



*FAIRCHILD AFB DESIGN GUIDE*  
DATA SHEETS

1 May 2022

## TABLE OF CONTENTS

<u>Description</u>	<u>Page</u>
<b><u>Division 03 – Concrete</u></b>	
<b>Section 033000 – Cast-in-Place Concrete</b>	
Data Sheet .....	4
<b><u>Division 04 – Masonry</u></b>	
<b>Section 042000 – Unit Masonry</b>	
Data Sheet .....	5
<b><u>Division 05 – Metals</u></b>	
<b>Section 050000 – Metals</b>	
Data Sheet .....	6
<b><u>Division 06 – Woods, Plastics, and Composites</u></b>	
<b>Section 060000 – General Requirements</b>	
Data Sheet .....	6
<b><u>Division 08 – Openings</u></b>	
<b>Section 080000 – Openings</b>	
Data Sheet .....	6
<b>Section 087100 – Door Hardware</b>	
Data Sheet .....	7
<b><u>Division 09 – Finishes</u></b>	
<b>Section 090000 – Finishes</b>	
Data Sheet .....	8
<b>Section 093010 – Ceramic Tile</b>	
Data Sheet .....	10
<b><u>Division 10 – Specialties</u></b>	
<b>Section 100000 – Specialties</b>	
Data Sheet .....	14
<b>Section 101400 – Signage</b>	
Data Sheet .....	15
<b><u>Division 11 – Equipment</u></b>	
<b>Section 110000 – Equipment</b>	
Data Sheet .....	19
<b><u>Division 14 – Conveying Equipment</u></b>	
<b>Section 140000 – Conveying Equipment</b>	
Data Sheet .....	20
<b><u>Division 21 – Fire Suppression</u></b>	
<b>Section 210000 – Fire Suppression</b>	

Data Sheet .....	20
<b><u>Division 22 – Plumbing</u></b>	
<b>Section 220000 – Plumbing, General Purpose</b>	
Data Sheet .....	21
<b><u>Division 23 – Heating, Ventilating, and Air-Conditioning (HVAC)</u></b>	
<b>Section 230000 – HVAC Equipment</b>	
Data Sheet .....	22
<b>Section 230900 – Instrumentation and Control for HVAC EMCS</b>	
Data Sheet .....	31
<b>Section 235200 – Heating Boilers</b>	
Data Sheet .....	31
<b><u>Division 26 – Electrical</u></b>	
<b>Section 260000 – Electrical</b>	
Data Sheet .....	32
<b>Section 262000 – 15 Kv Electrical Distribution</b>	
Data Sheet .....	34
<b>Section 263213 - Engine Generators</b>	
Data Sheet .....	36
<b>Section 264200 – Cathodic Protection</b>	
Data Sheet .....	38
<b><u>Division 27 – Communications</u></b>	
<b>Section 275116 – Mass Notification Systems</b>	
Data Sheet .....	39
<b>Section 275400 – Klaxon and Naoc Alarm System</b>	
Data Sheet .....	42
Detail Sheet.....	
Detail 1 – Klaxon System at Facility.....	43
Detail 1 – NAOC System at Facility .....	44
<b><u>Division 28 – Electronic Safety and Security</u></b>	
<b>Section 284611 – Carbon Monoxide Detection and Alarm</b>	
Data Sheet .....	45
<b>Section 284620 – Fire-Alarm System</b>	
Data Sheet .....	45
<b><u>Division 31 – Earthwork</u></b>	
<b>Section 312000 – Earth Moving</b>	
Data Sheet .....	48
<b><u>Division 32 – Exterior Improvements</u></b>	
<b>Section 320000 – Miscellaneous Details</b>	
Data Sheet .....	48
Detail Sheet.....	49
Detail 1 – Sidewalk Intersection .....	50
Detail 2 – Bollards .....	51
Detail 3 – Bike Rack .....	52
Detail 4 – Outdoor Bench .....	53
<b>Section 321600 – Curbs and Gutters</b>	
Detail Sheet.....	54
Detail 1 – Typical Curb and Gutter.....	54

Detail 2 – Typical Curb Cut .....	55
Detail 3 – Asphalt Curb Backing .....	55
Detail 4 – Earthen Curb Backing .....	56
<b>Section 323100 – Fences and Gates</b>	
Data Sheet .....	56
Detail Sheet.....	57
Detail 1 – Wall Column.....	57
Detail 2 – Screen Wall.....	58
Detail 3 – Wall Screen or Enclosure .....	59
<b>Section 328400 – Planting Irrigation</b>	
Data Sheet .....	60
Detail Sheet.....	69
Detail 1 – Flush Point .....	69
Detail 2 – Emitter .....	70
Detail 3 – Electric Control Valve.....	70
Detail 4 – Quick Coupler Valve .....	71
Detail 5 – Auto Drain Valve .....	72
Detail 6 – Backflow Preventer .....	73
Detail 7 – Swing Joint.....	74
<b>Section 329000 –Planting</b>	
Data Sheet .....	74
Contractor Pesticide Documentation Rqmts .....	84
<b>Section 329300 – Plants</b>	
Detail Sheet.....	85
Detail 1 – Clear View Triangle.....	85
Detail 2 – Tree Planting.....	86
Detail 3 – Shrub Planting .....	87
Detail 4 – Ground Cover Planting .....	88
Species List.....	89
<b><u>Division 33 – Utilities</u></b>	
<b>Section 330000 – Utilities</b>	
Data Sheet .....	93
Atch 1 – Utility Verification Procedures .....	96

END OF TABLE OF CONTENTS

**When developing design/construction documents (UFGS specifications, drawings, submittals, etc.) use the following Design Guide data developed by the 92d Civil Engineer Squadron Engineering Flight.**

## **SECTION 033000 – CAST-IN-PLACE CONCRETE**

### **A. GREEN PROCUREMENT PROGRAM**

1. Fairchild Air Force Base has adopted the Green Procurement Program Plan regarding recycling and conserving resources. The Plan requires that some construction materials be composed of a minimum percentage of recycled products. See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 016000, Product Requirements, for details.

### **B. AIR CONTENT**

1. Exterior concrete slabs shall have a minimum air content of 6 percent.

### **C. COMPRESSIVE STRENGTH**

1. Exterior concrete slabs shall have a minimum 28 day compressive strength of 4000 psi.

### **D. CURING COMPOUNDS**

1. Except for use on airfield, no liquid curing compounds shall be allowed for Portland Cement Concrete.

### **E. CONCRETE TEMPERATURE**

1. Temperature of fresh concrete shall be maintained between 50 and 90 degrees Fahrenheit. Concrete must be protected from freezing during the curing period.

