and provide a lock for the breaker. Label shall state: “IDS Do Not Turn Off."

(8) Backup Power: Provide backup power to the primary power by dedicated batteries in remotely located system elements such as individual sensors and in control communicators.

(a) When radio frequency (RF) operation is required, batteries shall be an integral part of dispersed system elements.

(b) Batteries shall be capable of operation in any position and shall be protected against venting caustic chemicals or fumes within an equipment cabinet.

(c) Batteries shall also be capable of continuous operation for up to 24 hours without recharge or replacement.

(d) If the sensors power requirements exceed the allowable UL rated capacity of the control communicator battery, provide the number of separate power supplies required to power the sensors.

(e) Provide each power supply with its own rechargeable battery and charger.

6. System Performance Requirements:

a. Provide Commercial off the Shelf (COTS) system components to operate as described herein within the context of the integrated system performance previously described. Where inconsistencies occur between the following component performance requirements and integrated system level performance descriptions, integrated system performance descriptions shall take precedence.

b. Modularity: Provide system components to facilitate modular subassembly and part replacement. Electronic components of the system shall be of the solid-state type, mounted on printed circuit boards conforming to UL 796. Circuitry shall not be so densely placed as to impede maintenance. Power dissipating components shall incorporate safety margins of not less than 25 percent with respect to dissipation ratings, maximum voltages, and current carrying capacity. Light duty relays and similar switching devices shall be solid-state or hermetically sealed electromechanical type.

c. Reliability: Provide only components in current manufacturing production. Components shall be manufactured to meet requirements specified herein and shall be free from characteristics and defects which affect appearance or serviceability or which render equipment unsuitable for the intended purpose. Provide components designed for continuous operation at specified conditions.

d. Maintainability: Components shall be capable of being maintained using commercially available standard tools and equipment. Components shall be arranged and assembled to Intrusion Detection System.

e. Environmental Conditions:

(1) Interior Conditions: Equipment installed in environmentally protected interior areas shall meet performance requirements specified by UL for the specific equipment or device.

(2) Exterior Conditions: Components mounted in locations exposed to weather shall be housed in corrosion-resistant enclosures with appropriate environmental protection. Component performance shall not degrade because of improper housing design. Components in enclosures shall meet performance requirements when exposed to ambient conditions specified by UL for the specific equipment or device.

f. Transient Voltage Surge Suppression: Intrusion detection and communication circuits shall be protected at both ends against transient voltage surges. Transient Voltage Surge Suppressors (TVSS) or surge protection devices (SPD) are required for the protection, within specified limits, of AC electrical circuits and electronic equipment from the effects of lightning induced voltages, external switching transients and internally generated switching transients. Individual suppressors shall be installed where shown on the drawings.

g. Electromagnetic Interference (EMI): Intrusion Detection System components employing electromagnetic radiation shall be designed and constructed to provide maximum practical invulnerability to electronic countermeasures.

h. Electromagnetic Radiation (EMR): Provide only Intrusion Detection System components which are FCC licensed and approved. Provide system components which are electromagnetically compatible.

i. Interchangeability: Like components shall be physically and functionally interchangeable as complete items, without modification of either the original items or of other components with which the items are used.

j. Safety: Intrusion Detection System components shall conform to application rules and requirements of NFPA 70 and applicable Underwriters Laboratories publications.

k. Human Engineering: Aural considerations shall include location of annunciators, tone pitch, quality, and intensity.

(1) The number of different audible signals shall not exceed four. Component design shall provide for ease of accessibility for maintenance.

l. Visual Annunciators: Annunciators shall be either liquid crystal displays (LCDs) or light emitting diodes (LEDs).

(1) Annunciators shall be so connected in the circuit that failure of the annunciator, socket, or protective circuitry shall not result in an improper or indeterminate signal. LCDs and LEDs shall be compatible with standby power supplies.

(2) LEDs shall be brightly lit and visible from a distance of 30 feet in an area illuminated at 807 l x 75 foot-candles.

(3) LEDs shall be used in outdoor applications or in the presence of sunlight.

m. Controls: Provide to ensure ease of operation of specified characteristics. Controls, switches, visual signals, and indicating devices, input and output connectors, terminals, and test points shall be clearly marked or labeled on hardware to permit quick identification, intended use, and location.

(1) Terminal markings and labels shall be of a permanent and legible type and located to be visible when the associated system wiring is in place.

(2) Identification markings shall be associated with each adjustment device or item requiring periodic maintenance.

(3) Safety warning or cautions shall be marked in conspicuous red letters. Control and indicator identifications that are exposed outside enclosures shall be permanent machine engraved letters, and painted to contrast with the background color.

(4) Controls not required for operation of the system shall be inaccessible to the system operator.

n. Test Points: Test points, controls, and other adjustments inside enclosures shall be readily visible and accessible with minimum disassembly of equipment. Test points and other maintenance controls shall not be readily accessible to operator personnel.

o. Component Enclosures: Annunciator housings, power supply enclosures, sensor control, and terminal cabinets, control communicators, wiring gutters, and other component housings, collectively referred to as enclosures, shall be formed, and assembled to be sturdy and rigid.

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*Note: Main Premise Control Unit cabinet shall have no modifications to the cabinet to facilitate conduit or other devices. Only the conduit knock-outs that were provided by the manufacture shall be used and these knock-outs shall not be made larger to allow larger pipe sizes.*

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p. Metal Thickness: Thicknesses of metal in cast and sheet metal enclosures of all types shall not be less than those in Tables 8.1, 8.2, and 8.3 of UL 1610 for alarm components, NEMA ICS 2, and NEMA ICS 6 for other enclosures.

q. Doors and Covers: Doors and covers shall be flanged. Where doors are mounted on hinges with exposed pins, hinges shall be of the tight-pin type, or ends of hinge pins shall be tack welded to prevent ready removal.

(1) Provide doors having a latch edge length of less than 24 inches with a single lock.

(2) Where the latch edge of a hinged door is 24 inches or more in length provide the door with a three-point latching device with lock; or alternatively with two locks, one located near each end.

(3) All knock-outs shall be plugged with hardware that cannot be removed from outside the box or cabinet.

(4) Covers of junction boxes provided to facilitate initial installation of the system shall be held in place by tack welding, brazing, or one-way screws.

r. Ventilation: Ventilation openings in enclosures and cabinets shall conform to the requirements of UL 1610.

s. Mounting: Unless otherwise indicated, sheet metal enclosures shall be designed for wall mounting with top hole slotted. Mounting holes shall be in positions which remain accessible when major operating components are in place and the door is open, but shall be inaccessible when the door is closed.

t. Enclosure Locks: Locks and key-lock operated switches required to be installed on component enclosures shall be UL listed, round-key type with three dual, one mushroom, and three plain pin tumblers, or shall have a pick resistance equal to a lock having a combination of five cylinder pin and five-point three-position side bar in the same lock.

(1) Keys shall be stamped "U.S. GOVT. DO NOT DUPLICATE." Key-lock operated switches shall be keyed differently and shall be two-position, with the key retractable from either position.

(2) Furnish two keys for each lock. Maintenance locks shall be of the one-way key-pull type arranged so that the key can be withdrawn only when the lock is in the locked position.

(3) Locks on components for maintenance access shall be keyed alike; furnish only two keys for such locks.

(4) Deliver keys, tagged with metal tags, accompanied by a manufacturer's certificate which records the number of each key made.

7. Detection Sensors: Sensors shall detect penetration of the facility perimeter and protected zones by unauthorized personnel or intruders, and shall conform to UL 634 or UL 639, as applicable. Unless otherwise specified, required sensor power shall be 12 volts DC.

a. Interior Point Sensors

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*NOTE: Only Balanced Magnetic Switches will be accepted on IDS at RAFB*
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(1) Door and window open detection: Balanced Magnetic Switch (BMS) shall be surface mounted or recessed.

(a) Balanced Magnetic Switch shall have a magnetic field tamper circuit with a high probability of alarm if an external magnet is introduced in defeat attempts.

1) Provide each magnetic switch with an over current protective device, rated to limit current to 80 percent of switch capacity.

2) The magnetic switch housing shall be protected from unauthorized access by encapsulating reed switches in a polyurethane potting compound.

3) The magnetic switch shall have a tamper resistant enclosure, a pry tamper and integral tamper switch.

4) Magnetic switch shall be rated for a minimum lifetime of one million operations.

5) BMS shall be installed with the proper mounting hardware provided by the manufacture.

6) Conductors running from the door to alarm circuits shall be unimpaired within a flexible armored cord constructed from corrosion-resistant metal.

7) Each end of the armored cord shall terminate in a junction box or other enclosure.

8) Armored cord ends shall be mechanically secured to junction boxes by clamps or bushings.

9) Conductors and the armored cord shall experience no mechanical strain as the door is moved from fully open to close.

10) The switch circuit shall initiate a tamper alarm if a short circuit is applied to the door cord.

(b) Recessed Balanced Magnetic Switch: The recessed Balanced Magnetic Switch shall have a gap up to 1/2 inch (3/8 inch in steel).

1) Field adjustments in the fixed space between magnet and switch housing shall not be possible.

2) Ball-bearing door trips shall be mounted within vault door headers such that when the locking mechanism is secured, the door bolt engages an actuator, mechanically closing the switch.

3) The door bolt locking mechanism shall be completely engaged before the ball-bearing door trip is activated.

4) The magnetic switch shall have a tamper resistant enclosure and integral tamper switch.

(c) Glass Breakage Sensors: Sensors shall detect window breakage by responding to sonic or vibration frequencies that accompany breaking glass.

1) Sensors shall selectively filter input to detect only frequency of breaking glass and to minimize false alarms from sources such as jangling keys, ringing phones, and slamming doors.

2) Glass Breakage Sensors shall initiate alarm when the glass they protect is cracked or broken.

3) Sensors shall provide positive detection of breakage of plate, safety, laminated, and tempered glass.

4) Sensor shall have a sensitivity adjustment controlling the output voltage from the detecting element which triggers a solid-state latching device. Provide the sensor with an LED for adjusting the sensitivity.

5) Sensor shall be contained in a fire-resistant ABS plastic housing and shall be ceiling or wall mounted, as indicated.

6) Sensor shall provide coverage of large glass areas up to 35 feet wide. Sensor housing shall be tamper resistant and designed for screw mounting.

7) Sensor shall not initiate alarm in response to seismic vibrations or other ambient stimuli.

8) The sensor shall have a tamper resistant enclosure and integral tamper switch.

(d) Dual Technology Glass Break Sensor: Sensor shall detect window breakage by responding to acoustic frequencies that accompany breaking glass.

1) The sensor shall be combined with a passive infrared motion detector (PIR) for the purpose of eliminating occupant-generated false alarms. It will extend coverage to occupied areas, allowing the sensors to be armed while people are present.

2) The sensor shall have a tamper resistant enclosure and integral tamper switch.

(e) Recessed Glass Break Sensor: A recessed glass break sensor is to be used when appearance is a consideration. Recessed models can be mounted directly to the wall or ceiling or can be installed on a single gang box.

1) The sensor shall employ pattern recognition technology that listens for the actual pattern of breaking glass.

2) The sensor shall be able to detect the difference from breaking glass and normal room sounds by listening across the glassbreak frequency spectrum.

3) The sensor shall provide 25 feet, 360 degree coverage of the area to be protected.

4) The sensor shall have a tamper resistant enclosure and integral tamper switch.

(f) Screening: Construct security screens from a maximum of 26 AWG insulated hard-drawn copper. Connect screens to an alarm circuitry by means of flexible armored cords.

1) Security screen circuitry shall provide end-of-line resistors in series or equivalent methods ensuring alarm activation if short-circuiting of the screen is attempted. If screen corners are not installed as a break wire sensor (wire traps), provide tamper switches.

2) Provide tamper switches in frames as required with not less than one switch on each side if dimensions are 2 feet square or less, and two switches if dimensions exceed 2 feet square. Tamper switches shall be corrosion resistant; spring operated, and shall initiate an alarm with a

movement of 2 inches or less and before access to the switch is possible. Electrical characteristics of the switch shall match alarm system requirements. The sensor shall have a tamper resistant enclosure and integral tamper switch.

(2) Object Protection: Safes and Vaults

(a) Capacitance proximity sensor: Capacitance proximity sensor shall detect changes in the established capacitance to ground of a protected object. When the protected object is touched and a ± 20 pf - (variable) change in the capacitance is detected an alarm shall be generated. Circuits measure the ratio between the charging current and the resultant rate of change of voltage with time.

(b) Sensor shall protect objects up to a 50,000 Pico farad capacitive load. The system shall provide means of indicating an alarm condition at the protected objects during installation and calibration. Provide the indicator with a disabling device within a tamperproof enclosure.

(c) The number of objects protected by a single capacitance detector shall not exceed the unit's maximum capacitance at the desired sensitivity.

(d) Protected objects shall be insulated from ground by insulating pads which shall have a dielectric constant such as glass or thermoplastic materials. If screen grids or radiators are employed as antennas, insulate from ground. Wires used for grids shall be larger than No. 14 AWG, 30 percent copper-clad steel covered with a minimum of 1/32 inch vinyl coating. Space grid elements at 6 inches maximum, and construct in a symmetrical manner.

(e) Provide sensor with sensitivity controls inaccessible to operating personnel.

(f) Sensor shall be insensitive to human body movements in excess of 36 inches from the antenna circuit.

(g) Sensor sensitivity to alarm-producing stimuli shall be readily adjustable from contact to 36 inches with a heavily gloved hand.

(h) Sensor shall not initiate nuisance alarms in response to normal ambient conditions.

(i) Provide sensors with tamper switches. Interconnecting lines and tamper switches shall remain under constant supervision, even when the system is set for authorized access.

(j) Sensor shall not reset upon restoration of SECURE mode if the antennas were altered during authorized entry to disable detection capability.

(1) Vibration vault sensor: Sensor shall sense short duration, large amplitude signals like those produced in attacks from explosions, hammering or chiseling. It shall also detect long duration, small amplitude signals like those produced in attacks from torches, thermal lances, drills, grinders, or cutting discs.

(a) The sensor enclosure base shall be constructed of die-cast aluminum with a stamped 22 gauge steel cover.

(b) The sensor shall have a tamper resistant enclosure and integral tamper switch.

(2) Vibration sensors: Sensors shall sense and selectively amplify signals generated by forced penetration of a protective structure.

(a) Sensors shall initiate alarms upon detecting drilling, cutting, or blasting through walls, or other methods of forced entry through a structure.

(b) Mount vibration sensors directly contacting the surface to be protected.

(c) Sensors shall be designed to give peak response to structurally conveyed vibrations associated with forcible attack on the protected surface.

(d) Provide at least one sensor on each monolithic slab or wall section, even though spacing closer than that required for midrange sensitivity may result.

(e) House sensors in protective mountings and fasten to the surface with concealed mounting screws or an epoxy.

(f) Provide sensors with tamper switches. Removal of a sensor from the surface shall initiate an alarm.

(g) An adjustable alarm discriminator shall function to prevent incidental vibrations which may occur from triggering the alarm circuit. Adjust the discriminator on the job to the precise needs of the application.

(h) Connect sensors to an electronic control unit by means of wiring or fiber optics cable run in rigid steel conduit or EMT.

(i) Sensor sensitivity shall be individually adjustable unless sensor is designed to accommodate vibration ranges of the specific surface type on which it will be mounted.

(j) Sensitivity adjustments shall not be accessible without removing the cover on the sensor.

(k) Sensor shall not be responsive to airborne sound.

NOTE: Utility inlet openings are protected in a variety of methods, the correct one being dependent on two variables: the nature of the intrusion threat (e.g., physical penetration, electrical, electro-optical) and the characteristics of the utility inlet opening (e.g., discharge water, office air duct, electric conduit). Subsequent to such analysis, almost any of the intrusion trap sensor is used for this application.