### **F. HOT WEATHER REQUIREMENTS**

1. The Contractor shall prepare a plan which describes the methods and materials which shall be used to protect concrete under hot weather conditions. See ACI 305R, Hot Weather Concreting, for recommended methods and materials. The Contracting Officer Representative will review and approve (or reject) the proposed plan. In addition to the incorporation of this plan, the Contractor shall:

a. Sprinkle forms and underlying material with water immediately before placing the concrete and the concrete shall be placed at the coolest temperature practicable when hot weather concreting procedures are likely to apply.

b. Cease all placement of concrete when the temperature of the fresh concrete exceeds 90 degrees F.

2. Hot weather conditions shall be assumed to prevail when the surface evaporation rate exceeds 0.15 pounds per square foot per hour as determined by using ACI 305R Figure 2.1.5.

### **G. COLD WEATHER REQUIREMENTS**

1. ACI 306R, Cold Weather Concreting, shall be referenced as a specification.

2. The procedures of Section 1.5 of ACI 306R shall be required and submitted to the Contracting Officer representative. The Contracting Officer Representative will review and approve (or reject) the procedures.

3. Concrete damaged by freezing shall be removed and replaced.

## **SECTION 042000 – UNIT MASONRY**

### **A. GREEN PROCUREMENT PROGRAM**

1. Fairchild Air Force Base has adopted the Green Procurement Program Plan regarding recycling and conserving resources. The plan requires that some construction materials be composed of a minimum percentage of recycled products. See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 016000, Product Requirements, for details.

B. GENERAL

1. Brick and block shall be tested for limited efflorescence.
2. Upon completion UNIT MASONRY walls shall be cleaned and sealed.
3. Brick face and panel systems shall be cleaned at the end of the one year warranty period.

C. COLOR

1. Face Brick and Brick Panel System
  - a. Brown Varitone Wire Cut as previously manufactured by Interpace Industries Inc.,
  - b. Imperial Red Mission as previously manufactured by Interpace Industries Inc., or
  - c. As approved by the Base.
2. Concrete UNIT MASONRY Unit
  - a. Color requirement:
    - i. Split faced, normal weight block color to be standard gray color.
    - ii. Paint to match as approved by the Government.
3. Mockup

Provide 4 ft. by 8 ft. sample panels of UNIT MASONRY construction for evaluation and establishing workmanship expectations. Panel shall be used to evaluate subsequent UNIT MASONRY work for the specific project. Panel shall be removed upon direction of the Government.

## **SECTION 050000 – METALS**

### **A. GREEN PROCUREMENT PROGRAM**

1. Fairchild Air Force Base has adopted the Green Procurement Program Plan regarding recycling and conserving resources. The Plan requires that some construction materials be composed of a minimum percentage of recycled products. See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 016000, Product Requirements, for details.

### **B. COLD-FORMED METAL FRAMING**

1. Structural metal studs and joists shall be used for all non-residential construction.
2. All exposed metal framing shall be painted to match adjacent finish.
3. See Section 090000, Paragraph C for non-structural wall requirements.

### **C. STEEL DECK**

1. All new steel deck shall be a minimum of 20 gauge.

### **D. Metal Roofing**

1. See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 07 – Moisture and thermal protection.

## **SECTION 060000 – WOOD, PLASTICS, AND COMPOSITES**

### **A. GREEN PROCUREMENT PROGRAM**

1. Fairchild Air Force Base has adopted the Green Procurement Program Plan regarding recycling and conserving resources. The Plan requires that some construction materials be composed of a minimum percentage of recycled products. See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 016000, Product Requirements, for details.

### **B. COMPLIANCE**

1. Comply with the specified provisions of the Architectural Woodwork Institute AWI P-208, Quality Standards Illustrated as follows:
2. Wood Casework: AWI Section 400, Premium Grade.
3. Plastic Laminate Casework: AWI Section 400, Custom Grade.
4. Wood Paneling: AWI Sections 200 and 500, Premium Grade.
5. Shop Finishing: AWI Section 1500, Premium Grade.
6. Installation: AWI Section 1700, Premium Grade.

## **SECTION 080000 – OPENINGS**

### **A. DOORS**

1. All facilities that serve the public shall have automatic hardware at entry doors along the accessible route of travel.

2. “Balance” doors (with offset pivot hinges) shall be allowed, but only when such doors are 48” in width or wider.

3. Automatic closure of vehicle doors is preferred over manual closure, to ensure that doors are not left open, and for user convenience. Automatic closure shall be accomplished using buried loop detectors and automatic timers, except at restricted area access entry points. Time interval shall be adjustable. Manual operation of vehicle doors shall still be possible in case of emergency or malfunction. At restricted area access points, provide Automated Entry Control Systems. Coordination and approval must occur with Security Forces prior to procurement of any Automated Entry Control Systems.

4. Hangar doors shall have detectors that disable the heat while the doors are open. Maximum gaps of a few inches are allowable to account for poor fit between door panels. The heating disable function shall be capable of being overridden by the base EMCS system.

5. Exterior roll-up doors shall have a minimum R-value of R-4.75.

**B. WINDOWS**

1. Window glass shall be of high quality, performance glazing with dark bronze tint.
2. Window frames shall be anodized aluminum with dark bronze finish, or to match adjacent. Direction will be given by CE.
3. Window systems shall have a maximum U-factor of 0.30.

**C. DOOR HARDWARE**

1. When developing specifications for this section, use the Fairchild Base Design Guide sectional information developed by the 92d Civil Engineer Squadron Engineering Flight.

**D. TRANSLUCENT WALL AND ROOF ASSEMBLIES**

1. Exterior face sheet shall be crystal in color.
2. Interior face sheet shall be white in color.

**SECTION 087100 – DOOR HARDWARE**

**A. IN-HOUSE AND CORPS OF ENGINEER PROJECTS**

1. Locksets, Latchsets, and Deadbolts
  - a. The designer shall write the specifications to include the following:
    - i. "Locksets, latchsets and deadlocks shall be heavy duty weight. To the maximum extent possible, all locksets, latchsets and deadlocks shall be from the same manufacturer, and of matching style, finish, color, etc. All key operated locks shall be compatible with the Best Lock Corporation "BEST" interchangeable cores."
    - ii. The keying schedule shall be developed by the designer and be included in either the project specifications or project drawings.
2. Lock cores shall be specified as follows:
  - a. For Base Contracted Projects:
    - i. The contractor shall provide seven pin "BEST" "TB" keyway cores (no substitutes) keyed to the Base Best Grandmaster Key controlled system. Final "pinned" cores and keys shall be purchased from "BEST" by the contractor and shipped to the base locksmith so that they are received prior to Substantial Completion. The base will install the final cores and return the construction cores to the manufacturer.
  - b. For Corps of Engineers (CoE) Contracted Projects:
    - i. Construction cores shall be provided by the contractor and delivered to the government prior Substantial Completion. The keying schedule shall still be prepared by the designer and included in the either the specifications or drawings, however, it will be annotated with a note that says "Final cores to be provided by the contractor".