(3) Protection of utility inlet openings: Provide protection by a sensor of the wire trap type consisting of up to 26 AWG hard-drawn copper wires with a tensile strength of 17.8 N 4 pounds maximum interlaced throughout the opening such that no opening between wires shall be larger than 4 inches on center.

(a) Terminate sensor so that attempts to cut the wire or otherwise enlarge openings between wires shall cause an alarm.

(b) Sensor termination shall be tamper protected.

(4) Interior Volumetric (Space) Sensors

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NOTE: Include a schedule of sensors on the plans when the size of areas and pattern coverage is different from one sensor to another.
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(a) Passive infrared (PIR) sensors: Sensors shall detect intruder presence by monitoring the level of infrared energy emitted by objects within a protected zone.

1) Sensor shall initiate an alarm upon observing increased or fluctuating infrared energy caused by the presence and motion of an intruder whose temperature is as little as 3 degrees F different from the background temperature.

2) Sensor shall be passive in nature; no transmitted energy shall be required for detection.

3) Sensor shall be sensitive to infrared energy emitted at wavelengths corresponding to the human body and other objects at ambient temperatures.

4) Detection pattern for wall-mounted sensors shall be 50 ft by 50ft, unless otherwise indicated, and shall be housed in a tamper-alarmed enclosure.

5) Detection pattern for ceiling-mounted sensors shall be 360 degrees, unless otherwise indicated, and have a tamper resistant enclosure or integral tamper switch.

6) Sensor shall provide some means of indicating an alarm condition during installation and calibration. A means of disabling the indication shall be provided within the sensor enclosure.

7) Sensor shall alarm if an intruder moves within the area of protection more than 5 feet at a velocity of 0.1 foot per second, and one step per second, assuming 6 inches per step. Detection sensitivity shall be irrespective of the direction of motion.

8) Sensor shall also alarm at velocities faster than 0.1 foot per second, up to 10 feet per second. Sensor optimum detection range shall be as indicated.

9) Sensor shall not alarm in response to general area thermal variations.

10) Sensor shall have RFI and white light immunity.

(b) Dual technology sensors: Provide sensor combining passive infrared and microwave sensors designed and manufactured specifically to be mounted in a single enclosure.

(c) Microwave sensor: Sensor shall detect intruder presence by transmitting electromagnetic energy into a protected zone, receiving direct and reflected energy, and monitoring frequency shift between transmitted and received signals.

1) If more than one device is used in an area, devices shall operate on different frequencies. Provide for selective filtering by sensor to minimize nuisance alarms due to moving metal objects such as fan blades and blinds, interference from radar, or other sources of electronic interference.

2) Transceivers shall consist of a combined transmit/receive antenna and an adjustable-gain preamplifier in a single housing. Provide transceivers with sensitivity adjustments. Transceiver controls shall permit adjustment of transmission range and alarm signal threshold.

3) Sensitivity controls shall be inaccessible to operating personnel. Sensitivity requirements shall be met with sensitivity controls set approximately at midrange.

4) The sensor shall have a tamper resistant enclosure and integral tamper switch.

(d) Additional dual technology sensor requirements: The enclosure containing two sensor sections shall be tamper alarmed.

1) Both microwave and PIR sections shall activate simultaneously to generate an alarm.

2) Only an intrusion characterized by volumetric motion and radiant body heat shall be detected.

3) Sensor shall provide some means of indicating an alarm condition during installation and calibration. A means of disabling the indicator shall be provided within the sensor enclosure.

4) Sensor shall alarm if an intruder moves within the area of protection more than 5 feet at a velocity of 0.1 foot per second, and one step per second, assuming 6 inches per step.

5) Detection sensitivity shall be irrespective of the direction of motion. Sensor shall also alarm at velocities faster than 0.1 foot per second, up to 10 feet per second.

6) Sensor shall not alarm in response to general area thermal variations.

7) Mount sensors as indicated. Electronic circuitry shall be solid state and mounted on printed circuit boards. Sensor elements shall contain circuitry for transmitter drive, signal processing, tamper circuitry, and power supplies.

8) Circuitry shall provide an alarm relay with Form C contacts capable of carrying 2 amperes at 100 volts DC minimum.

9) The sensor shall have a tamper resistant enclosure and integral tamper switch.

(e) Audio Sensors: Sensors shall consist of microphones which detect audio information and transmit signals to an audio amplifier in a central control unit.

1) Multiple units may be connected to a central control unit.

2) Audio sensors shall be designed to be especially sensitive to generic audio intrusion signature of either breaking glass, splintering wood, fracturing of cement block, or normal voice conversation.

3) Sensors shall have sensitivity adjustments which shall be inaccessible to operating personnel. Sensitivity adjustment shall permit operating ranges up to a maximum of 5000 square feet. Sensors shall have a detection sensitivity of unidirectional design.

4) Sensors shall be capable of installation in a concealed configuration and shall be inherently self-protecting.

(f) Photoelectric Sensors: Sensors shall detect intruder presence by establishing a series of infrared beams and detecting beam disruptions.

1) Transmitters shall be dual beam type and shall be designed to emit no perceptible light. The beam may be reflected by one or more mirrors before being received and amplified. Disruption of the beam by an opaque body shall prohibit an intruder from shining another light source into the receiver to escape detection.

2) Provide some means of local alarm indication on the sensor for use at the protected zone during installation and calibration.

3) Provide with an indicator disabling device within the sensor enclosure. Sensor shall consist of modulating transmitter, focusing lenses, mirrors,

demodulating receiver, power supply, and interconnecting lines housed in tamper-alarmed enclosure.

4) The receiver unit shall provide an alarm relay with contacts capable of carrying 2 amperes at 120 volts AC minimum.

5) The protective beam shall be focused in a straight line. The installed beam distance from transmitter to receiver shall not exceed 80 percent of the manufacturer's maximum recommended rating.

6) Mirrors may be used to extend the beam or to establish a network of beams. Each mirror used shall degrade the maximum system range by no more than 50 percent.

7) Mirrors and photoelectric sources used in outdoor applications shall have self-heating capability to eliminate condensation and shall be housed in weatherproof enclosures.

8) The system shall utilize automatic gain control or be provided with sensitivity adjustments to allow for various beam lengths. Controls shall be inaccessible to operating personnel. With controls set at approximately midrange, the system shall initiate an alarm whenever the beam is interrupted.

9) Test the system by walking through the beam. Systems that use multiple beams to establish a fence shall be tested by attempting to crawl under and jump through and over the beams.

10) Systems shall provide cutoffs of at least 90 percent to handle a high percentage of light cut-off prior to initiating an alarm.

11) Sensor shall have RFI immunity.

(5) Duress Alarms:

(a) Hardwire Duress Alarms: Install at points within the protected area as indicated.

1) Alarms shall be capable of being secretly activated by the foot or hand of an average adult in both standing and seated positions.

2) Alarms shall not be visible or audible from the sensor.

3) The alarm signal shall lock-in upon activation until manually reset with a key or similar device and shall be readily identifiable by the Intrusion Detection System.

4) Sensors shall be easy to operate and designed to minimize the possibility of accidental activation.

5) Hardwire duress alarms shall be rated for a minimum lifetime of 50,000 operations. Securely mount sensors in rugged, corrosion-resistant housing.

6) Duress alarms shall be silent at the reporting location and clearly distinguishable from intrusion detection alarms at the central monitoring station.

(b) Radio Frequency Duress Alarms: Duress alarms shall consist of a compact and lightweight transmitter enclosed in a case that can be easily worn at the waist on a belt.

1) Transmitter shall have a unique identification code.

2) Transmitter shall transmit up to times on the power provided by internal batteries.

3) Provide transmitter in a corrosion-resistant case.

4) Transmitter shall be FM modulated to ensure reception and decoding of the alarm signal.

5) The signal transmitted shall readily interface with the Intrusion Detection System communications subsystem as specified.

6) Activation of the sensor shall be by hand-operated switch protected from accidental activation.

(c) Security Control Pad Activated Duress Alarms: Duress alarms shall consist of programmable Security Control Pad activated push buttons or a Security Control Pad activated Duress code, a user code programmed as a Duress code.

1) Dedicated keys on the Security Control Pad shall be individually enabled via programming to initiate an alarm signal. Each programmed key shall also have the capability to initiate an auxiliary output for additional alarm signaling.

b. Communications:

(1) Communications shall link together the subsystems of the Intrusion Detection System. Intrusion Detection System communications links shall be via AES IntellInet radio using a telephone line as backup (standard pots line).

(2) AES IntelliNet: AES Radio shall follow the following requirements;

(a) Communications link to the AES shall be supervised.

(b) AES IntelliNet communications interface devices shall be provided for the Premise Control Unit (PCU).

(c) Sensor device interfaces shall be by polling loop, except as specified otherwise.

(d) Premise Control Unit to central alarm reporting Digital Receiver shall be digital, asynchronous, or multiplexed data.

(e) The Premise Control Unit primary communication shall be the AES IntelliNet radio mesh network system. Backup communication shall be monitored telephone lines.

(f) The format used to communicate to the Base Central Station shall be contact ID.

(g) Premise Control Unit shall be capable of communication by means of a 128 Bit AES Encryption process certified by NIST (National Institute of Standards and Technology) to a Digital receiver with a built-in Encryption Alarm Router.

(h) The Premise Control Unit shall meet DCID 6/9 and JAFAN 6/9 requirements.

(3) The AES IntelliNet radio must operate on the base IDS frequency and have the IDS Cipher code installed. The IDS Cipher code is installed only by the Alarm Shop personnel.

(a) The AES Radio shall be installed only by an AES authorized dealer.

(b) Where required an outside antenna shall be installed to felicitate commutations to the Robins Central Monitoring Station.

(c) A NET-CON reading of 5 or less is required by UL No installs with NET-CON reading of 6 and 7 will be accepted or connected to the base AES system.

(d) The AES Radio shall be installed by UL 2050 guide lines and must meet the following requirements:

1) The AES radio must be tan and factory finished paint.

2) The AES radio must have a tamper switch install and connected to zone one on the input board of the radio.

3) The AES radio shall have a AES IntelliPro installed and connected to the Premise Control Unit telephone connection.

4) The IntelliPro shall be programmed for contact ID.

5) The Premise Control Unit shall have a telephone line connected to the IntelliPro and monitored for “telephone line cut”.

6) The AES IntelliPro has an “off-line” voltage output that shall be monitored by a zone on the Premise Control Unit. This zone shall be programmed to be non-bypassable in the Premise Control Unit.

7) The AES radio has a relay output for “antenna cut” this must be monitored by a zone on the Premise Control Unit and programmed as a 24hr alarm type.

8) All cabinet tampers installed on Premise Control Unit equipment shall be connected to a zone input on the AES Radio.

9) All knock-outs not used by the install shall be plugged.

10) The AES radio shall be powered by a hardwired transformer install in a tampered cabinet.

11) The AES radio main AC power should be the same as the Premise Control Unit.

(e) Sensor Device: Sensor devices to Premise Control Unit polling loop supervision shall be provided for hardwire devices.

7) The connection to the polling loop device will be supervised in a way that prevents tampering with the device by way of direct current line supervision.

8) Circuit shall be supervised by monitoring changes in the current that flows through the detection circuit and a terminating resistor of at least 2000 ohm.

9) Devices that have an alarm circuit and a tamper circuit built-in, shall have the alarm circuit supervised by a resistor and a separate 24 hour audible alarm connection for the tamper.

10)Alarm circuitry shall initiate an alarm in response to opening, closing, shorting, or grounding of the conductors by employing Class C, Standard Line Security.

11)Alarm device units shall provide an alarm response in the annunciator in not more than one second as a result of the following changes in normal transmission line current:

i. Five percent or more in normal line signal when it consists of direct current from 0.5 milliamperes through 30 milliamperes.

ii. Ten percent or more in normal line signal when it consists of direct current from 10 microamperes to 0.5 milliamperes.

iii. Five percent or more of any element or elements of a complex signal upon which security integrity of the system is dependent. This tolerance will be applied for frequencies up to 100 Hz.

iv. Fifteen percent or more of any element or elements of a complex signal upon which security integrity of the system is dependent. This tolerance will be applicable for frequencies above 100 Hz.

c. Premise Control Unit (PCU)

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*NOTE: Locate in secure, indoor, dry location. To determine the number of zones required for a specific project, consider the following as a minimum: two zones for each device (even number alarm point) and (odd number for tamper point).*

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(1) Premise Control Unit Requirements: PCU shall include a command processor installed in an attack and tamper resistant enclosure. The PCU shall be packaged and include a power transformer, battery(s), network connection cable, Security Control Pad(s), Security Control Pad connection cable(s) and additional components as required. All system electronic components shall be solid-state type, mounted on printed circuit boards. Light duty relays and similar switching devices shall be solid-state type or electromechanical. The Premise Control Unit shall provide at a minimum but not limited to, the following capabilities;

(a) The Premise Control Unit areas and zones shall be programmable, and the system shall store, log, display, and transmit specific custom designations for system areas, zones, and user names.

(b) The Premise Control Unit, user interfaces, zone input devices, relay output devices, and the signal receiving equipment shall be engineered, manufactured, assembled, and must be distributed from a location within the United States of America.

(c) The system shall support user interaction by way of a Security Control Pad.

(d) The Premise Control Unit shall support zone input connections, system Security Control Pads, system zone expansion modules, and wireless zone input modules, and must support zone input connections by way of at least two competitive products. The system shall offer a seamless integrated compatibility with hard-wire and/ or wireless zone expansion equipment for at least 128 zones.

(e) The Premise Control Unit shall be capable zone expansion and Security Control Pad data buses that exceed 10,000 feet of cable must include splitter/repeater modules to boost data voltage and maintain data integrity.

(f) The Premise Control Unit shall provide a seamless capability to provide a minimum 20 addressable relays, which can be located at any connection location upon a zone expansion bus.

(g) Premise Control Unit relay outputs shall have the capability of being triggered as a result of a command from the user interface, changes in system status, changes in zone status, or by a programmable schedule.

(h) Premise Control Unit relay output states shall be programmable for momentary, maintained, pulsed, or must follow the state of an associated zone input.

(i) The Premise Control Unit shall be completely programmable either locally from a Security Control Pad or remotely through a standard dial-up. Remote configuration or control is not permissible for installation that must conform to DCID 6/9 requirements this feature shall be disabled after acceptance test is completed.

(j) The Premise Control Unit shall be equipped with an anti-reversing circuit breaker to prevent damage due to accidental reversal of battery leads.

(k) The Premise Control Unit shall be capable of monitoring a maximum of 128 individual zones and controlling output relays.

(l) User/Authorization Level Capacity shall be capable of operation by 150 unique Personal Identification Number (PIN) codes with each code having one of nine user profiles. This allows for limitation of certain functions to authorized users. The operation of all Security Control Pads shall be limited to authorized users.

(m) The Premise Control Unit shall support a maximum of sixteen 16 Security Control Pads with alphanumeric display. Each Security Control Pad shall be capable of arming and disarming any system area based on a pass code authorization. The Security Control Pad alphanumeric display shall provide complete prompt messages during all stages of operation and system programming and display all relevant operating and test data.

(n) Communication between the Premise Control Unit and all Security Control Pads (SCP) and zone expanders shall be multiplexed over a non-shielded multi-conductor cable, as recommended by the manufacturer. This cable shall also provide the power to all Security Control Pads, zone expanders, output expanders, and other power consuming detection devices.

(o) If at any time a Security Control Pad does not detect polling, the alphanumeric display shall indicate distinct alphanumeric messages.