3. Door hardware. For guidance see FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 087100 Guidelines, Attachment 1.

## **SECTION 090000 – FINISHES**

### **A. DESIGN GUIDES**

1. All interior and exterior finishes are in various AMC Design Guides and the Fairchild AFB Architectural Compatibility Plan. Copies of these documents can be checked out by hand receipt from the Engineering Flight, 92 CES/CEN.

### **B. GREEN PROCUREMENT PROGRAM**

1. Fairchild Air Force Base has adopted the AF Sustainable Procurement Program regarding procurement of items that use recycled materials and conserve resources. The program requires that some construction materials be composed of a minimum percentage of recycled products. See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 016000, *Product Requirements*, for details.

### **C. NON-STRUCTURAL METAL FRAMING**

1. Metal studs shall be used for all non-residential construction.
2. All exposed metal framing shall be painted to match adjacent finish.
3. See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 05, Section 05000 for load bearing wall requirements.

### **D. CERAMIC TILE**

1. When developing specifications for this section, use the Fairchild Base Design Guide sectional information developed by the 92d Civil Engineer Squadron Engineering Flight.

### **E. CARPET**

1. When developing specifications for this section, use the Fairchild Base Design Guide sectional information developed by the 92d Civil Engineer Squadron Engineering Flight.
2. For projects which are solely for carpet replacement, refer to the current Installation Facilities Standards (IFS) to obtain information on USAF Carpet Program, and the Mandatory Source Selection Contract AFCA (10 August 2018).

### **F. SUSPENDED CEILINGS**

1. Ceiling grid shall be 2' x 2' accepting tiles with "tegular" type reveal edges. Drop-out ceilings (foam-grid panels) are not permitted. Ceiling grids shall be seismically braced per the current International building Code.

### **G. EXTERIOR PAINTING**

1. Applies to all base facilities including commercial/industrial buildings, flightline facilities, and administration complexes.
2. Follow AMC Design Guides and the Base Architectural Compatibility Plan.
3. Specific Guidance
  - a. Exterior colors shall match:
    - i. Walls: "FAFB Cool Sierra Tan" #CR-133-10 (Sherwin-Williams' color: "Sierra Tan" #SW8258).
    - ii. Doors and Frames: Sherwin-Williams' color: "Spanish Moss" #SW2070.
    - iii. Roof Panels: AEP Span – Dura Tech 5000 finish color "Cool Weathered Copper" (SRI 34).



FAIRCHILD AIR FORCE BASE DESIGN GUIDE – DATA SHEETS

- iv. Wall Panels: Citadel Architectural Products – Kynar 500 metal finish color: “Bone White”.
- v. Paint codes for Sherwin-Williams “Spanish Moss” and “FAFB Cool Sierra Tan” are provided below.
- vi.

EXTERIOR	ARCHITECTURAL			
SUPER PAINT	LATEX			
SATIN	IFC 8112NP			
<b>2070 SPANISH MOSS</b>				
SHER-COLOR FORMULA				
CCE*COLORANT	0Z	32	64	128
W1-White	-	38	-	1
B1-Black	4	60	1	1
R2-Maroon	-	24	-	-
Y3-Deep gold	4	4	1	-
<b>ONE GALLON</b>				
ULTRADEEP				
A89T00154	640392379			

EXTERIOR	ARCHITECTURAL			
SUPER PAINT	LATEX			
SATIN	IFC 8112NP			
<b>2070 SPANISH MOSS</b>				
SHER-COLOR FORMULA				
CCE*COLORANT	0Z	32	64	128
W1-White	4	63	-	1
B1-Black	28	47	1	1
R2-Maroon	2	56	-	-
Y3-Deep gold	20	22	1	-
<b>FIVE GALLON</b>				
ULTRADEEP				
A89T00154	640392387			

EXTERIOR	ARCHITECTURAL			
SUPER PAINT	LATEX			
SATIN	IFC 8112N			
<b>CR-133-10 FAFB COOL SIERRA TAN</b>				
CUSTOM MANUAL MATCH				
CCE*COLORANT	0Z	32	64	128
W1-White	2	19	1	1
B1-Black	4	53	1	-
R2-Maroon	-	4	-	-
Y3-Deep gold	-	9	-	1
G2-New Green	-	2	-	-
<b>ONE GALLON</b>			ULTRADEEP	
A89W00153			640392346	

EXTERIOR	ARCHITECTURAL			
SUPER PAINT	LATEX			
SATIN	IFC 8112NP			
<b>CR-133-10 FAFB COOL SIERRA TAN</b>				
CUSTOM MANUAL MATCH				
CCE*COLORANT	0Z	32	64	128
W1-White	12	34	1	1
B1-Black	28	11	1	-
R2-Maroon	-	20	-	-
Y3-Deep gold	-	46	-	1
G2-New Green	-	10	-	-
<b>FIVE GALLON</b>				
ULTRADEEP				
A89W00153	640392353			

- b. Metal roofing shall match AEP Span – Dura Tech 5000 metal finish color “Cool Weathered Copper”; gutters, fascia and trim shall match “Spanish Moss”.
- c. Downspouts shall be “open-face” type with both exterior and interior surfaces (exposed to view) colored to match adjacent facility surface color.
- d. Personnel doors, all door trim and window trim shall be “Spanish Moss” or painted to match the body of the facility, as approved by the Contracting Officer. Roll-up doors shall match the

- building body color if building is painted, and shall match “Spanish Moss” if building is mostly brick.
- e. Bollards shall be “Spanish Moss” with 4” white reflective (Scotchlite or approved equal) band with its top edge 4” below top of bollard.
  - f. Exterior paint type (latex, acrylic, etc.) and paint finish (flat, semi-gloss, gloss) shall be determined by the Design Guides and approved by the government.
  - g. The use of markings, symbols, or signs on buildings is prohibited unless they are part of the approved building paint scheme. No super graphics are authorized on and in facilities.
  - h. Miscellaneous.
    - i. Exterior HVAC and electrical equipment, ducts, pipes, and architectural features on or near facilities shall be made “invisible” by painting them to match the adjacent facility surface color. If not near the facility (as determined by the Government), items shall be painted “Spanish Moss”. Landscaping shall also be used when appropriate to reduce visibility of these items.
    - ii. Exterior handrails for administrative facilities shall be brushed aluminum or dark bronze anodized aluminum, and shall not be painted steel. Handrails in industrial areas shall be steel, painted “Spanish Moss.”
    - iii. All trash dumpsters are to be painted “Spanish Moss.” Utility cabinets, HVAC equipment, trash dumpsters shall be screened in accordance with the Architectural Compatibility Plan.