(p) The Security Control Pad shall include self-test diagnostics enabling the installer to test all Security Control Pad functions.

(q) The Security Control Pad shall provide an easy-to-read English text display. The text shall exactly match the text seen in all software reports, Security Control Pad displays, and central station reports.

(r) The Security Control Pad user interface shall be a simple-to-use, menu-driven help system that is completely user friendly.

(s) The Premise Control Unit shall support sub-control partitions.

(t) A minimum of 8 Class B zones shall be available on the system. The system shall have the capacity for 8 zone expanders or single zone expanders. All Class B zones shall be 2-wire, 22 AWG minimum, supervised by an end-of-line (EOL) device and shall be able to detect open and short conditions in excess of 300ms duration.

(u) Each zone shall function in any of the following configurations:

1) Night, Day, Exit, Fire, Supervisory, Emergency, Panic, Auxiliary
2) 1, Auxiliary 2, Fire Verification, Cross Zone, Priority, and Key
3) Switch Arming.

(v) The digital SLCs bus shall be able to operate at a maximum wiring distance of 10000 feet from the control panel on unshielded, non-twisted cable. This distance may be extended when a bus repeater module are installed.

(w) Provide for Security Control Pad audible indication of device activation. Audible chime shall sound when select devices activate in order to alert personnel of access into an area during normal access times. The audible chime may be activated when a magnetic switch is activated at a main entrance leading into an un-secured area during working hours.

(2) Standalone Electronic Door Access

NOTE: Standalone Electronic Door Access shall be an integral function of the Premise Control Unit. Access assignment shall be configured at the Premise Control Unit via the Security Control Pad or direct PC workstation communications. A failure in the Access system shall not have a cause or effect on the Intrusion Detection System.

(a) The Premise Control Unit shall be capable of integrating area access control capability where specified into the same Premise Control Unit with the ability to have up to 75 user credentials. User access is limited to custom profiles and/or schedules. Anti-pass back shall be available. Networked version shall support a Two-Man Rule feature. The system shall support up to sixteen 16 access doors, connected to the system using a manufacturer-approved interface module. Access Control equipment shall communicate to the system by way of the Premise Control Unit Security Control Pad bus.

(3).Field Fabricated Nameplates: Provided laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic 0.125 inch thick, and white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style. 2.5.1 Manufacturer's Nameplate each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

(4). Factory Applied Finish: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test. All cabinets shall be painted tan from the manufacture. No paint shall cover schematics, listing labels, or serial numbers.

8. Equipment Installation: Intrusion Detection System equipment and devices shall be installed by the manufactures instructions conforming to this specification and UL requirements.

a. Cable/Wire Runs: All wiring to the Intrusion Detection System shall be installed in a manner that protects against tampering with or spoofing the system in any way. This shall include using Rigid Pipe, IMC, or dual shielded cable. This cable shall be installed in one continuous run and the shielding kept bound together until the end of the loop or area of protection, where an End of Line Resistor will be installed. The cable tamper circuit will be programmed as a 24hr audible zone. The zone shall be labeled Wire Cut Tamper. All junction boxes that contain spliced or tapped conductors shall be protected by a tamper switch. All junction boxes or covers not having tamper protection shall have tamper screws installed. No boxes with punch-out pipe tabs shall be used anywhere in the Intrusion Detection System.

b. Tamper switches shall be an integral part of all intrusion sensor devices. An initiation of an alarm signal will occur when the door or cover is moved as little as 1/4 inch from the normally closed position. Tamper switches shall also be Located within enclosures, cabinets, housings, boxes, raceways, and fittings to prevent direct line of sight to any internal components and to prevent tampering with switch or circuitry. Conceal tamper switch mounting hardware so that the location of the switch within the enclosure cannot be determined from the exterior.

c. Conduit: Install in accordance with NFPA 70.

d. Underground Cable Installation: Underground conductors connecting protected structures and objects to the central alarm updating and display unit shall be run direct burial or in conduit. Coaxial cable shall not be spliced. If permitted, cables connecting protected structures and objects to the security control console shall be sized such that initially only approximately 60 percent of the circuit pairs will be used. Cable pairs not used shall be reserved for future use of additional detection circuits.

9. Intrusion Detection System Operational Test Plan:

a. Test shall ensure that the requisite degree of intrusion detection is provided. Initially, test each sensor and subsystem component individually using the following requirements:

(1) Test glass breakage sensors by using test units supplied by the manufacturer which simulate glass breakage.

(2) When the function of each component within a particular subsystem, such as each sensor within a particular zone, is verified, certify that subsystem of the entire Intrusion Detection System has satisfactorily met the specifications, an account number and the radio will be programmed into the base IDS network.

(3) Test each subsystem similarly until each detection zone has been certified.

(4) Once subsystem certification is completed, test the entire integrated system to ensure that subsystem elements are compatible and function as a complete system.

(5) The integrated system test shall be accomplished in linear fashion, end-to-end, and shall verify that each simulated intrusion performed within each detection zone produces an appropriate alarm or signal, and that alarm is correctly annunciated at the Security Control Pad and Central Station Receiver.

(6) Provide for approval, not later than 30 days prior to formal inspection and test, a detailed operational test plan of how each component, subsystem, and entire Intrusion Detection System will be tested.

(7) When tests are complete and corrections made, submit a signed and dated certificate with a request for formal inspection and tests.

10. System Acceptance Test

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*Note: The 78 CES/CEOFA Alarm Shop shall inspect the IDS before it is connected to the Base Central Station Receiver located at Robins Air Force Base. The IDS must pass inspection and testing before it can be placed on-line to the Law Enforcement Desk.*

**********

a. System Acceptance testing shall be performed as follows;

(1) The Security Manager, Security Contractor, and 78 CES/CEOFA Alarm Shop Engineer will conduct final acceptance testing of the system.

(2) Prior to the final acceptance test, security contractor shall conduct a complete test of the entire Intrusion Detection System and provide the 78 CES/CEOFA Alarm Shop Engineer with a written report.

(3) Following completion of the initial testing and correction of any noted deficiencies, conduct a five-day burn-in test, intent of the burn-in test shall be to prove the Intrusion Detection System by placing it in near real operating conditions.

(4) During this period the Intrusion Detection System shall be fully functional and programmed such that all points, interfaces, controls, reports, messages, prompts, etc. can be exercised and validated.

(5) Record and correct any system anomaly, deficiency, or failure noted during this period.

(6) Scheduling of the final acceptance test shall be based on a review of the results of this burn-in period.

(7) Deliver a report describing the results of the functional tests, burn-in tests, diagnostics, calibrations, corrections, and repairs including written certification to the Security Manager, Security Forces SFS/ESS NCO and 78 CES/CEOFA Alarm Shop Engineer that the installed complete Intrusion Detection System has been calibrated, tested, and is fully functional as specified herein.

(8) Prior to the final acceptance test, complete all clean-up and patch work requirements. Security equipment closets and similar areas shall be free of accumulation of waste materials or rubbish caused by operations under the contract at completion of the work, remove all waste materials, rubbish, contractor tools, construction equipment, machinery and all surplus materials.

(9) Upon written notification from the Contractor that the Intrusion Detection System is completely installed, integrated and operational, and the burn-in testing completed, the Security Manager and CES/CEOFA Alarm Shop Personnel will conduct a final acceptance test of the entire system at a mutually acceptable time.

(10) During the final acceptance test, no adjustments, repairs, or modifications to the system shall be conducted without the permission of the Inspectors.

(11) During the course of the final acceptance test by the Security Manager and CES/CEOFA Alarm Shop Personnel, the Contractor shall be responsible for demonstrating that, without exception, the completed and integrated Intrusion Detection System complies with the contract requirements. Physical and functional requirements of the project shall be demonstrated and shown. This demonstration will begin by comparing as-built drawings conditions of the Intrusion Detection System to requirements outlined in this Section, item by item. Following the section compliance review, IDS and SCP equipment will be evaluated.

(12) The functionality of the various interfaces between systems will be tested.

(13) The installation of all field devices will be inspected. This field inspection will weigh heavily on the general neatness and quality of installation, complete functionality of each device, and compliance with mounting, back box and conduit requirements.

(14) All equipment shall be on and fully operational during any and all testing procedures.

(15) Provide personnel, equipment, and supplies necessary to perform all site testing.

(16) Provide a minimum of two contractor employees familiar with the Intrusion Detection System for the final acceptance test. One contractor employee shall be responsible for monitoring and verifying alarms while the other will be required to demonstrate the function of each device. Supply at least two radios or portable telephones for use during the test.

**********

*Note: The Contracting Officer's Technical Representative retains the right to suspend, terminate or reschedule testing at any time when the IDS is found to be incomplete or fails to perform as specified. In the event that it becomes necessary to suspend, terminated, or reschedule the test, all of the fees and expenses related to the test shall be deducted from the contractor's retainage. In the event it becomes necessary to suspend, terminate, or reschedule the test, the contractor shall work diligently to complete and/or repair all outstanding items as required by the Contract Documents. The contractor shall supply the Security Manager and the Contracting Officer's Technical Representative with a detailed punch list completion schedule outlining task-by-task completion dates and a tentative date for a subsequent retest. During the final acceptance test, no adjustments, repairs, or modifications to the system shall be conducted without the permission of the Contracting Officer's Technical Representative.*

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11. Device Nameplates: Provide number, location, and letter designation of nameplates as indicated.

a. All Devices installed in the Intrusion Detection System shall be labeled.

b. All Zone type devices shall be labeled with a zone number.

c. The Premise Control Unit shall have the account number fixed to the outside bottom right corner.

*12. Certification: Contractor must provide the UL certificate 45 days after the final inspection. The certificate shall be listed for a period of not less than 5 years.*

*a. Compliance with this requirement is mandatory for all new systems or upgrades installed at Robins Air Force Base.*

--List of Acronyms--

1. ABS----------Acrylonitrile Butadiene Styrene
2. AC----------Alternating Current
3. AES----------AES Corp
4. AWG----------American Wire Gauge
5. BMS----------Balanced Magnetic Switch
6. CCTV----------Closed Circuit Television
7. CEOFA----------Civil Engineering Operations Fire Alarms

8. CEN----------Engineering Division
9. COTS----------Commercial Off The Shelf
10. DC----------Direct Current
11. DCID----------Director of Central Intelligence Directives
12. ECP----------Entry Control Point
13. EMT----------Electrical Metallic Tubing
14. ESS----------Electronic Security Specialist
15. ESS----------Electronic Security System
16. FCC----------Federal Communications Commission
17. FM----------Frequency Modulation
18. IDS----------Intrusion Detection System
19. JAFAN----------Joint Air Force Army Navy
20. LCD----------Liquid Crystal Display
21. LED----------Light Emitting Diode
22. NET-CON------Network Connectivity
23. NIST----------National Institute of Standards and Technology
24. PCU----------Premise Control Unit
25. PIR----------Passive Infrared
26. RFI----------Radio Frequency Interference
27. SCP----------Security Control Pad
28. SFS----------Security Forces Squadron
29. UL----------Under Writers Laboratory

-- End of Acronyms Table –

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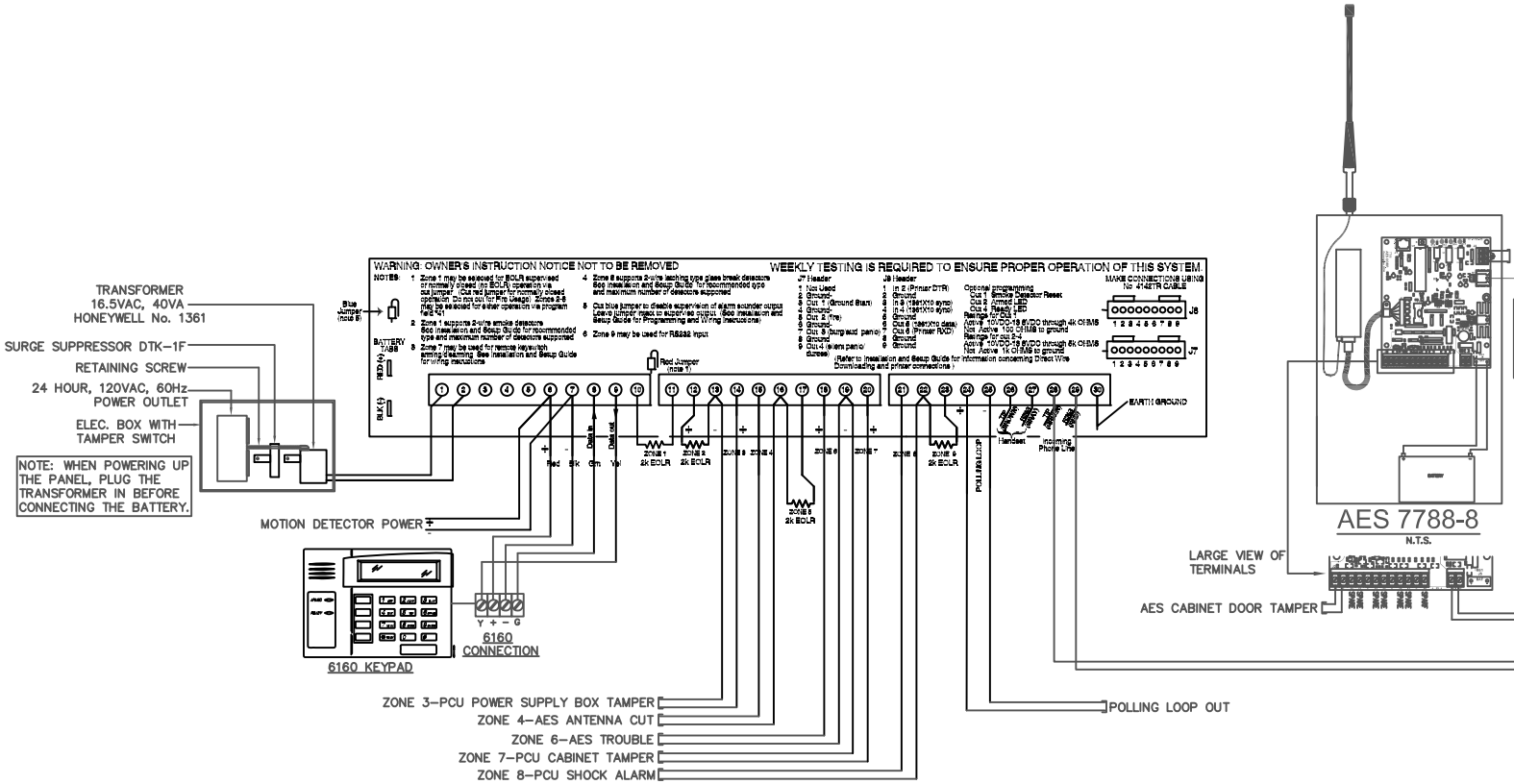
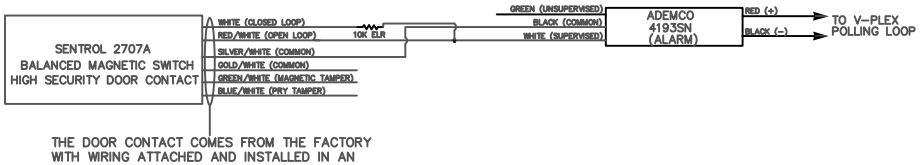



## TYPICAL VISTA-128BP WITH ATTACK PROOF ENCLOSURE

ATTACK PROOF ENCLOSURE PART NUMBER: VISTA-ULKT

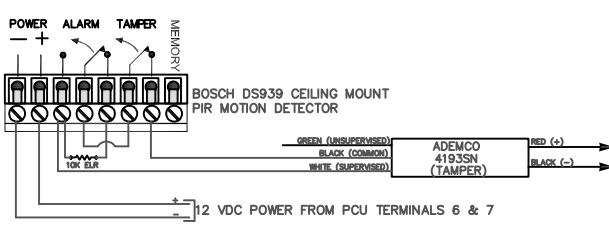
N.T.S.