#### H. INTERIOR PAINTING

1. Compatibility: Interior design compatibility at Fairchild AFB shall be a cohesive approach to coordination of interior materials, construction details, finish colors and furnishings.
2. Color: Follow AMC Design Guides and the Architectural Compatibility Plan.
  - a. For interior “cool” white match: Sherwin-Williams “Sleek White” #SW1018
  - b. For interior “warm” white match: Sherwin-Williams “FAFB Off White” #CR-2546-07
3. Specify Class 5 drywall finish for all walls with semi-gloss paint, Class 4 drywall finish for other paints.
4. Specify special sealer for all gypsum wallboard composed of recycled products.
5. All exposed surfaces, including (but not limited to) ductwork, conduit, grilles, diffusers, piping (sprinkler, water service, drainage, etc.), and equipment (access panels, etc.) shall be painted to match color, texture and finish of adjacent surfaces, unless factory finish is suitable (as determined by Government) or specific exceptions are called out in the specifications. Fire alarm devices are not to be painted. All conduit related to fire protection shall be “red”, and prefinished from the factory. Field painting is prohibited.
6. Painted CMU is not acceptable as an interior finish except inside utility rooms, such as storage, mechanical, electrical, communications, etc.

### SECTION 093010 – CERAMIC, QUARRY, AND GLASS TILING

#### A. PURPOSE

1. Provide technical and functional/aesthetic criteria for the selection, installation, and maintenance of ceramic tile. Ceramic tiles include glazed, unglazed, porcelain, quarry, mosaics and pavers. These standards do not apply to other hard surface products such as stone, resin, conglomerates, etc.

#### B. GLOSSARY OF TERMS

1. **Breaking Strength** – In order to determine the strength and durability of ceramic tile, a standard test method (ASTM C648) is used to evaluate the tile. A force is applied to an unsupported portion of the tile specimen until breakage occurs. The ultimate breaking strength is then recorded in pounds. The ANSI standard requires an average breaking strength of 250 lbs for floor tile.
2. **Ceramic Mosaic Tile** – Tile formed by either the dust-pressed or plastic method, usually ¼ to 3/8 inch thick, having a facial area of less than six square inches. May be of either porcelain or natural clay composition and they may be either plain or with an abrasive mixture throughout.
3. **Coefficient of Friction** – This is a term used in physics to describe the amount of force required to cause an object to start moving across a surface. Tiles are tested for coefficient of friction in accordance with ASTM C-1028. A quantitative value can be determined to generally express the relative degree of slip resistance. A higher coefficient indicates increased resistance. Although there is no current ANSI requirement, a minimum coefficient of friction of 0.50 (wet and dry) is the recognized industry standard for a slip-resistant flooring surface. The Occupational Safety and Health Administration (OSHA) also recommends this same standard for walking surfaces. The Americans with Disabilities Act (ADA) recommends a minimum coefficient of friction of 0.60 (wet and dry) for accessible routes and 0.80 for ramps.
4. **Durability Classification (Abrasion Resistance)** – Glazed ceramic and porcelain tile normally carry a durability class rating. Although there are no official industry standards, most manufacturers give their tile a rating number from I to IV+, according to the results of the Porcelain Enamel Institute (PEI) abrasion test. The Porcelain Enamel Institute rating is not a measurement of quality. It is a scale that clearly indicates the areas of use each manufacturer recommends and has designed their tile to fit.

Rating	Traffic	Recommended Applications
Class I	No Foot Traffic	interior residential and commercial wall
Class II	Light Traffic	interior residential and commercial wall; residential bathroom floor
Class III	Light/Moderate	residential floor and wall
Class IV	Moderate/ Heavy Traffic	residential, medium commercial and light institutional floor and wall
Class IV+	Heavy/Extra Heavy Traffic	residential, commercial and institutional floor and wall; subjected to heavy/extra heavy traffic

5. **Glazed Tile** – Tile with fused impervious facial finish composed of ceramic material, fused to the body of the tile that may be non-vitreous, semi-vitreous, vitreous or impervious.
6. **Paver Tile** – Glazed or unglazed porcelain or natural clay tile formed by the dust-pressed method having a facial area of six square inches or more.
7. **Porcelain Tile** – A ceramic mosaic or paver tile that is generally made by the dust-pressed method of composition resulting in a tile that is dense, impervious and fine grained.
8. **Quarry Tile** – Glazed or unglazed tile, made by the extrusion process from natural clay or shale usually having a facial area of six square inches.
9. **Scratch Hardness (MOH's Hardness)** – The relative hardness of glazed tile is an important issue that should be addressed when selecting tile. Scratch resistance of glazes is measured by scratching the surface of the tile with different minerals and assigning a "MOH's Scale Hardness" number to the glaze, the softest mineral used is talc (a rating of 1) and the hardest is a diamond (a rating of 10 if no scratch). Most glazes used on ceramic tile fall in the five to six range, which is also slightly harder than most steels. Case-hardened steel, such as what is used in drill bits, is

approximately six and will scratch most glazes. Quartz, number 7 on the MOH's scale, will scratch most glazes (sand is a common example of natural quartz).

10. Tile – A ceramic surfacing unit, usually relatively thin in relationship to facial area, made from clay or a mixture of clay and other ceramic materials, called the body of the tile, having either a glazed or unglazed face and fired above red heat in the course of manufacturing to a temperature sufficiently high to produce specific physical properties and characteristics.
11. Unglazed Tile – A hard, dense tile of uniform composition throughout, deriving color and texture from the materials of which the body is made.
12. Water Absorption – ASTM C-373 is the test method for classifying ceramic tile by the percent of its water absorption. Individual tiles are weighed, saturated with water, and then weighed again. The percent difference between the two conditions is referred to as the water absorption. Although this test is used to evaluate water absorption of glazed and unglazed product, it can also be a good indicator to predict the stain resistance of the unglazed tiles. Generally for unglazed tiles, the lower the water absorption, the greater the stain resistance.
  - a. Impervious - Tiles exhibiting 0.5% or less
  - b. Vitreous - Tiles exhibiting more than 0.5% but not more than 3.0%
  - c. Semi-Vitreous - Tiles exhibiting more than 3.0% but not more than 7.0%
  - d. Non-Vitreous - Tiles exhibiting more than 7.0%

#### C. LOCATION

1. Tile is appropriate for all areas which may be subject to high foot traffic, wetness, and require the need for increased durability, e.g., dining facilities, kitchens, break rooms, restrooms, entry lobbies, floors and or walls, etc.