## 4193SN SERIAL MONITOR MODULE
## MONITORING HIGH SECURITY DOOR CONTACT

NOT TO SCALE

ONE ZONE IS SUPERVISED, ONE ZONE IS NON-SUPERVISED. THE NON-SUPERVISED ZONE IS NOT USED. THE ZONE MONITORING THE DOOR CONTACT ALARM CONTACTS IS PROGRAMMED AS A PERIMETER ZONE. THE TAMPER ZONES ARE PROGRAMMED AS 24-HOUR ZONES.




## 4193SN SERIAL MONITOR MODULE
## MONITORING MOTION DETECTOR

# Robins Air Force Base
# Base Facility Standards

**Title: TRAFFIC SIGNAL CONTROL SYSTEMS**

**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 6J – TRAFFIC SIGNAL CONTROL SYSTEMS

**CRITERIA REFERENCE DOCUMENTS**: The publications listed below form a part of this document to the extent referenced. The publications are referred to in the text by the basic designation only.

GEORGIA DEPARTMENT OF TRANSPORTATION

| | |
|---|---|
| GDOT | (2011) Signal Design Guidelines |

U.S. DEPARTMENT OF TRANSPORTATION - FEDERAL HIGHWAY ADMINISTRATION (FHA)

| | |
|---|---|
| FHA | (2009) Manual on Uniform Traffic Control Devices (MUTCD) |

UNIFIED FACILITIES CRITERIA (UFC)

| | |
|---|---|
| UFC 3-250-18FA | (2006) General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas |

TRAFFIC SIGNAL CONTROL SYSTEMS

General This is one part of the Robins AFB Base Facility Standards. Refer questions or exception requests to the Technical Design Chief in 778 CEG/CENMP. Any exceptions granted to these requirements shall be noted clearly in the project design analysis by using a Deviation Request.

All designs shall be in accordance with applicable UFC's, GDOT's, and all other applicable codes and regulations as referenced herein. If there is a conflict, normally use the more stringent requirement. The specifications shall require all materials and equipment to be current production items.

**<<<END OF BFS PART 6J>>>**

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# Robins Air Force Base
# Base Facility Standards

**Title: EMERGENCY LIGHTING SYSTEMS**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR
ROBINS AFB

## PART 6K – EMERGENCY LIGHTING SYSTEMS

**CRITERIA REFERENCE DOCUMENTS**: The publications listed below form a part of this document to the extent referenced. The publications are referred to in the text by the basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101 (2009; TIA 09-1; TIA 09-2) Life Safety Code

NFPA 70 (2011) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 924 (2006; Reprint Feb 20119) Standard for Emergency Lighting and Power Equipment

UNIFIED FACILITIES CRITERIA

UFC 3-520-01 Interior Electrical Systems

UFC 3-530-01 Interior and Exterior Lighting and Controls

ROBINS AFB FACILITY STANDARDS

***BFS Part 6B*** ***Interior Lighting***

***BFS Part 7A*** ***Energy Conservation***

***BFS Part 7C*** ***Sustainable Design & Development***

EMERGENCY LIGHTING SYSTEMS

a. General:

(1) Facilities over 25,000 square feet shall use a small permanent generator and/or an Emergency Lighting Inverter (uninterruptible power supply) to feed the circuits in the emergency system.

(a) In areas with metal halide lamps, selected overhead metal halide fixtures shall be connected to the emergency system to provide the emergency lighting. Connect the entire overhead metal halide fixture, including quartz lamp if provided, to the system. Quartz lamps may be used in selected fixtures to provide initial foot-candles until the metal halide lamp strikes and starts to illuminate.

(b) In areas with fluorescent lighting, connect selected fixtures to the emergency system for emergency lighting. Connect the entire fixture to the system. Exit signs within the facility shall be connected to the system.

(c) Emergency lighting fixtures shall not be switched except by branch circuit breakers in the emergency system.

(d) Emergency lighting located within conference rooms should have an internal battery pack located within the fixture to allow the entire fixture to be switched off for presentations.

(e)In stairwells, only half of the lights shall be connected to the Emergency Lighting Inverter and/or generator with the other half connected to commercial power. In case work is being done on equipment you still have lighting in stairwell for the safety of personnel.

(2) Wall packs with integral battery units are not acceptable within the facility. For facilities less than 25,000 SF, emergency lighting shall be provided with integral battery packs in the fixtures.

(3) Clearly mark the emergency fixtures with a label designated “emergency” and a printed label with the circuit number, so Shop personnel can find them easily. Install a laminated plastic nameplate on the fixture. Nameplate shall have an orange background with white letters (minimum ¼ inch letters), which describe the emergency lighting circuit number. All raceways shall be marked with a 3 inch orange tape band every ten feet. All junction boxes used in the emergency wiring shall have orange covers and marked with circuit numbers.

(4) Install an emergency light in each electrical and mechanical room.

(5) Place a laminated drawing of the system near the emergency unit, or near the main electrical panel for a system of individual fixtures, but always on the building interior.

**<<<END OF SECTION>>>**

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# Robins Air Force Base
# Base Facility Standards

**Title: Energy Conservation**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
Also known as Installation Design Guide (IDG)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 7A – Energy Conservation

**TABLE OF CONTENTS**



ACRONYMS AND ABBREVIATIONS:

AFI Air Force Instruction
ANSI American National Standards Institute
BCE Base Civil Engineer
BLCC Building Life Cycle Cost Program
CO2 Carbon Dioxide
DDC Direct Digital Controls
DD From 1391 Military Construction Project Data Form
EO Executive Order
ETL Engineering Technical Letters
FEMP Federal Energy Management Program
HQ AFMC Headquarters Air Force Materiel Command
HVAC Heating, Ventilation, and Air Conditioning
LCCID Life Cycle Cost in Design
MBTU Million British Thermal Unit
MOU Memorandum of Understanding
NEMA National Electrical Manufacturers Association
NFPA National Fire Protection Association
NRG Designated SRM Funding for Air Force Energy Projects
SDD Sustainable Design and Development
SEER Seasonal Energy Efficiency Ratio
SRM Sustainment, Restoration, and Modernization

**References**

• Energy Policy Act of 2005, Public Law 109-58, 8 Aug 05
• Energy Independence and Security Act of 2007, 19 Dec 07
• Executive Order 13123, Greening the Government through Efficient Energy Management, 8 Jun 99 (Revoked by E.O. 13423 – (OSD continuing some reporting requirements)
• Executive Order 13423, Strengthening Federal Environmental, Energy and Transportation Management (Jan 07)
• Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance, (OCT 09)
• OSD Memo – Installation Energy Policy Goals, 18 Nov 05
• DODI 4170.11 – Installation Energy Management, 22 Nov 05
• Unified Facilities Criteria (UFC) 3-400-1, Including Change 4, August 2008
• US Department of Energy (DOE) and US Environmental Protection Agency (EPA) Energy Star® Program
• Unified Facilities Criteria (UFC) 3-410-01FA, Including Change 3, August 2008
• American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 62.1 - 2004
• United States Green Building Council (USGBC) Leadership in Energy and Environmental Design Rating System (LEED)

*BFS Part 2 – Environmental*
*BFS Part 6A - Facility Electrical, General*
*BFS Part 6B - Interior Lighting*
*BFS Part 7C –Sustainable Design & Development*

**DIRECTIVES:**

• Executive Order (EO) 13327, Federal Real Property Asset Management, 6 Feb 04
• Energy Policy Act (EPAct) 2005, 8 Aug 05
• Public Law 109-58, Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding and Guiding Principles, 24 Jan 06
• EO 13423, Strengthening Federal Environmental, Energy and Transportation Management, 26 Jan 07
• Public Law 110-140, Energy Independence and Security Act (EISA), 2007, 19 Dec 07
• EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance, 8 Oct 09
• Deputy Under Secretary of Defense (Installations and Environment), Memorandum, 19 Jan 10, Subject: DoD Implementation of Storm Water Requirements under Section 438 of the energy Independence and Security Act (EISA 2007)

1. GENERAL: This is one part of the Robins AFB Base Facility Standards. Any exceptions granted to these requirements shall be noted clearly in the project design analysis by using a Deviation Request. Robins AFB, while being committed to purchasing and consuming energy in the most efficient, cost effective, and environmentally responsible manner possible, must develop facilities which are designed and operated in the most efficient manner with today's technology. It is the intent of this program to require immediate and sustained action, otherwise Robins will continue on an irrevocable path of ever increasing demands on limited energy resources and diversion of funds that could be used for other critical mission requirements. This program will address all building criteria that can affect the use or misuse of energy.

a. All design shall be in accordance with applicable UFCs, ETLs, AFIs, and all other applicable codes and regulations as referenced herein. Also conform to NFPA 101 – Life Safety Code and the current International Building Code (IBC). If there is a conflict, normally use the more stringent requirement. All materials and equipment shall be current production items.

b. All AE firms shall apply energy conservation measures throughout the development and design phases, within the budget goals, so that the energy consumption per gross square footage of the facility is at its most efficient operation at the time of beneficial occupancy Energy efficient and sustainable building design shall be a collaborative and coordinated effort of architects, electrical, mechanical and structural engineers. It cannot be achieved through analysis and optimization of the individual components and subsystems. A holistic "whole building" design approach shall collaboratively integrate different building elements and systems to optimize the overall project sustainability, water, and energy efficiency. Creative design of the building floor plan and configuration, envelope, orientation and fenestration can minimize energy needed to ventilate condition and light the facility. Integration of the mechanical systems design must be coordinated with the designs of other involved building systems and features including the building envelope, lighting system, and occupant activities. Understanding how one system (or individual components within a given system) affects another is essential to making the most of the available opportunities for energy savings. All facilities should be designed 30% below American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) standards or the International Energy Code.

2. GOALS (EPAct2005, EO 13423, EISA 2007):

- Energy Reduction: Reduce energy intensity (MBTU/SF) 30% by the end of FY15 based on a 2003 baseline.
- Renewables: Meet goals for electricity generated with renewable, 5% in FY10-12, 7.5% in FY13 and beyond and 25% by 2025, 50% must be from new sources (after Jan 1999). (EPAct 2005, 10 USC 2911, EO 13423). This has been established as an Air Force goal, not an individual Command or Base goal by AFCESA.
- Building Performance/Sustainability: Energy consumption must be 30% below ASHRAE 90.1 standards (EPAct 2005), 15% of MILCON and major renovation projects must comply with MOU on sustainability by FY15 (EO 13423); High Performance Green Federal Buildings (EISA 2007). 100% capable of achieving LEED Silver certification Program SDD costs at 2% of primary facility cost 5% per FY for formal LEED certification 10% LEED certified in FY10 and after All SRM projects shall consider using LEED principles where financially feasible ( AF Policy)

- Advanced Utility Meters: Meter all facilities electrically when economically feasible by 2012 (EPAct 2005). Add natural gas and steam meters by 2016 (EISA 2007). Consider every facility over 35,000 square feet in size and each fence line meter. Add water meters for those facilities that consume over 2 M Gals per year and at the fence line. (AF Meter Policy)
- Utility Meter Reporting: Report to HQ annually number of meters required and those installed (EPAct 2005) and benchmark metered facilities (EISA 2007).
- Energy Star Products: All products for new construction and replacements will be Energy Star rated or FEMP designated products.
- Electric Motors: All electric motors from 1 to 500 HP will be premium energy type. A/C refrigeration equipment will meet minimum SEER requirements (EPAct 2005).
- Solar Hot Water: New and renovated facilities with a hot water requirement will be 30% solar generated (EISA 2007).
- Fossil Fuel: Reduce fossil fuel usage in facilities by the following goals: 55% by 2010, 65% by 2015, 80% by 2020, 90% by 2025 & 100% by 2030, as compared with such energy consumption by a similar building in fiscal year 2003 (as measured by Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from the Energy Information Agency) (EISA 2007).
- Commissioning: Verification and documentation during the period beginning on the initial day of the design phase of the facility and ending not earlier than one year after the date of completion of construction (EISA 2007).
- Audits: Audit 25% of facility Square footage per year in "covered" facilities. Must be "comprehensive" audits for energy and water (EISA 2007).
- Water Conservation: Reduce water intensity (Gals/SF) 2% per year or 16% by the end of FY15 from a FY07 baseline. Additionally, EO 13514 extended the reduction goal for water intensity to 26% by the end of FY20 from a FY07 baseline. All new and replacement fixtures and toilets will be water saving (EO 13423).
- Greenhouse Gases: Reduce greenhouse gas emissions through reduction of energy intensity (EO 13514).

3. NEW CONSTRUCTION: Meet or exceed the energy performance standards set forth in Title 10, Codes of Federal Regulations (CFR), Part 435 (10 CFR 435), Energy Conservation Voluntary Performance Standards for Federal Buildings.

a. The majority of current MILCON projects are to replace or modernize current missions, future missions and infrastructure associated with each. These types of design and construction projects should be capable of a minimum of "Silver" certified Leadership in Energy and Environmental Design—new construction (LEED-NC) as designated by the U.S. Green Building Council (USGBC).

**All MILCON projects starting with the FY12 Program are to be LEED Silver-Certified.** Construction agents for these projects shall include applicable SDD practices as outlined in the LEED rating system, in designing for sustainable siting, energy, water conservation, air quality preservation, material recycling, and construction waste recovery by complying with 40% better than ASHRAE standard 90.1 current version (2007), and by meeting a minimum of 15 points in water efficiency and energy and atmosphere points per LEED-NC and a minimum of 35 points overall. **For all Non-MILCON Projects, primarily Minor Construction and Major Renovation projects, by the directions from the Energy Office, per project, will specify whether a particular project will be certified and registered by the USGBC or be certified through self-assessment led by a LEED accredited professional on the project team.** Additional renewable energy production efforts

specific to a facility may be directed such as solar roofs, solar water heating and/or transpired walls (solar walls).

b. All new construction will include solar hot water in its design. However, after technical evaluation if the data can demonstrate that solar hot water is not an appropriate process at that location due to the siting or the functions in the facility, then the design agent can propose to the Energy Office that this particular facility be excluded from the requirement to incorporate solar hot water. Solar hot water installation also must be considered for any major modifications to facilities, with an analysis provided to the Energy Office, requesting approval if it is not being proposed. A LEED silver capable/certification and life cycle cost should be considered where economically feasible.

c. Energy efficient technologies that support sustainability and/or energy efficiency, i.e., ground source heat pumps, solar water, thermal storage systems, etc., shall be considered for all new construction and major renovations of buildings on base, subject to the review and coordination of the RAFB Energy Office. A LEED silver capable/certification and life cycle cost associated with this particular requirement should be considered where economically feasible.

d. Guidelines for minor energy efficiency components in facilities energy efficiency components, such as motion detectors or infrared sensors if more appropriate, must be included in all new construction and modifications to facilities in all rooms unless it can be shown that they would interfere with the mission of that room. The ability to do automatic temperature setbacks needs to be included in all new construction and any modifications to the central HVAC system of facilities. New facilities will include meters for electricity, natural gas, steam, chilled water, and potable water, if provided in the facility. Requests for modifications or waivers of these guidelines for minor energy efficiency components shall be made in writing to the Robins AFB Energy Office.

e. Incorporation of energy saving practices at Robins AFB will help HQ AFMC, the Air Force and DOD meet federal energy requirements, reduce energy consumption, and improve our energy intensity while improving life-cycle facilities cost. Each project will address all building criteria that can affect the use or misuse of energy.