#### D. SELECTION

1. Technical criteria: Select tile based on the performance criteria appropriate for the functional use of the space. There are five properties of ceramic tile to consider: Coefficient of Friction, Durability Classification or PEI, Scratch Hardness, Breaking Strength and Water Absorption. Select tiles with the following properties:
  - a. Coefficient of Friction: Floor tile shall have a minimum coefficient of friction of 0.60 (wet and dry) or higher in accordance with ASTM C-1028. Standing water and other contaminants create slippery conditions for any hard surface floor material. Floor applications with exposure to these conditions require extra caution in the tile selection. Use abrasive grains or raised textured tile for greater traction in areas with the possibility of standing water or grease build up.
  - b. Durability Classification: Floor tile shall be Class IV—Heavy Traffic, durability classification as rated by the manufacturer when tested in accordance with ASTM C-1027 for abrasion resistance as related to foot traffic. Class III can be considered for residential installations.
  - c. Scratch Hardness: Glazed floor tile shall have a scratch hardness of 6.0 or higher. Do not use glazed tile in areas of high abuse where possible tile breakage may occur. Avoid high gloss or polished tiles for areas with high traffic; use only as accents in floor patterns.
  - d. Breaking Strength: Tile shall be impact resistant with a minimum breaking strength of 250 lbs in accordance with ASTM C-648.
  - e. Water absorption: Use only vitreous or impervious tile for most applications in accordance with ASTM C-373.
2. Functional/Aesthetic Criteria: Some products work better in certain functional areas than others. The pattern, texture, and color or combination of colors will greatly influence the overall appearance of tile. Consider the amount of cleaning and maintenance required when selecting particular tiles and grouts.

- a. Slip resistance: This is a major factor in the selection of tiles for kitchens and entrance lobbies. There are numerous products that have slip-resisting features for lobbies. Unglazed quarry tile works best for commercial kitchen floor installations. Because of the possibility of water and grease spillage, unglazed tile must be sealed in kitchens.
- b. Color: Recommend tile with through-color, that is, color the entire thickness of the tile body. Avoid solid color tiles unless they are designed into a pattern. Avoid light-colored quarry tile in commercial kitchens. Colors and patterns shall be approved by the Government.
- c. Texture: Tiles with a textured surface and an interesting variation of colors will tend to show less surface soiling.
- d. Grout: Select medium to dark pigmented grouts. Light grouts tend to change color and trap soil over a period of time. Minimize the visibility of grout by using larger-sized tile.
- e. Base: Use a matching tile base in commercial kitchens and other areas subject to excessive water. In other locations, wood or vinyl base may be appropriate. Ensure that there is an aesthetical transition between tile/wood bases and vinyl bases as you progress from one area to another.

## E. INSTALLATION

1. Tile: Install tile in accordance with the appropriate ANSI A108/ANSI A118/136-1999 Specifications for the Installation of Ceramic Tile as per manufacturer's instructions.
  - a. Provide transition strips wherever the tile meets another floor material to avoid damage to the tile edges and ensure that there are no accessibility issues.
  - b. Provide trim tile like bull nose at wall edge transitions.
  - c. Mockup: Provide 4 ft. by 8 ft. sample panels of tile construction (floor and wall) for evaluation and establishing workmanship expectations. Panels shall be used for evaluation of subsequent tile work for the specific project. Panels shall be removed upon direction of the Government.
2. Grout: Ceramic tile grout shall be prepared and installed in accordance with ANSI A108.10. Follow grout manufacturer's recommendations as to grouting procedures and precautions.
  - a. Take special care, especially when grouting with dark pigmented colors, to clean all of the grout from the tile during installation. A grout release is recommended to prevent finely powdered pigments from lodging in the pores of the tile surface. Epoxy grouts are recommended for kitchens, showers and rest rooms.
3. Sealant: Some tiles and grouts do not require sealant, but others require multiple coats of sealant at the time of installation. Do not apply sealant to glazed tile, but unglazed tile must be sealed.
  - a. Apply sealant to the tile and grout in accordance with manufacturer's instructions. Perform acceptance tests per manufacturer's recommendations before accepting the completed installation. Some sealants may also require reapplication several times a year. Application of silicone sealer may be required for maximum protection.
  - b. Obtain the tile manufacturer's guidelines for recommended cleaning agents. Ensure that the occupant receives the care information in the form of an Operations & Maintenance Manual. Include information regarding requirements for reapplication of sealants.

## F. CARE AND MAINTENANCE

1. Clean and maintain floor tile according to the manufacturer's recommendations without being excessive. Obtain specific information on the product used from the tile distributor, contractor or installer. Provide Operations Engineering Service Contracts Element (92 CES/CEOE) with appropriate cleaning and care instructions so this information can be incorporated into base custodial contracts.

2. **Cleaning:** Establish a regular schedule for routine cleaning of tile floors to remove day-to-day dust and other “normal” accumulations (food crumbs, boot and shoe marks, etc.). This includes (but is not limited to) sweeping, dusting, light vacuuming and washing.
  - a. Identify and remove stains and spillage immediately. Under normal situations, most tile can be easily cleaned using clear water with a manufacturer’s recommended tile cleaner. Always follow up with a rinse of clean water.
  - b. Do not use undiluted bleach or harsh/abrasive cleaning agents as they can scratch the surface of the tile or degrade the finish surface of either tile or grout. Do not combine ammonia with any bleach as this creates a toxic substance.
  - c. Tile with coarse or abrasive type surfaces requires more frequent performance of cleaning and/or maintenance. More vigorous agitation with more frequent changes of water is necessary.
3. **Maintenance:** Maintain the tile on a regular and frequent basis to prevent buildup of soil, grease, residue, soap, detergents, sealers, dampness, liquids, etc., which may reduce the static coefficient of friction, and reduce the aesthetic appearance of the tile.
  - a. Do not apply waxes or floor polish to ceramic tile floors unless specifically recommended by the manufacturer. Wax cleaner, oil-based detergents and sealants may decrease the slip resistance of ceramic tile. They also have the tendency to attract and trap dirt when not completely removed during the cleaning process.
  - b. In cases where waxing is recommended, ensure that old wax is stripped according to manufacturer’s recommendations before new wax is applied.
  - c. Follow manufacturer’s directions when buffing is recommended as a maintenance procedure. Do not buff excessively, or use coarse buffing pads, as this may cause a permanent burn to the surface of the tiles.
  - d. Use protective padding to prevent damage when moving any heavy equipment or sharp-edged items over the tile (e.g., moving furniture into a building, bringing in carts of musical instruments for a performance at a club, etc.). This is especially important when tile is used as stair treads.