f. The Department of Defense (DOD) Energy Management Program is based on compliance with public law and Federal policy. There are several program goals and objectives designed to complement each other by forming a synergy to improve operating efficiency, enhance mission capability, and improve personnel comfort and productivity.

g. Meet or exceed the energy performance standards set forth in Title 10, Codes of Federal Regulations (CFR), Part 435 (10 CFR 435), *Energy Conservation Voluntary Performance Standards for Federal Buildings.* LEED Silver capable/certification and life cycle cost should be considered where economically feasible. Minimize the life cycle cost of new facilities by using energy efficient measures.

h. Guidelines for selecting Cool Roofs: Cool roofs will be utilized on all new or major renovation projects unless demonstrated to exceed a 10-year payback and an exception to policy approved by the 78 CEG/CD. Cool roof minimum requirements are a minimum Solar Reflectance Index (SRI) of 64 on flat roofs (pitch of 9.5 degrees or less) or 36 SRI on all other roofs with a combination of a minimum of R-36 roof insulation value. The roof R value is calculated using all other components of the roof structure. SRI values lower than the Cool Roof minimum can be installed with an offsetting and proportional increase

in roof structure R value (excluding the cool roof impacts on R value) using R-60. Submit cool roof policy exception requests and supporting documentation to the Director of Civil Engineering through the Base Energy Office. A LEED silver capable/certification and life cycle cost should be considered where economically feasible.

i. Guidelines for Solar Hot Water - All new construction will automatically consider including solar hot water in its design. However, after technical evaluation, if the data can demonstrate that solar hot water is not an appropriate process at that location due to the siting or the functions in the facility, then the design agent can propose to the Energy Office that this particular facility be excluded from the requirement to incorporate solar hot water. Solar hot water installation also must be considered for any major modifications to facilities, with an analysis provided to the Energy Office, requesting approval**,** if it is not being proposed. A LEED silver capable/certification and life cycle cost should be considered where economically feasible.

j. Guidelines for Minor Energy Efficiency Components: In Facilities Energy efficiency components, such as motion detectors or infrared sensors if more appropriate, must be included in all new construction and modifications to facilities in all rooms unless it can be shown that they would interfere with the mission of that room. The ability to do automatic temperature setbacks needs to be included in all new construction and any modifications to the central HVAC system of facilities. New facilities will include meters for electricity, natural gas, steam, chilled water, and water, if provided in the facility. Requests for modifications or waivers of these guidelines for minor energy efficiency components shall be made in writing to the Energy Office.

4. DESIGN REVIEWS: Work with your design section and review projects for energy conservation. Milestones for review are the Preliminary/ Final Designs. The Commissioning Agent shall review the Design Plans and Specifications, the Basis of Design, and the Robins AFB Project Requirements prior to 60% completion of the design. The Commissioning Agent shall assess the completeness and clarity of the Base's Project Requirements, verify that the requirements stated in the Base's Project Requirements are addressed in the Basis of Design, and verify that the Design Plans and Specifications are prepared in accordance with the Basis of Design and the Base's Project Requirements. The Commissioning Agent shall back check the reviewed documents at 95%completion of the design. The Commissioning Agent shall provide a Design Review Report which shall identify any discrepancies between the reviewed documents, deviations in the design from the Basis of Design or Base’s Project Requirements, or deficiencies that would prevent the building energy systems from operating effectively in accordance with the sequence of operation. The Design Review Report shall individually list each deficiency and the corresponding proposed corrective action necessary for proper system operation. The report shall be submitted with the final design submission to the Government. The Contracting Officer's Representative, the Commissioning Agent, and the Designers shall meet, discuss, and resolve any items contained in the report no later than 14 calendar days after submission of the report.

Design Review (Design-Bid-Build): The Commissioning Agent shall review the Contract Plans and Specifications and advise the Contracting Officer's Representative of any deficiencies that would prevent the building energy systems from operating effectively in accordance with the sequence of operation specified. The Commissioning Agent shall review the Basis of Design and Base's Project Requirements. The Commissioning Agent shall compare the Basis of Design and the Base's Project Requirements against the Contract Plans and Specifications and advise the Contracting Officer of any discrepancies.

The Design Review shall be performed before the first submission of building energy system related submittals. The Commissioning Agent shall provide a Design Review Report individually listing each deficiency and the corresponding proposed corrective action necessary for proper system operation. The report shall be submitted to the Contracting Officer no later than 14 days after approval of the Commissioning Agent. The Contracting Officer, the Commissioning Agent, and the Designer shall meet and discuss any items contained in the report no later than seven calendar days after submission of the report. All items will be resolved at that meeting. The building including the building envelope, HVAC systems, service water heating, power, and lighting systems shall meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1-2004. Substantiation requirements are defined in Design all building systems and elements to meet the minimum requirements of ANSI/ASHRAE/IESNA 90.1-2004. Design the buildings, including the building envelope, HVAC systems, service water heating, power, and lighting systems, to achieve an energy consumption that is at least 30% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1-2004.

5. PROJECTS: Work with BCE & Command Energy Manager to program, design and execute 'NRG' projects that are identified by you or the energy audits. Energy Manager will be the POC for other offices within CE that may be involved.

6. LIFE CYCLE COST (LCC) ANALYSIS: Work with Command Energy Manager to develop LCC's for projects selected as 'NRG' Projects. Use BLCC5 software to perform the Life Cycle Cost Analysis to justify and select the energy options for the project.

7. THERMAL PERFORMANCE**:** Energy Management and Control System (EMCS): EMCS will be utilized in each facility with 10 tons of A/C or more. Provide timers or some type of method to allow occupants to extend the period that is temperature controlled. Contractor shall program night setback as a part of the installation of the EMCS. During setback and times system is not in use, the dampers for outdoor air and exhaust dampers shall automatically close (2009 International Energy Conservation Code, Sec 503 Jan 2009). A building's cooling and heating needs are affected by the performance of interrelated building systems and characteristics, including building envelope characteristics; passive solar design elements, such as day lighting, lighting systems, plug-in and other internal loads. The appropriate HVAC design solution shall be determined only after the requirements and contributing thermal loads of these interrelated systems have been thoroughly reviewed and all possible efficiency gains through sustainable design strategies have been carefully considered.

a. Building system shall be laid out with a perimeter zone and at least one interior zone. Perimeter zone shall extend from the outside walls to 15 feet away from the walls. For buildings with less than a 50 foot long wall, one zone may be used.

b. Smaller individual units and facilities too small for economical use of EMCS will use programmable thermostats. Contractor shall program the thermostat.

c. Demand Ventilation: Demand control ventilation is required for spaces larger than 500 SF and a flow greater than 1,200 CFM. (2009 International Energy Conservation Code, Sec 503.2.6 Jan 2009)

d. Ventilation shall be provided by one or more of the following:

- A set automatic outdoor airflow in the occupied mode, which shall be closed when the building space is in the unoccupied mode.
- CO2 monitoring demand ventilation systems for buildings with highly variable occupancy if directed by the base project engineer.

e. Design Conditions: Outdoor and indoor design conditions shall be in accordance with UFC 3-410-01FA. Outdoor air and exhaust ventilation requirements for indoor air quality shall be in accordance with ASHRAE 62.1.

f. Design systems in geographical areas that meet the definition for high humidity in UFC 3-410-01FA in accordance with the special criteria for humid areas therein. Cooling equipment may be oversized by up to 15 percent to account for recovery from night set forward. Heating equipment may be oversized by up to 30 percent to account for recovery from night setback. Design single zone systems and multi-zone systems to maintain an indoor design condition of 50% relative humidity for cooling only. For heating only where the indoor relative humidity is expected to fall below 20% for extended periods, add humidification to increase the indoor relative humidity to 30%. Where fan coil units are used, provide a non-permeable wall covering behind the unit. Provide ventilation air from a separate dedicated air handling unit. Do not condition outside air through fan coil units. Avoid the use of direct expansion cooling coils in air handling units with constant running fans that handle outside air.

g. Building Envelope Sealing: Design and construct the building envelope for operational maintenance buildings, administrative buildings, office portions of mixed office and open space, dining, dormitories, medical facilities, and instructional/training facilities with a continuous air barrier to control air leakage into, or out of, the conditioned space. Clearly identify all air barrier components of each envelope assembly on construction documents and detail the joints, interconnections and penetrations of the air barrier components. Clearly identify the boundary limits of the building air barriers, and of the zone or zones to be tested for building air tightness on the drawings.

h. Energy Management Systems: Establish, maintain and maximize use of Energy Management and Control Systems (EMCS, SCADA, etc.) to centrally monitor and control utility and building systems. EMCS should be sustainable and non proprietary.

i. Provide adjustable ranges on thermostats so that occupants can change their set point up or down 3 degrees.

j. Programmable thermostats: Provide 7-day electronic programmable thermostats with lockout capability in facilities areas where EMCS is not available or applicable. Contractor shall program the thermostat as a part of installation. The programmable thermostat shall be capable to automatically change from the cooling mode to the heating mode and vice-versa as required.

k. High efficiency systems that require less energy to operate should be incorporated in lighting, HVAC, and other systems. Buildings should meet high standard, measurable goals for energy management.

8. LIGHTING: Lighting shall comply with the recommendations of the Illumination Engineering Society of North America (IESNA), DRAFT Robins Air Force Base energy policy letter, and all applicable guidelines set forth in Part 6A-Facility Electrical, General and Part 6B-Interior lighting, of this BFS. Typically, use T-8, T-32 or 28 watt fluorescent lamps for administrative areas and the lamps with the greatest efficiency in other situations. Lighting for administrative areas should be designed at a level of 1 watt/SF (2009 International Energy Conservation Code, Sec 505 Jan 2009).

a. Use switches (remote from the panel board located at main entrances and other locations) to allow user control of lighting. For facilities larger than 25,000 SF, use the EMCS as a secondary control to turn lights off during unoccupied times. Motion sensors will be utilized in small offices/bathrooms and other similar locations.

b. Day-lighting controls for fixtures located within 15 feet of open light sources such as windows and skylights will be utilized. Skylights will be utilized wherever feasible.

c. Utilize emergency lighting with individual back-up batteries (for small applications) or IPS systems in larger buildings. Continuous lighting (24/7) or “night-lighting” shall be discouraged.

d. Warehouses shall use high output fluorescents (preferably T-5 technology).

e. All outside lights shall be induction (ETL 10-2) and shall be controlled by an EMCS system or by astronomical/photo-cell combination controller.

f. Compact Fluorescent Lamps (CFL)(ETL 07-7: This ETL requires the use of CFLs for locations where incandescent lamps incorporation Edison Type A (standard incandescent) sockets are traditionally installed. This ETL provides design and replacement criteria and guidance for replacing incandescent lamps with CFLs. The use of incandescent lamps is restricted to very limited applications. CFLs may be used in canopies or porches/overhangs that are less than 10 feet above the floor and at doors.

g. Interior Lighting: Interior lighting shall utilize electronic ballast and energy efficient fluorescent lamps with a Correlated Color Temperature of 4100K. Compact fluorescent fixtures shall have a Color Rendering Index of (CRI) of 82 or higher. Linear fluorescent fixtures shall have a CRI of 85 or higher. Fluorescent lamps shall be the low mercury type qualifying as non-hazardous waste upon disposal. Surface mounted fixtures shall not be used on acoustical tile ceilings. An un-switched fixture with emergency ballast shall be provided at each entrance to the building.

h. Light-Emitting Diode (LED) Fixture Design and Installation Criteria for Interior and Exterior Lighting Applications; ETL 10-18: This ETL provides technical guidance and criteria for specifying, designing, and installing LED luminaries for interior and exterior lighting applications at air Force installations. This ETL does not apply to LED airfield lighting systems, including but not limited to, taxiway, obstruction, runway edge, threshold, or approach lighting systems (consult ETL 11-13)

i. Use of LED Fixtures in Airfield Lighting Systems on Air Force Installations and Expeditionary Locations (ETL 11-13): This ETL supersedes ETL 10-15, Use of Light-Emitting Diode (LED) Fixtures in airfield Systems on Air Force Installations and Expeditionary Locations, dated 24 September 2010.

j. Alternative Water Sources, (ETL 08-10) – Use of Non-Potable Water: This ETL provides technical requirements for using alternative water sources to supply non-potable water where it is

appropriate for use in Air Force facilities and on Air Force property. This ETL does not apply to the use of alternative water sources for use as potable water.

9. ENERGY CONSERVATION RATED EQUIPMENT: Purchase Energy Star or FEMP designated products. The term “Energy Star product” means a product that is rated for energy efficiency under an Energy Star program. The term “FEMP designated product” means a product that is designated under the Federal Energy Management Program of the Department of Energy as being among the highest 25 percent of equivalent products for energy efficiency. When selecting integral sized electric motors, choose NEMA PREMIUM type motors that conform to NEMA MG 1, minimum Class F insulation system. Motors with efficiencies lower than the NEMA PREMIUM standard may only be used in unique applications that require a high constant torque speed ratio (e.g., inverter duty or vector duty type motors that conform to NEMA MG 1, Part 30 or Part 31).

10. WATER: The availability of potable and non-potable water at Robins is a primary issue for the future of the installation. Design for development sustainability must incorporate consideration for limiting water requirements and preserving water supply. The use of native plants in landscaping reduces irrigation requirements. If some irrigation is necessary, high efficiency irrigation systems greatly reduce water consumption. Surface water retention ponds can be included to reduce flooding, and to hold water on-site to be utilized as an irrigation source. Gray water can be used for irrigation, and to flush toilets.

a. Waterless urinals and low-flow toilets and showers reduce the use of water. Also, new technology in the use of recycled rainwater and treated effluent may offer water saving alternatives in the future.

b. Use tank-less electric heating for facilities with less than/equal to 4 restrooms.

c. Temperature setting for hot water will be 110 degrees (180 degrees for feeding establishments).

d. Hot water pipes will be insulated with at least 1 inch insulation.

e. Hot water recirculation system(s) will implement a means to shut off the system during low occupancy or low use periods.

f. Low Flow Devices: All new water devices shall be limited to a maximum as follows:

| Item | Flow Rate |
|---|---|
| Toilets | 1.28 GPF |
| Urinals | 0.5 GPF |
| Showerheads | 1.5 GPM |
| Hand washing faucets | 0.5 GPM |

11. LANDSCAPE: The management of energy source is a design concern for the future. Concerns for energy are inherent in the orientation of buildings to take advantage of breezes and reduce heat generation in summer. The selection and placement of deciduous trees can provide cooling shade in summer while allowing sun to warm the building in winter.

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# Robins Air Force Base
# Base Facility Standards

**Title: Corrosion Control & Cathodic Protection**
**Date: 22 November 2013**

## BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA

(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 7B – CORROSION CONTROL & CATHODIC PROTECTION

**CRITERIA REFERENCE DOCUMENTS:**

AIR FORCE INSTRUCTION 32-1054, CORROSION CONTROL

ETL 88-4, Engineering and Services Reliability and Maintainability (R&M) Design Checklist, June 1988, Section 14, "Corrosion Prevention and Control"

ETL 1110-3-474, Engineering and Design, Cathodic Protection

ETL 1110-9-10 (FR), Engineering and Design, Cathodic Protection System Using Ceramic Anodes

UFC 3-570-02A - Cathodic Protection

UFC 3-570-06 - Operation and Maintenance: Cathodic Protection Systems

MIL-HDBK-1004/10, Electrical Engineering, Cathodic Protection [UFC 3-570-02N]

MIL HDBK 1022, Petroleum Fuel Facilities [UFC 3-460-01]

MIL HDBK 1110/1, Paints and Protective Coatings [UFC 3-190-06]

MIL-HDBK 1136, Maintenance & Operation of Cathodic Protection Systems [UFC 3-570-06]

MIL-HDBK 1164, Operations and Maintenance of Water Supply Systems [UFC 3-230-02]

*BFS Part 2 - Environmental*

*BFS Part 7A –Energy Conservation*

*BFS Part 7C – Sustainable Design & Development*

## 1. GENERAL

a. Chilled Water/Hot Water Piping: Provide cathodic protection for underground steel pipe.

b. Natural gas - All underground natural gas lines with metal piping shall be coated and shall have cathodic protection installed.

c. Cathodic protection shall be provided on all new underground steel systems and piping. Insulating devices shall be used as necessary to isolate dissimilar metal common to an electrolyte (soil, water, etc). All underground steel systems shall be coated and/or wrapped.

d. All below ground tanks shall meet the latest editions of the EPA regulations, be double walled, and have cathodic protection.

e. Provide cathodic protection test station if directed by the base project design engineer.

f. Provide sampling port near the pump inlet. For temperatures above 120F, provide a cooler.

g. All below ground steel tanks and piping shall be provided with either sacrificial anodes (high potential magnesium) or impressed current cathodic system or both as directed by the Base Project Engineer.

## 2. GENERAL CRITERIA FOR EXTERIORS OF UTILITY SYSTEMS

All above ground portions of utility lines and equipment shall be protected against corrosion by galvanizing or protective coatings. All underground lines and equipment made of metal shall be either uncoated or coated and cathodically protected. Details follow:

a. Metal Posts, Columns, and Bollards in contact with or embedded in concrete: Coal tar epoxy system for electrical insulation before placing on or in concrete. Final dry thickness of coats shall be 6 mils.

b. Metallic Parts in Concrete Pits: When no provisions are made to prevent water in the pits, add a zinc anode (min. 3 lb.) at the lowest metallic point.

c. Water Tanks:

(1) Exterior: Use an approved primer and two coat system.

(2) Internal: Provide impressed current cathodic protection with hi-silicon cast iron anodes.

d. Above Ground Tanks with Underground Lines: Provide protection of lines based upon type of substance stored.

e. Underground Tanks:

(1) Use double lined fiberglass tanks. Follow latest guidance from 78 CEG/CEIE on leak detection and other environmental standards.

(2) Provide protection of lines based upon type of substance stored.

f. POL Tanks shall have the bottoms coated and cathodically protected with isolation from other systems.

g. POL Lines shall be factory coated black steel with cathodic protection and isolating flanges. Provide surge arresters across the flanges to prevent sparks.

h. Natural Gas Lines shall be high-pressure polyethylene (PE) with PE valves and joints.

(1) Field locating (to enable path detection and to connect metal sections of the lines):

(a) Install marking tape with metal tracing wire 1 foot above pipe.

(b) Also install tracer wires placed on the lines using #14 AWG Cu with nicked TW insulation.

(2) Use metal riser assemblies at facilities (with isolating joints for metallic lines) and 1-pound hi-pot magnesium anodes connected.

i. Steam And Condensate Lines shall be metallic meeting **ETL 88-6** with exterior coatings and cathodic protection.

(1) Use isolating flanges at facilities and major above ground transitions.

(2) Locate anodes at least 15 feet from lines to prevent drying out the ground around the anodes.

(3) Do not allow anode wires to cross either set of lines.

(4) insulate the lines from the concrete in pits to prevent touching and accidentally protecting rebar.

(5) If using COE specification, modify it to require cathodic protection regardless of soil resistivity, to counter effects of anaerobic bacteria.

j. Domestic Water Lines shall be one of these:

(1) Plastic:

(a) Field locating (to enable path detection and to connect metal sections of the lines):

1. Install marking tape with metal tracing wire 1 foot above pipe.

2. Also install tracer wires placed on the lines using #14 AWG Cu with nicked TW insulation.

(b) Use metal riser assemblies at facilities with 1-pound hi-pot magnesium anodes connected.

(2) Cast iron lines.

(a) Do not coat the cast iron.

(b) Bond the joints with No. 4 Cu AWG insulated wire. Coat both ends of the Thermit wire connections.

(3) Ductile iron.

(a) Coat ductile iron:

1. Factory applied coating with field verification an correction is first choice.

2. Coal tar epoxy system is second choice.

(b) Bond the joints with No. 4 Cu AWG insulated wire. Coat both ends of the Thermit wire connections.

(c) Provide cathodic protection.

1. Use isolating flanges at facilities and major aboveground transitions.

2. Insulate the lines from the concrete in pits to prevent touching and accidentally protecting rebar.

k. Chilled and Hot Water Lines shall be metallic with exterior coatings and cathodic protection.

(1) Use isolating flanges at facilities and major aboveground transitions.

(2) Insulate the lines from the concrete in pits.

l. Industrial Waste Lines shall be one of these:

(1) PVC or other plastic is the first choice, provided the designer determines this is compatible with the waste products.

(a) Field locating (to enable path detection and to connect metal sections of the lines):

1. Install marking tape with metal tracing wire 1 foot above pipe.

2. Also install tracer wires placed on the lines using #14 AWG Cu with nicked TW insulation.

(b) Use metal riser assemblies at facilities with 1-pound hi-pot magnesium anodes connected.

(2) Cast iron.

(a) Do not coat the cast iron.

(b) Bond the joints with No. 4 Cu AWG insulated wire. Coat both ends of the Thermit wire connections.

(3) Ductile iron.

(a) Coat ductile iron:

1. Factory applied coating with field verification and correction is first choice.

2. Coal tar epoxy system is second choice.

(b) Bond the joints with No. 4 Cu AWG insulated wire. Coat both ends of the Thermit wire connections.

(c) Provide cathodic protection.

1. Use isolating flanges at facilities and major aboveground transitions.

2. Insulate the lines from the concrete in pits to prevent touching and accidentally protecting rebar.

m. SanitaryWaste Lines shall be one of these:

(1) Cast iron.

(a) Do not coat the cast iron.

(2) PVC or Concrete. For field locating (to enable path detection and to connect metal sections of the lines):

(a) Install marking tape with metal tracing wire 1 foot above pipe.

(b) Also install tracer wires placed on the lines using #14 AWG Cu with nicked TW insulation.

n. Electrical Lines when metal shall be coated but not cathodically protected. Do not use direct buried concentric neutral cables.

**3. GENERAL CRITERIA FOR INTERIORS OF UTILITY SYSTEMS**

a. Potable water shall be in accordance with MIL-HDBK 1005/7A, DATED 1SEP99 **[Now UFC 3-230-19N]**. Our well water is very corrosive and non-scaling.

b. Hot or Chilled Water systems for heating or cooling shall have equipment and chemicals installed for chemical water treatment in accordance with AFR 91-40. This applies to both closed and open-type recirculating systems.

c. Steam systems for heating shall have equipment and chemicals installed for chemical water treatment in accordance with AFR 91-40. This applies to both closed and open-type recirculating systems.

d. Storage Tanks for liquids shall be protectively coated on the interiors with interior cathodic protection when water is the liquid stored.

e. Other Utility systems do not require interior corrosion treatments.

**4. DETAILED CRITERIA FOR EACH CORROSION PROTECTION METHOD**
[Note - Insure drawings and specifications address these items.]

a. Material Selection: Provide quality details to insure industry minimums are not used by installers when higher-level materials are required.

b. Protective Coatings:

(1) Prepare coating specifications for above and below ground high value metallic structures per AFM 85-3, "Paints and Protective Coatings" **[Now UFC 3-190-06]**, except as modified below.

(2) Prepare metal surfaces using Rust Deoxidizing Primer (RDP) by Total Rust and Corrosion Control, Inc., in Atlanta, GA, or approved equal. Blasting systems may be substituted, but must be individually approved for use at Robins AFB.

(3) On all metallic structures where we have approved surface preparation by blasting to white or near white finish, no blasted surface will be left unprimed beyond the normal workday. Any such unprimed surface must be reblasted.

(4) Do not use thin plastic film tapes, such as electrical tape, to coat underground structures or wiring. Reference NACE Standard RP-01-69.

(5) All protective coatings shall be mildew resistant.

(6) Verify coatings on underground utilities in field with “holiday” detector before burial.

(7) Coal Tar Systems:

(a) When using standard coal tar mastic on buried lines, use on RDP-prepared or near white blasted surfaces a primer and two coats of the coal tar to give a final dry thickness of 125 mils.

(b) When using coal tar epoxy on buried lines, use on RDP-prepared or near white blasted surfaces a primer and two coats of the coal tar epoxy to give a final dry thickness of 6 mils.

(8) Coat major cathodic structures like brass valves and copper lines underground to minimize corrosion of adjacent structures.

(9) Insulate thrust blocks on systems that have cathodic protection.

c. Cathodic Protection:

(1) Soil pH in the area generally ranges from 5.0 to 6.2.

(2) Soil resistivity on Base generally ranges from 10,000 ohm-cm to over 100,000 ohm-cm with anaerobic bacteria actively present.

(3) Base all cathodic protection design upon designer field tests made at the construction site. Tests include soil resistivity and water conductivity. We have soil resistivity grid maps of Robins for review.

(4) At Robins AFB, we now prefer deep well ground beds to conventional or distributed shallow bed designs. Obtain approval for other than deep well designs.

(5) Bury each pipeline in a separate trench with at least 2 feet separation from nearby utilities to preclude galvanic cells between different metals or new and old metals in case inadvertent metallic connections between the two ever occur.

(6) Install test stations and interference bonds for operational checks of cathodic protection systems and prevention of impressed current interferences between unprotected and protected pipeline systems.

(7) All cathodic protection designs not by Base specialists must be performed by a National Association of Corrosion Engineers (NACE) accredited "Corrosion Specialist." The Corrosion Specialist must have a minimum of five years experience in the design of cathodic protection systems.

(8) Criteria of Protection:

(a) All installed cathodic protection systems must comply with the instant off rule.

(b) Due to the presence of anaerobic bacteria at Robins, our minimum criterion is -1.0V.

(c) No other criteria are allowed.

(9) Remember to connect the rectifier "+" terminal to the anodes in the field.

d. Industrial Water Treatment:

(1) General:

(a) Base the equipment installation upon specific information obtained at the construction site and upon existing Base water treatment methods. Information includes data such as current analysis of Base water.

(b) For the Automatic chemical feed system, all water treatment design not by Base specialists must be performed by an NACE accredited "Corrosion Specialist" with at least five years experience in this design.

(c) Chemical pot feeders:

1. Use at least 5-gallon capacity.
2. Provide pressure gauge on intake side of protected system.
3. Completely serviceable from floor level.
4. Sight Glass.
5. Funnel with isolation valve. Screw-on covers prohibited.

(d) Use interlocks to insure chemicals will not feed when main system is off; e.g., condenser pumps.

(e) Automatic chemical feed will use one of these methods:

1. Water meter - timer method, where chemicals are added in relation to water make-up.

2. Solids controller, to control boiler blow down and chemical feed based upon manual settings.

(f) Inject chemicals downstream of pumps. A full-size valve could be required to divert sufficient flow into the pot feeder, but this is not usually needed provided the line connections are at least 15 - 20 feet apart. NEVER feed chemicals near the pump inlet.

(2) Chilled Water:

(a) Closed Systems:

1. 100 Tons or less: Use chemical pot feeders.

2. Over 100 Tons: Use automatic system or manual system as determined by the base project engineer.

(b) Open Systems (Cooling Towers): Use automatic system.

(3) Hot Water (Closed Systems):

(a) 1000 MBTU/H or less: Use chemical pot feeders.

(b) Over 1000 MBTU/H: Use automatic system or manual system as determined by the base project engineer.

(4) Steam:

(a) Provide automatic system.

(b) Inject oxygen scavengers directly into the deaerator tank.

(c) Inject boiler water chemicals into feed water line right before the boiler drum.

(d) Blowdown Dumping:

1. At main plants, dump to industrial waste.

2. Dump elsewhere to sanitary waste.

(e) Provide for manual blowdown of tank bottom.

**5. PETROLEUM, OILS, AND LUBRICANTS**

a. All below ground tanks shall meet the latest editions of the EPA regulations, be double walled, and have cathodic protection.

b. Below ground piping will be double wall, properly coated, and cathodically protected per applicable EPA regulations. The designer will evaluate the use of underground fuel pipe and submit recommendations to the Base. The Base will make the decision on the use of underground piping.

c. Provide leak detector monitor system for the double walled tanks and double walled product fuel piping.

<<<End of Section>>>

Author: Ken Preston, 78 CEG/CENMP, 478-327-2914

Reviewer: Ban Ngo, 78 CEG/CENMP, 478-327-2918

Approval: _____
Stefanie Dawson, 78 CEG/CENMP, 478-327-2948

# Robins Air Force Base
# Base Facility Standards

**Title: Base Sustainable Design Program**
**Date: 22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION
FOR ROBINS AFB

## PART 7C – BASE SUSTAINABLE DESIGN PROGRAM

**CRITERIA REFERENCE DOCUMENTS:**

Executive Order 13423

Air Force Instruction 32-1021

Engineering Technical Letter 08-13

Unified Facilities Guide 04-030-01

**Air Force Sustainable Design and Development (SDD) Implementing Guidance, 02June2011**

**Atch 1 - LEED 2009 Minimum Program Requirements (MPR)**

**Atch 2 - LEED 2009 MPR Supplemental Guidance**

**Atch 3 - Air Force MILCON Sustainability Requirements Reporting Score sheet, LEED 2009**

**Atch 4 - Guidance on Applying LEED Principles to Air Force Horizontal Construction Projects**

**Atch 5 - Guidance on Applying LEED Principles to Air Force Utility Construction Projects**

**Atch 6 - Guidance on Applying LEED Principles to Air Force Industrial Construction Projects**

**Atch 7 - Implementing Guidance to Meet EISA 2007 Section 438 Requirements**

*BFS Part 7A –Energy Conservation*

*BFS Part 2 - Environmental*

GENERAL:

a. This is one part of the Robins AFB Base Facility Standards. Refer questions or exception requests to the Technical Design Chief in 778 CES/CEPT. Any exceptions granted to these requirements shall be noted clearly in the project design analysis by using a Deviation Request.

b. The Contractor/Designer shall incorporate sustainable design in all designs and projects in accordance with the applicable UFC's, AFI's, ETL's, Memorandums and all other applicable regulations as referenced herein. Also conform to NFPA 101 - Life Safety Code and the current International Building Code (IBC). If there is a conflict, coordinate with the Project Manager to determine the more stringent requirement.