## **SECTION 100000 – SPECIALTIES**

### **A. GREEN PROCUREMENT PROGRAM**

1. Fairchild Air Force Base has adopted the AF Sustainable Procurement Program regarding procurement of items that use recycled materials and conserve resources. The program requires that some construction materials be composed of a minimum percentage of recycled products. See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 016000, *Product Requirements*, for details.

### **B. SIGNAGE**

1. When developing specifications for this section, use the Fairchild Base Design Guide sectional information developed by the 92d Civil Engineer Squadron Engineering Flight.

### **C. PAPER TOWEL AND TOILET PAPER DISPENSERS**

1. In restrooms, all paper towel and toilet paper dispenser cabinet locks shall be tool operated. Keyed locks shall not be permitted.
2. Any restroom design shall require locating, furnishing, and installing backing for the specific dispensers needed by the Government’s custodial contract, but shall not be installed by the Government’s Custodial Contractor. Dispensers shall meet the paper product and soap specifications outlined below.

- a. Toilet Tissue Dispensers shall be a high-capacity standard 3-roll type and come complete with a tamper-resistant lock. If a role is used, simply turn the dial to advance to the next role. Where limited space is an issue, the use of a standard 2-role side-by-side type dispenser is acceptable, where one role is covered, while one is in use. Toilet tissue paper product specifications: 3.25 inch x 4 inch double ply, 865 sheets per role.
- b. Hand Towel Dispensers shall be a high-capacity design and come complete with a tamper-resistant lock. The dispenser shall require the user to only touch the paper product reducing cross-contamination and shall cut the rolled paper product in pre-measured 11-inch lengths. Dispenser shall hold 1 high-capacity role. Hand towel paper product specifications: 8-inch roll, 800 feet per roll. Multi-fold towels & dispensers are no longer used on the installation.
- c. Hand Soap Dispensers shall be a high-capacity cartridge style. Dispenser shall accept a 1 liter replaceable cartridges and come complete with a tamper-resistant lock. The use of refillable liquid containers is no longer supported on the installation.

## SECTION 101400 – SIGNAGE

### A. OVERVIEW

1. **When developing specifications for signage, use UFC 3-120-01, Design: Sign Standards as amended/clarified by this data sheet.**
2. Hierarchy:
  - a. This data sheet. This data sheet incorporates standards set forth in AMC Exterior Sign Standards and AMC Services Signage Policy Supplement.
  - b. UFC 3-120-01, Design: Sign Standards.
3. Design proposals for all signs (other than the types mentioned in this data sheet) shall be submitted to Base Civil Engineer's Architectural Compatibility Review Board (ACRB) for approval prior to implementation. Allow a minimum of 30 days in the design process for ACRB review.

### B. REFERENCES

1. AMC Exterior Sign Standards
2. AMC Services Signage Policy Supplement
3. ASTM D4956, Standard Specification for Retroreflective Sheeting for Traffic Control, <http://www.astm.org/Standards/D4956.htm>
4. Fairchild Air Force Base Installation Facilities Standards
5. Manual on Uniform Traffic Control Devices (MUTCD), Federal Highway Administration <http://mutcd.fhwa.dot.gov/>
6. UFC 3-120-01, Design: Sign Standards  
[http://www.wbdg.org/ccb/DOD/UFC/ufc\\_3\\_120\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_3_120_01.pdf)

### C. TYPOGRAPHY, GRAPHICS, AND SIGN PLACEMENT

1. Graphics
  - a. For exterior signs, where a shield or emblem is referenced, use the AMC shield for units under AMC. Tenant units, such as AETC, JPRA, DRMO, ANG, and Army, may use their respective shield or emblems. When using adhesive backed stickers for these shields or emblems, trim to the outline of the shield or emblem only.

### D. THE AMERICANS WITH DISABILITIES ACT

1. Parking Stalls

- a. All parking lot striping shall be white. Do not provide handicapped symbols or wording to the parking surface of parking stalls.
- b. Handicapped parking access aisles will be striped white by diagonal stripes.

E. EXTERIOR IDENTIFICATION SIGNS

1. Military Identification Signs:

a. Military (Building) Identification Sign

- i. All building identification signs shall be free standing.
- ii. Signs shall be Charleston Industries, Inc., Architectural Signage Systems, Series 325 Post and Panel System, Standard Design.
- iii. Signs will be double-faced and oriented perpendicular to the roadway to permit reading by traffic moving in both directions.
- iv. Provide full street address below the unit name.
- v. Provide address lettering heights equal to the name of the organization.
- vi. Sign colors shall be white letters on “National Park Service Brown” background. Background, sign back, and post color shall match.
- vii. Posts shall be 2-1/2” x 3-1/4” with 3’ buried in a 12” diameter by 3’-6” deep concrete footing.
- viii. Existing SERE School building identification signs are installed on brick bases. All future signs shall match main base (installed on posts).

b. Building Number Sign Type

- i. Only show the building number without displaying “Building Number” wordage.
- ii. Locate sign on side elevation at approximately 5’-4” above ground. Adjust the placement of the sign to fit within the brick or block coursing where possible. Use only one sign per building.
- iii. Sign colors shall be white letters on “National Park Service Brown” Pantone, PMS469c color background.

2. Community Identification Signs:

- a. Use Military (Building) Identification Sign when identifying community facilities as opposed to the Community Facilities Signs.
- b. Facilities with Services Activities (per AMC Services Signage Policy Supplement):
  - i. Facilities that house more than one Services activity will have all collocated activities listed on the exterior sign.
  - ii. Illuminated entrance signage is limited to one exterior illuminated sign per facility, located at or near the main entrance to the facility/operation.
  - iii. Entrance door signage is limited to facility name and hours of operation.
- c. ACRB approval is required for all community and services activity identification signs.

F. DIRECTION SIGNS

1. Do not attach additional signs, such as the “H” for “Hospital” or “Tree City USA” to posts supporting another sign.
2. Direction Signs



- a. Sign colors shall be white letters, arrows, rules and borders (reflectivity mandatory) on “National Park Service Brown” background.

### 3. Street Name Sign

- a. Provide one street name sign (for each street) at each street intersection.
- b. Sign locations shall be consistent with other intersections in area and installed above traffic control signs. Mount both street name signs on single post.
- c. Sign panel material shall be aluminum with a minimum thickness of 0.100”.
- d. All street name signs are to include a 4” AMC shield to the left of the street name.
- e. Sign colors and materials shall be as specified in the MUTCD.

### 4. Direction Signs Type

- a. Vehicular directional and way finding signs shall be as detailed in the MUTCD.
- b. Pedestrian directional signs shall follow UFC 3-120-01.

## G. REGULATORY SIGNS

### 1. Traffic Control Signs

- a. Traffic control sign face layout and colors shall be in accordance with the *MUTCD*.
- b. Sign back and post color shall be painted to match Sherwin Williams SW #2070 “Spanish Moss.”
- c. Reflective sheeting shall be warranted to meet or exceed *MUTCD Table 2A-3 Minimum Maintained Retro-reflectivity Levels* for ten years. Black is non-reflective.
- d. If *MUTCD* sign size is inconsistent with other signs of the same type on base, obtain ACRB approval.
- e. Sign panel material shall be aluminum with minimum thickness:

Horizontal width less than 20”	0.063”
Horizontal width between 20” and 36” inclusive	0.080”
Horizontal width over 36”	0.125”

#### Notes:

- 1 - The side dimension for a diamond shaped warning sign is considered to be the maximum horizontal dimension.
  - 2 - Freestanding signs on the flightline (within the controlled area) shall be 0.100” minimum thickness.
- f. Either non-perforated 2-1/2” square or 2-3/8” outside diameter round metal posts may be used. Round posts require special mounting brackets to maintain orientation of sign panels, bolting through round post is not permitted.

### 2. Handicapped Parking Signs:

- a. Handicapped Parking Signs shall be freestanding unless approved by the Architectural Compatibility Review Board (ACRB).
- b. Use Parking Regulation Sign for designation of handicapped parking stalls.
- c. Do not display any “Fines” wordage or panels to handicapped signs.
- d. Sign face colors shall be white symbol, letters, and border on “National Park Service Brown” background.

- e. Sign back and post color shall be painted to match Sherwin Williams SW #2070 “Spanish Moss.”
- f. For van accessible spaces, provide the same, but substitute the wording “Van Accessible” for “Reserved Parking.”
- g. Signs shall be pole mounted. Use the clear height of 5’-0” to the bottom of the panel unless safety dictates use of the 7’-0” height. When handicapped parking spaces are adjacent to reserved parking spaces, install handicapped parking signs at same height as reserved parking signs.
- h. Handicapped parking sign posts shall be non-perforated 2” square metal tubing.

3. Reserved Parking Signs:

- a. Reserved Parking Signs shall be freestanding unless approved by the ACRB.
- b. Curb markings shall not be used.
- c. Use Parking Regulation Sign for designation of reserved parking stalls.
- d. Sign face colors shall be white letters and border on “National Park Service Brown” background.
- e. Sign back and post color shall be painted to match Sherwin Williams SW #2070 “Spanish Moss.”
- f. Signs shall be pole mounted. Curb markings shall not be used.
- g. Reserved parking sign posts shall be non-perforated 2” square metal tubing.
- h. The following reserved parking locations are authorized:
  - i. Squadron-level facilities may have one reserved parking sign for each of the following positions: Squadron Commander, Deputy (Ops Officer), First Sergeant, and Chief Master Sergeants.
  - ii. Wing Commander: Reserved parking signs for the wing commander are authorized at Wing Headquarters, Command Post, Fitness Center, Officer/Enlisted Club, Commissary, and Base Exchange.
  - iii. Limited customer service or visitor spaces and government-owned vehicle spaces are authorized: Number and location(s) shall be approved by the ACRB.
  - iv. Honor Guard: One spot at the Shoppette and one spot at the Base Exchange.
  - v. Car-Pool: Use requires approval by the ACRB.

H. MOTIVATION SIGNS

- 1. Exterior signs displaying unit emblems, mottoes, or personal names are not permitted.
- 2. Use of motivation signs shall be approved by the ACRB.

I. WALL MOUNTED SIGNS

- 1. Use of wall mounted signs is discouraged.
- 2. Except for the Building Number Sign or required hazard placards, use of wall mounted signs shall be approved by the ACRB.

J. SPECIFICATIONS AND DETAILS

- 1. Submit shop drawing of each sign and post/base for approval by 92 CES/CENM prior to manufacture.
- 2. Do not mix metals. For example, use aluminum bolts with aluminum stock.
- 3. Assembly bolts and brackets shall match the surface color where attached.

4. Exterior Signs shall be designed for nighttime visibility.
  - a. All sign background, legend, symbol, and border colors shall be retroreflective except for black which shall be opaque.
  - b. Reflective sheeting shall meet ASTM D4956 Type I.
5. For exterior signs not specified elsewhere in this data sheet, the minimum aluminum panel thickness shall be 0.063”.
6. Sign Posts/Bases:
  - a. Use concrete footings.
  - b. The use of wood posts is not permitted.
  - c. Steel posts, when used, shall be galvanized.
  - d. Posts shall not be perforated.

## SECTION 110000 – EQUIPMENT

### A. PERMITTING REQUIREMENTS

1. Refer to Section A.3, *Environmental*, to determine permitting requirements for equipment that includes, but is not limited to: paint booths, sawdust collectors, bag houses, and cyclones.

### B. Equipment Installation requirements

1. All equipment mounting brackets shall be secure using finish screws that are color-coded to match the mounting brackets.
2. Any damage to the walls and ceilings during installation of any equipment shall be professionally repaired to match the same texture and color of the surrounding area. Damaged ceiling tiles shall be replaced with matching tiles.
3. Interior conduit shall be run inside walls, above ceilings or in crawl spaces/basement areas. Cable/wires run in ceilings that are used for return air plenums shall be run in rigid conduit or are “plenum-rated”. Flush mounted cut in boxes shall be used for all new power/data points. Surface mounted conduit and boxes are prohibited except in utility rooms.
4. All power cords and data lines shall exit walls and ceilings at a point as close to the equipment as possible. All data lines shall enter walls in boxes with color coded faceplates that match the type originally installed in the facility.
5. No conduit, wires, cable, etc. are allowed to be attached to the exterior walls or roofs of buildings except in extreme circumstances. Building penetrations shall be below grade whenever possible. If it is not possible to enter buildings below grade, conduit shall enter the building as close to grade as practical. All exposed exterior conduit shall be painted to match the exterior of the facility.
6. All equipment installations that require supporting electrical work or other facility modifications must be approved by 92CES on an AF Form 332 PRIOR to purchasing the equipment. A drawing/sketch shall be attached to the AF Form 332 that shows the location of all equipment that is proposed to be installed and depicts the location of any new electrical or communication requirements. All electrical work that is provided as part of the equipment installation shall conform to the National Electrical Code.
7. Any equipment installation requiring penetration of fire walls shall be protected with a material or system of the same hourly rating that is listed by UL, FM, or a NRTL.