<<<<< **END OF SUSTAINABLE DESIGN SECTION** >>>>>

Author: Marquis A. Salley Jr., 78 CEG/CE, 478-327-2915

Reviewer: Larry Allen, 78 CEG/CENPL, 478-327-2980

Approval: ***Original Signed By***
Terry Landreth, 778 CES/CEPT, 478-327-2910

# Air Force MILCON Sustainability Requirements Scoresheet

## version LEED® 2009

| General Information | |
|---|---|
| | Project ID (e.g. ABCD12345) |
| | Building Name |
| | Project Type |
| | Installation |
| | City |
| | State |
| | MAJCOM |
| | PM Name |
| | PA ($k) |
| | Building Size (SF) |
| | Program Year (FY####) |
| | Project Phase |
| | Design Started (FY####) |
| | BOD (MM/DD/YY) |
| | Pursuing formal LEED® Certification |
| | Date Project Registered with USGBC (MM/DD/YY) |
| LEED® 2009 | LEED® Rating System |
| 0 | LEED® Credits Achievable |
| Prerequisites Not Achieved | LEED® Certification Level Achievable (per AF SDD Policy (July 2007)) |
| | LEED® Credits Awarded by GBCI (e.g. 42) |
| | LEED® Certification Level Awarded by GBCI |
| | LEED® Energy and Water Credits Achievable |
| | Date Project Certified by GBCI (MM/DD/YY) |
| | Registration Fees ($) |
| | Certification Fees ($) |
| 0% | HPSB Compliant |
| 0% | Water Conservation Achieved (% below EPAct 1992) |
| 0% | Energy Efficiency Achieved (% below ANSI/ASHRAE/IESNA Standard 90.1-2007) |
| | Cost to Implement EISA 438 (Pre-Development Hydrology) |
| | Comments |

**Color Coding: See Instructions Tab for more detail**

| | | |
|---|---|---|
| Drop-Down Box | Drop-Down Box Stoplight | Custom Subquestions |
| No Entry | Yes - Credit Achieved | Not Required |
| Custom General Information | Maybe - Credit Maybe | |
| LEED Prerequisite | No - Credit not Achieved | |

# Air Force MILCON Sustainability Requirements Scoresheet

**version LEED® 2009**

**Federal Requirements for High Performance Sustainable Buildings (HPSB)**

| | | | |
|---|---|---|---|
| **HPSB I: Employ Integrated Design Principles** | | | |
| Achievable Points | 0 | Possible Points | 2 |
| | HPSB I.1 | **Integrated Design** | 1 |
| | HPSB I.2 | **Commissioning** | 1 |
| **HPSB II: Optimize Energy Performance** | | | |
| Achievable Points | 0 | Possible Points | 5 |
| | HPSB II.1 | **Energy Efficiency, Achieve Option 1 or 2 and insert design percentage** | 1 |
| | 1 | Reduce energy use 30% Below ANSI/ASHRAE/IESNA Standard 90.1- 2007, OR | |
| | 2 | If not at least 30% below ANSI/ASHRAE/IESNA Standard 90.1-2007, will the design achieve the maximum level of energy efficiency that is life-cycle cost-effective? | |
| | | Insert percentage below ANSI/ASHRAE/IESNA Standard 90.1-2007 in terms of energy use (e.g. 32) | |
| | | Insert building energy intensity (Btu/SF) calculated with the energy model per 10 CFR 433 | |
| | | Roof Attributes (Recommended) | |
| | | Cool roof (LEED SS cr 7.2 or Energy Star) | |
| | | Green roof | |
| | | Solar electric | |
| | | Solar thermal | |
| | | Solar passive | |
| | | Achieve "Designed to Earn the Energy Star" rating - Benchmark from first year of operation (Recommended) | |
| | HPSB II.2 | **Preferential use of ENERGY STAR or FEMP-designated equipment, when lifecycle cost effective** | 1 |
| | HPSB II.3 | **On-site Renewable Energy - Solar Hot Water Heater System** | 1 |
| | | Lifecycle cost assessment found solar hot water heater system not effective | |
| | | When lifecycle cost effective, solar hot water system installed - min 30% demand | |
| | | Insert percentage achieved | |
| | HPSB II.4 | **On-site Renewable Energy** | 1 |
| | | Lifecycle cost assessment found renewable energy generation projects not effective | |
| | | When lifecycle cost effective, renewable energy generation projects installed | |
| | | Renewable energy type | |
| | | Insert first renewable energy type, if applicable | |
| | | Insert second renewable energy type, if applicable | |
| | | Insert generation capacity (kW) | |
| | | Insert percentage of total building | |
| | HPSB II.5 | **Measurement and Verification - Advanced Metering** | 1 |
| | | Water Metering: Select N/A if not used | |
| | | Electric Metering: Select N/A if not used | |
| | | Natural Gas Metering: Select N/A if not used | |
| | | Steam Metering: Select N/A if not used | |
| | HPSB II.6 | **Project Case Study Entered in High Performance Federal Buildings Database (Recommended)** | |
| | EISA 2007 II.7 | **Reduction in fossil fuel-generated energy consumption (Recommended)** | |
| | EISA 2007 II.8 | **Data Center Energy Consumption (Recommended)** | |
| **HPSB III: Protect and Conserve Water** | | | |
| Achievable Points | 0 | Possible Points | 7 |
| | HPSB III.1 | **Indoor Water - 20% Reduction** | 1 |
| | | Insert percentage achieved | |
| | HPSB III.2 | **Outdoor Water - Reduce Potable Water Use by 50%** | 1 |
| | HPSB III.3 | **Outdoor Water - Stormwater runoff** | 1 |
| | HPSB III.4 | **Outdoor Water - Achieve Pre-Development Hydrology when technically feasible, when disturbance > 5,000 GSF** | 1 |
| | | Insert cost to implement | |
| | HPSB III.5 | **Process water potable water use** | 1 |
| | | Energy efficiency measures using water were considered and the cost was included in lifecycle cost assessment | |
| | | Energy efficiency measures using water were not considered for the design | |
| | HPSB III.6 | **Water-Efficient Products** | 1 |
| | HPSB III.7 | **Water Efficient Products - Irrigation Contractors** | 1 |

# Air Force MILCON Sustainability Requirements Scoresheet

## version LEED® 2009

| HPSB IV: Enhance Indoor Environmental Quality | | | | |
|---|---|---|---|---|
| Achievable Points | 0 | | Possible Points | 9 |
| | HPSB IV.1 | **Thermal Comfort, ASHRAE 55-2004** | | 1 |
| | HPSB IV.2 | **Ventilation: ASHRAE 62.1-2007** | | 1 |
| | HPSB IV.3 | **Moisture Control** | | 1 |
| | HPSB IV.4 | **Daylighting - 75% of Spaces** | | 1 |
| | HPSB IV.5 | **Daylighting - Controllability of Systems** | | 1 |
| | HPSB IV.6 | **Low Emitting Materials** | | 1 |
| | HPSB IV.7 | **Protect Indoor Air Quality during Construction** | | 1 |
| | HPSB IV.8 | **Protect Indoor Air Quality after Construction** | | 1 |
| | HPSB IV.9 | **Environmental Tobacco Smoke (ETS) Control** | | 1 |
| **HPSB V: Reduce Environmental Impact of Materials** | | | | |
| Achievable Points | 0 | | Possible Points | 6 |
| | HPSB V.1 | **Recycled Content** | | 1 |
| | HPSB V.2 | **Biobased Content** | | 1 |
| | HPSB V.3 | **Environmentally Preferable Products** | | 1 |
| | HPSB V.4 | **Waste and Materials Management - Recycling** | | 1 |
| | HPSB V.5 | **Waste and Materials Management - Divert 50% from Disposal** | | 1 |
| | HPSB V.6 | **Ozone Depleting Compounds** | | 1 |
| **HPSB Totals** | | | Possible Points | **29** |
| **0** | **Federal Requirements Achieved (29 line items)** | | | |
| **0** | **Federal Requirements Maybe Achieved** | | | |
| **0** | **Federal Requirements Not Achieved** | | | |
| **0%** | **Percentage of Federal Requirements Achieved** | | | |

# Air Force MILCON Sustainability Requirements Scoresheet

## version LEED® 2009

**LEED® 2009 Checklist**

LEED® Credits and/or Prerequisites that meet HPSB Requirements
LEED® Credits and/or Prerequisites that align closely with HPSB Requirements
LEED® Credits that meet USAF Energy & Water Criteria (may depend on technologies & strategies)

| Sustainable Sites | | | | |
|---|---|---|---|---|
| Achievable Points | 0 | Sustainable Sites | Possible Points | 26 |
| | Prereq 1 | Construction Activity Pollution Prevention (HPSB GP3) | | Required |
| | Credit 1 | **Site Selection** | | 1 |
| | Credit 2 | **Development Density & Community Connectivity** | | 5 |
| | Credit 3 | **Brownfield Redevelopment** | | 1 |
| | Credit 4.1 | **Alternative Transportation -** Public Transportation Access | | 6 |
| | Credit 4.2 | **Alternative Transportation -** Bicycle Storage & Changing Rooms | | 1 |
| | Credit 4.3 | **Alternative Transportation -** Low-Emitting & Fuel Efficient Vehicles | | 3 |
| | Credit 4.4 | **Alternative Transportation -** Parking Capacity | | 2 |
| | Credit 5.1 | **Site Development,** Protect or Restore Habitat | | 1 |
| | Credit 5.2 | **Site Development,** Maximize Open Space | | 1 |
| | Credit 6.1 | Stormwater Design, Quantity Control (HPSB GP3) | | 1 |
| | Credit 6.2 | Stormwater Design, Quality Control (HPSB GP3) | | 1 |
| | Credit 7.1 | **Heat Island Effect -** Non-Roof | | 1 |
| | Credit 7.2 | **Heat Island Effect -** Roof | | 1 |
| | Credit 8 | **Light Pollution Reduction** | | 1 |
| | | Select which LEED® Interior Lighting Option was used | | |

| Water Efficiency | | | | |
|---|---|---|---|---|
| Achievable Points | 0 | | Possible Points | 10 |
| | Prereq 1 | Water Use Reduction - 20% Reduction (HPSB GP3) | | Required |
| | Credit 1 | Water Efficient Landscaping (HPSB GP3) | | 2 to 4 |
| | 2 | Reduce Potable Water Use by 50% (HPSB GP3) | | 2 |
| | 4 | No Potable Use or Irrigation (HPSB GP3) | | 2 |
| | Credit 2 | **Innovative Wastewater Technologies** | | 2 |
| | Credit 3 | Water Use Reduction (HPSB GP3) | | 2 to 4 |
| | 2 | 30% Reduction (HPSB GP3) | | 2 |
| | 3 | 35% Reduction (HPSB GP3) | | 1 |
| | 4 | 40% Reduction (HPSB GP3) | | 1 |

| Energy & Atmosphere | | | | |
|---|---|---|---|---|
| Achievable Points | 0 | | Possible Points | 35 |
| | Prereq 1 | Fundamental Commissioning of the Building Energy Systems (HPSB GP1) | | Required |
| | Prereq 2 | Minimum Energy Performance (HPSB GP2) | | Required |
| | Prereq 3 | Fundamental Refrigerant Management (HPSB GP5) | | Required |
| | Credit 1 | Optimize Energy Performance (HPSB GP2) | | 1 to 19 |
| | 1 | 12% for New Buildings/8% for Existing Building Renovations | | 1 |
| | 2 | 14% for New Buildings/10% for Existing Building Renovations | | 1 |
| | 3 | 16% for New Buildings/12% for Existing Building Renovations | | 1 |
| | 4 | 18% for New Buildings/14% for Existing Building Renovations | | 1 |
| | 5 | 20% for New Buildings/16% for Existing Building Renovations | | 1 |
| | 6 | 22% for New Buildings/18% for Existing Building Renovations | | 1 |
| | 7 | 24% for New Buildings/20% for Existing Building Renovations | | 1 |
| | 8 | 26% for New Buildings/22% for Existing Building Renovations | | 1 |
| | 9 | 28% for New Buildings/24% for Existing Building Renovations | | 1 |
| | 10 | 30% for New Buildings/26% for Existing Building Renovations | | 1 |
| | 11 | 32% for New Buildings/28% for Existing Building Renovations | | 1 |
| | 12 | 34% for New Buildings/30% for Existing Building Renovations | | 1 |
| | 13 | 36% for New Buildings/32% for Existing Building Renovations | | 1 |
| | 14 | 38% for New Buildings/34% for Existing Building Renovations | | 1 |
| | 15 | 40% for New Buildings/36% for Existing Building Renovations | | 1 |
| | 16 | 42% for New Buildings/38% for Existing Building Renovations | | 1 |
| | 17 | 44% for New Buildings/40% for Existing Building Renovations | | 1 |
| | 18 | 46% for New Buildings/42% for Existing Building Renovations | | 1 |
| | 19 | 48%+ for New Buildings/44%+ for Existing Building Renovations | | 1 |
| | Credit 2 | On-Site Renewable Energy (HPSB GP2) | | 1 to 7 |
| | 1 | On-site 1% | | 1 |
| | 2 | On-site 3% | | 1 |
| | 3 | On-site 5% | | 1 |
| | 4 | On-site 7% | | 1 |
| | 5 | On-site 9% | | 1 |
| | 6 | On-site 11% | | 1 |
| | 7 | On-site 13% | | 1 |
| | Credit 3 | Enhanced Commissioning (HPSB GP1) | | 2 |
| | Credit 4 | Enhanced Refrigerant Management (HPSB GP5) | | 2 |
| | Credit 5 | Measurement & Verification (HPSB GP2) | | 3 |
| | Credit 6 | **Green Power** | | 2 |

# Air Force MILCON Sustainability Requirements Scoresheet

**version LEED® 2009**

| | | | | |
|---|---|---|---|---|
| **Materials & Resources** | | | | |
| Achievable Points | 0 | | Possible Points | 14 |
| | Prereq 1 | Storage & Collection of Recyclables (HPSB GP5) | | Required |
| | Credit 1.1 | **Building Reuse,** Maintain Existing Walls, Floors & Roof | | 1 to 3 |
| | | 1 | Maintain 55% of Existing Walls, Floors & Roof | 1 |
| | | 2 | Maintain 75% of Existing Walls, Floors & Roof | 1 |
| | | 3 | Maintain 95% of Existing Walls, Floors & Roof | 1 |
| | Credit 1.2 | **Building Reuse,** Maintain 50% of Interior Non-Structural Elements | | 1 |
| | Credit 2 | Construction Waste Management (HPSB GP5) | | 1 to 2 |
| | | 1 | 50% Recycled or Salvaged | 1 |
| | | 2 | 75% Recycled or Salvaged | 1 |
| | Credit 3 | **Materials Reuse** | | 1 to 2 |
| | | 1 | 5% | 1 |
| | | 2 | 10% | 1 |
| | Credit 4 | Recycled Content (HPSB GP5) | | 1 to 2 |
| | | 1 | 10% | 1 |
| | | 2 | 20% | 1 |
| | Credit 5 | **Regional Materials** | | 1 to 2 |
| | | 1 | 10% Extracted, Processed & Manufactured | 1 |
| | | 2 | 20% Extracted, Processed & Manufactured | 1 |
| | Credit 6 | Rapidly Renewable Materials (HPSB GP5) | | 1 |
| | Credit 7 | Certified Wood (HPSB GP5) | | 1 |
| **Indoor Environmental Quality** | | | | |
| Achievable Points | 0 | | Possible Points | 15 |
| | Prereq 1 | Minimum IAQ Performance (HPSB GP4) | | Required |
| | Prereq 2 | Environmental Tobacco Smoke (ETS) Control (HPSB GP4) | | Required |
| | Credit 1 | **Outside Air Delivery Monitoring** | | 1 |
| | Credit 2 | **Increased Ventilation** | | 1 |
| | Credit 3.1 | Construction IAQ Management Plan, During Construction (HPSB GP4) | | 1 |
| | Credit 3.2 | Construction IAQ Management Plan, Before Occupancy (HPSB GP4) | | 1 |
| | Credit 4.1 | Low Emitting Materials, Adhesives & Sealants (HPSB GP4) | | 1 |
| | Credit 4.2 | Low Emitting Materials, Paints & Coatings (HPSB GP4) | | 1 |
| | Credit 4.3 | Low Emitting Materials, Flooring Systems (HPSB GP4) | | 1 |
| | Credit 4.4 | Low Emitting Materials, Composite Wood & Agrifiber Products (HPSB GP4) | | 1 |
| | Credit 5 | **Indoor Chemical & Pollutant Source Control** | | 1 |
| | Credit 6.1 | Controllability of Systems, Lighting (HPSB GP4) | | 1 |
| | Credit 6.2 | **Controllability of Systems,** Thermal Comfort | | 1 |
| | Credit 7.1 | Thermal Comfort, Design (HPSB GP4) | | 1 |
| | Credit 7.2 | **Thermal Comfort,** Verification | | 1 |
| | Credit 8.1 | Daylight & Views - Daylight 75% of Spaces (HPSB GP4) | | 1 |
| | Credit 8.2 | **Daylight & Views** - Views for 90% of Spaces | | 1 |
| **Innovation & Design Process** | | | | |
| Achievable Points | 0 | | Possible Points | 6 |
| | Credit 1.1 | **Innovation in Design 1.1** | | 1 |
| | | | Select if ID 1.1 was for energy and/or water | |
| | Credit 1.2 | **Innovation in Design 1.2** | | 1 |
| | | | Select if ID 1.2 was for energy and/or water | |
| | Credit 1.3 | **Innovation in Design 1.3** | | 1 |
| | | | Select if ID 1.3 was for energy and/or water | |
| | Credit 1.4 | **Innovation in Design 1.4** | | 1 |
| | | | Select if ID 1.4 was for energy and/or water | |
| | Credit 1.5 | **Innovation in Design 1.5** | | 1 |
| | | | Select if ID 1.5 was for energy and/or water | |
| | Credit 2 | **LEED® Accredited Professional** | | 1 |
| **Regional Priority Credits** | | | | |
| Achievable Points | 0 | | Possible Points | 4 |
| | Credit 1.1 | **Regional Priority 1.1** | | 1 |
| | | | Select if RP 1.1 was for energy and/or water | |
| | Credit 1.2 | **Regional Priority 1.2** | | 1 |
| | | | Select if RP 1.2 was for energy and/or water | |
| | Credit 1.3 | **Regional Priority 1.3** | | 1 |
| | | | Select if RP 1.3 was for energy and/or water | |
| | Credit 1.4 | **Regional Priority 1.4** | | 1 |
| | | | Select if RP 1.4 was for energy and/or water | |

| **LEED Project Totals (pre-certification estimates)** | Possible Points 110 |
|---|---|
| 0 | LEED® Credits Achievable |
| 0 | LEED® Credits Maybe Achievable |
| 0 | LEED® Credits Not Achievable |
| | LEED® Energy and Water Credits Achievable (when pursuing LEED® Certification) |
| Prerequisites Not Achieved | **LEED® Certification Level Achievable** |
| N/A | **LEED® Horizontal Benchmark Level** |
| N/A | **LEED® Utility Benchmark Level** |
| N/A | **LEED® Industrial Benchmark Level** |

**Certified:** 40-49 points, **Silver:** 50-59 points, **Gold:** 60-79 points, **Platinum:** 80-110

# Robins Air Force Base
# Base Facility Standards

**Title: GeoBase Program**
**Geographic Information System (GIS Procedures)**

**Date: 22 November 2013**

## BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS
PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

**PART 7D– GEOBASE PROGRAM (GIS PROCEDURES)**

**Revised: 22 November 2013**

**CRITERIA REFERENCE DOCUMENTS:**

US Army Corps of Engineers, Engineering and Construction Bulletin
http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2006_15.pdf

A/E/C Architectural/Engineering/Construction (AEC) CADD Standard (for CAD data)

AFI 32-10112 Installation Geospatial Information and Services (Installation GI&S)

1. GENERAL

a. To ensure that all design and construction projects make use of the most up to date utility and planimetric data and post construction updates are properly submitted to keep the base utility and planimetric data current. The Robins AFB GeoBase system is the sole data repository of Utility, Planimetric and Environmental data on Robins AFB.

b. Responsibility for the overall content and format of the Robins AFB GIS belongs with the 78 CEG GeoBase Office. Planimetric and utility features are the primary responsibility of the 78 CEG/CEOE office. The Environmental features are the responsibility of the 78 CEG/CEIE office. Any questions regarding the overall responsibility of the GIS content should be directed to the GeoBase Office before work on the project is initiated.

c. All Base construction projects that make changes to the existing Base infrastructure planimetric and environmental features must adhere to the following requirements.

2. Data Ownership

a. Robins AFB GIS program is divided and managed by two separate offices. The 78 CEG/CEOE office maintains all the Planimetric and Utility data. The 78 CEG/CEIE office maintains all the Environmental data.

78 CEG/CEOE
Planimetric Data: Airfield, Roads, Sidewalks, Buildings, Geodetic, hydrography, landform, pedestrian, land status.
Utility Data: Air, electrical, fuel, gas, heating/cooling, industrial, storm, wastewater, and water.

78 CEG/CEIE
All Environmental Data: Air Quality, groundwater quality, pollution control, regulated tanks, solid waste, hazmat/hazwaste, remediation, cultural, fauna, flora, wetlands.

3. Drawing Submittal Requirements

a. All Projects that make changes to the existing base infrastructure must include as-built drawings and must be submitted to the 78 CEG/CEOE before the project closeout is completed.

b. Facility orientation shall be shown on the site plan to include clearly marked coordinates and elevations. All coordinates shall be in NAD83, State Plane Coordinate System, GA West FIPS 1002 Feet. All elevations measurements shall be NAVD 88 US feet and tied to the base survey control network.

c. The contractor shall ensure that all data, metadata, and attributes are fully populated based on the current SDSFIE standard. Upon request the GeoBase office will provide the contractor with a current SDSFIE compliant GIS template to be used for populating the GIS deliverables as required under the contract.

d. Final drawing submittals shall be in AutoCAD and GIS (ESRI) format. Electronic ".dwg" and ".shp" files must be compatible with Robins AFB GeoBase system and require no alterations before acceptance. Contact the 78 CEG/CEOE, GeoBase office for the latest software version requirements.

4. Survey Control

a. If installing temporary or permanent ground control, benchmarks shall be set by a

Georgia licensed surveyor and tied into the existing base survey network.

b. Newly installed benchmarks shall be surveyed-in to not less than 3rd order, Class I accuracy or 1:10,000 using NAD83, State Plane Coordinate System, GA West FIPS 1002 Feet, NAVD88 Feet.

c. Any new permanent ground control benchmarks shall be submitted in separate detailed report showing data for each point, including Northing, Easting, and Vertical coordinates. The report must be verified and stamped by a Georgia licensed surveyor and submitted to the 78 CEG/CEOE GeoBase Office.

d. Contact the 78 CEG/CEOE, GeoBase Office for the latest survey network control report.

5. Points of Contact

a. 78 CEG/CEOE, Geobase Office

Building 1555, 775 Macon Street Robins AFB
Phone: 478-327-8924
b. 78 CEG/CEIE, Environmental Management

Building 359, 775 Macon Street, Robins AFB
Phone: 478-327-8104

Author: Josh Winters, 78 CEG/CENME, 478-327-8924

Reviewer: David Trescott, 78 CEG/CENMP, 478-926-8838

Approval: _____
Stefanie Dawson, 78 CEG/CENMP, 478-327-2948

# Robins Air Force Base
# Base Facility Standards

**Title:** **Antiterrorism**

**Date:** **22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 7E
## ANTITERRORISM

## CRITERIA REFERENCE DOCUMENTS:

ETL -01-1 – Reliability and Maintainability (R&M) Design Checklist
ETL – 04-4 – Trenchless Technology ((TT) for Crossing Air Force Pavements
UFC 4-010-01 – DoD Minimum Antiterrorism Standards for Buildings (9 Feb 2012)
UFC 4-010-02 – FOUO DoD Minimum Antiterrorism Standoff Distances for Buildings, (9 Feb 2012)
UFC 4-020-01 – DoD Security Engineering Facilities Planning Manual (11 Sep 2008)
UFC 4-022-01 – Security Engineering: Entry Control Facilities/Access Control Points (25 May 2005)
AF Installation Entry Control Facilities Design Guide (18 Feb 2003)
UFC 4-023-03 – Design of Buildings to Resist Progressive Collapse (Jan 05), including change 1 (14 Jul 2009)

## 1. ANTITERRORISM REQUIREMENTS

Where applicable, all designs and construction, A-E and others, shall incorporate engineering work necessary to comply with current Anti-terrorism minimum standards. All designs shall include all applicable requirements and calculations at each design submittal level, especially at the pre-final & 100% submittals.

Design and construction shall comply with the following requirements in addition to the referenced documents listed above.

## 2. DESIGN STRATEGIES FOR BUILDINGS

There are several major design strategies that are applied throughout the standards issued in UFC 4-010-01. They do not account for all of the measures considered in the standards, but they are the most effective and economical in protecting DoD personnel from terrorist attacks. Design strategies include:

- Maximize Standoff Distance
- Prevent building collapse
- Minimize hazardous flying debris
- Provide effective building layout
- Limit airborne contamination
- Provide mass notification

### Maximize Standoff Distance

The primary design strategy is to keep terrorists as far away from inhabited DoD buildings as possible. The easiest and least costly opportunity for achieving the appropriate levels of protection against terrorist threats is to incorporate sufficient standoff distance into project designs.

### Prevent Building Collapse

Provisions for preventing building collapse are essential to minimizing mass casualties of building occupants. Those provisions apply regardless of standoff distance or the ability of buildings to resist blast effects since structural systems that provide greater continuity and

redundancy among structural components will help limit collapse for any extreme loading events.

**Minimize Hazardous Flying Debris**

Flying debris can be minimized through building design and avoidance of certain building materials and construction techniques. The glass used in most windows breaks at very low blast pressures, resulting in hazardous, dagger-like fragments. Minimizing those hazards through reduction in window numbers and sizes and through enhanced window construction has a major effect on limiting mass casualties. Window and door designs must treat glazing, frames, connections, and the structural components to which they are attached as integrated systems. Hazardous fragments may also include secondary debris such as those from barriers and site furnishings.

**Provide Effective Building Layout**

Effective design of building layout and orientation can significantly reduce opportunities for terrorists to target building occupants or injure large numbers of people.

**Limit Airborne Contamination**

Effective design of heating, ventilation, and air conditioning (HVAC) systems can significantly reduce the potential for chemical, biological, and radiological agents being distributed throughout buildings. Provide within each facility the ability to shut-off the HVAC system in the event of an emergency.

**Provide Mass Notification.**

Providing a timely means to notify building occupants of threats and what should be done in response to those threats reduces the risk of mass casualties. Effective designs will include means for both local and remote origination of information.

## 3. ENTRY CONTOL FACILITY (ECF) DESIGN CONSIDERATIONS

Design considerations, in order of priority, are:

- Security
- Safety
- Capacity
- Image

**Security**

The first priority of an ECF is to maintain perimeter security.
The ECF:

- is a part of the installation perimeter and a legal line of demarcation
- must accommodate Random Antiterrorism Measures (RAM), for sustained operations;

- must be able to operate at all FPCONs, including 100% vehicle inspection; and
- must have security features that protect against vehicle-borne threats and illegal entry.

**Safety**

ECFs must have a working environment that is both safe and comfortable for Security Forces personnel. Security Forces safety includes provisions for personal protection against attack and errant drivers; consider climate, location, and orientation. Design the ECF so that persons and vehicles entering and leaving the facility do so in a safe and orderly manner to protect themselves, security personnel, and pedestrians from harm.

**Capacity**

Design the ECF to maximize the flow of traffic without compromising safety, security, or causing undue delays that may affect installation operations or off-installation public highway users.

**Image**

Design the ECF to impart an immediate impression of professionalism and convey the DoD's commitment to the protection and safety of DoD personnel and the security of its facilities and resources.

<<<<< **END OF BFS ANTITERRORISM** >>>>>

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# Robins Air Force Base
# Base Facility Standards

**Title:** **Fall Protection**

**Date:** **22 November 2013**

BASE FACILITY STANDARD (BFS) -- ROBINS AFB, GA
(Also known as Installation Design Guide)

FOR ARCHITECT-ENGINEER FIRMS AND CONTRACTORS PERFORMING DESIGN SERVICES AND CONSTRUCTION FOR ROBINS AFB

## PART 7F– FALL PROTECTION

**CRITERIA REFERENCE DOCUMENTS:**

AFI 91-202 Air Force Instruction, Mishap Prevention Program (Latest Edition)
AFI 91-203 Air Force Consolidated Occupational Safety Instructions
AFPAM 90-902 Operational Risk Management (ORM) Guidelines & Tools
AFPAM 91-210 Air Force Pamphlet (Latest Edition)
ANSI Z359.1 American National Standard Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components (Latest Edition)
Base Facility Standard (All other Parts excluding Part 7F - Fall Protection)
OSHA 29 Code of Federal Regulations (CFR), Part 1910 (Latest Edition)
OSHA 3146 Fall Protection in Construction (Latest Edition)
UFC 1-200 General Building Requirements (Latest Edition)
UFC 3-301 Structural Engineering (Latest Edition)

## 1. FALL PROTECTION REQUIREMENTS:

All Designs and construction, A-E and others, shall incorporate engineering work necessary to arrest a worker's fall. All designs shall provide all applicable calculations at each design submittal level, especially at the pre-final & 100% submittals.

All other designs shall provide all calculations at 100% submittal.

Design and construction shall comply with the following requirements in addition to the Codes and Standards listed above.
All of the three elements, (1) Anchor Point, (2) Personal Equipment, and (3) Connecting Means, are interconnected and shall be engineered to work together to arrest a worker's fall. Fall protection systems shall be adequately designed to minimize fall distances, arresting forces, rescue time and the chance for human error. For those who must work at an elevated level, the design, proper installation and implementation of an adequate fall arrest system are paramount to their safety. Additionally, the system shall be designed in such a way as to provide rescue access to the worker in the event of a fall.

**(1) Anchor points** shall be capable of supporting 5000 pounds of force per worker attached or twice the impact force applied during a fall. The anchor points shall also be independent of work platforms and guardrail systems. For overhead anchor points the dynamic rating of the manufacturer's equipment can be used as the force acting on the anchor point. For horizontal anchor points, the design of horizontal lifeline systems of the manufacturer's engineer shall be used. General considerations for anchor point planning shall be:

(a) Locate anchor points overhead to minimize free-fall and clearance distances and reduce forces.

(b) Calculate the total clearance distance required below the anchor point to prevent employees from striking the ground before the fall is arrested.

(c) Avoid swing fall hazards by working beneath the fixed overhead anchors or using horizontal lifelines when lateral movement is required.

**(2) Personal equipment**, in accordance with OSHA standards, means a full-body harness. Full-body harnesses shall be designed to minimize arresting forces and comfortably and safely arrest a fall. Because of the full-body harness design, a fall arrested worker can be suspended upright while waiting for rescue. Necessary features to look for when purchasing full-body harnesses are: a back D-ring for attaching lanyards to anchors, side D-rings and a back pad for support and comfort, and a lanyard clip for attaching lanyards.

**(3) Connecting** means are devices used to connect a worker to an anchor point. It shall be designed to provide protected movement during elevated work. There are three basic types of connecting means:

(a) Lanyards - serve as a connecting means to fixed overhead anchors, horizontal lifelines and aerial lifts. They are available in 4 and 6-foot lengths and limit fall arrest forces to between 750 and 900 pounds through the use of shock absorbers.

(b) Retractable devices - serve as a connecting means to fixed anchors and horizontal lifelines. They limit free-fall distances to 2 feet and fall arrest forces to between 600 and 750 pounds. These devices work like a car seat belt in that they retract instantaneously during a fall.

(c) Rope grabs - serve as connecting means when climbing vertical structures or performing work requiring vertical movement. Rope grabs connect the harness and the vertical lifeline. They limit fall arrest forces to between 700 and 800 pounds.

A detailed project-specific Safety Plan shall be submitted for review and approval by CEPG, in accordance with the Appendix-C prior to commencing work. Until the Safety Office concurs with the Contractor's Safety Plan, the contractor shall be prohibited from starting work.

<<<<< **END OF BFS FALL PROTECTION** >>>>>

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