## SECTION 140000 – CONVEYING EQUIPMENT

### A. ELEVATORS

1. Specifications shall require contractors installing elevators to include a 1-year service and maintenance agreement included in the construction contract for all new elevators. (This is in addition to the standard, one-year construction warranty).

## SECTION 210000 – FIRE SUPPRESSION

### A. GENERAL DESIGN REQUIREMENTS

1. Design for all new construction and major projects shall comply with, but not limited to:
  - a. UFC 3-600-01, *Fire Protection Engineering for Facilities*
  - b. All applicable Tri-Service Fire Protection Engineering Working Group (TSFPEWG) Guides
  - c. All Applicable NFPA standards, except where modified by UFC 3-600-01
  - d. All applicable Fairchild specific requirements
  - e. **The Designer shall confirm that this guidance has not been superseded by any subsequent DoD directives.**
2. Entire facility has automatic fire detection and/or sprinkler fire suppression system.

### B. KITCHEN EQUIPMENT

1. All suppression systems used for the protection of commercial cooking operations shall be wet chemical systems IAW NFPA 17A and shall be designed as “overlapping” type.

### C. WET-PIPE SYSTEMS

1. An electronic water flow switch (vane paddle type) shall be installed for the purpose of indicating a fire condition and be adjustable to delay the signal to the fire alarm panel up to at least one minute.
2. Water flow pressure switches and retard switches are not required.

### D. DRY-PIPE SYSTEMS

1. The air system side shall be maintained by an Air Pump: Supervisor Air Panel, Model F112, UL Listed 892A, the pump being a Vacuum-Pressure, Model # 400-1901, manufactured by Barnat Co., Berrington, IL 60010, or equal.

### E. PREACTION SYSTEMS

1. The chamber, valves and assembly shall be a Gem Multimatic, Model A-4; a Grinnell Duomatic, or approved equivalent.
2. No water flow pressure switches or retard switches on the system.

### F. FIRE HYDRANTS

1. Fire hydrants shall be Dry barrel and suitable for winter conditions. 5 inch Storz adapters must be attached to the largest diameter opening of all new fire hydrant installations.
2. Fire hydrants shall be identified by color, based upon NFPA 291.

### G. KEYS

1. All fire equipment cabinets on Fairchild AFB shall be keyed alike.

### H. MISCELLANEOUS REQUIREMENTS

1. The Inspectors Test Valve, if not located with riser, must not be hidden and remain accessible to maintenance personnel.
2. All fire sprinkler systems shall have a PIV shut off valve.
3. All hydraulic and general information placards will be metal and information shall be permanently stamped
4. Fire suppression systems shall have an external electric bell to indicate water flow by the fire riser room.
5. All tamper switch arms on OS&Y valve stems shall be in the groove of the valve stem for proper alignment.
6. All rooms containing Fire Suppression equipment shall be labeled at the door.

## **SECTION 220000 – PLUMBING, GENERAL PURPOSE**

### **A. BACKFLOW PREVENTION**

1. Backflow assemblies are required at the water service entrance to buildings. Internal backflow assemblies are required at boiler make-up connections and any other location where the source of potential contamination through cross-connections is present. Specify the appropriate level of protection for the level of hazard.
2. All backflow prevention assemblies shall be manufactured by Febco or Wilkins and shall, at time of installation, reside on the current publication of Washington State Department of Health – Division of Environmental Health – Office of Drinking Water's Publication 331-137, *Backflow Prevention Assemblies Approved for Installation in Washington State*.

### **B. CATHODIC PROTECTION**

1. See FAIRCHILD AIR FORCE BASE DESIGN GUIDE Section 264200 for cathodic protection Requirements.

### **C. WELDING**

1. See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 013520, Paragraph B.2 for welding requirements.

### **D. PIPING**

1. Do not specify grooved pipe and fittings for domestic water systems.
2. If copper piping is specified on hot or cold domestic water lines, Type L copper piping shall be used.
3. Isolation valves shall be provided for each domestic water line serving, or returning from, each bathroom in a facility and each individual dormitory style rooms; or the lines serving, or returning from, a common bathroom/kitchen in dormitory style housing.
4. Domestic water line isolation valves 2" and under shall be full port ball valves.

### **E. WATERLESS URINALS**

1. When specifying waterless urinals, require cartridge-less models. Basis of design shall be wall-hung, vitreous china, manufactured by ZeroFlush Inc. or approved equal.

### **F. AUTOMATED FLUSH VALVES**

1. Hard wired automatic flush valves shall be installed on all urinals and water closets in restrooms in customer service, administrative and other high-use public areas. Flush valves shall be SLOAN 186-1-ES-S Optima Flush Valve for urinals", SLOAN Model 111-ES-S Optima Flush Valve for water closets, or equal. Connect the number of flush valves to transformer per

manufacturer's recommendations (typically up to 10 flush valves). Chrome finish is required on all installed automatic flush valves. No battery operated automatic flush valves shall be used.

**G. AUTOMATED FAUCETS**

1. Hard wired automatic faucets shall be installed on all sinks in restrooms in customer service, administrative and other high-use public areas. The required finish for all faucets is chrome. No battery operated automatic faucets shall be used.

**H. SHOWER MIXING VALVES**

1. All shower mixing valves shall have stops.

**I. PRESSURE WATER COOLERS**

1. Pressure water coolers shall be wall-mounted type, complete with a bottle filler. The bubbler shall be located on the cabinet deck, and shall have an adjustable stream regulator. The control for the bubbler shall be a front push-button. The bottle filler shall have touchless control. The unit shall have a minimum 3000 gallon filtration system, complete with an LED Visual Filter Monitor to indicate when filter replacement is required. The unit shall also have a "Green Ticker" displaying the count of plastic bottles saved from waste.

**J. CLEANOUTS**

1. Install sanitary sewer cleanouts on each urinal, water closet and lavatory during new construction and when renovation work involves plumbing. All other cleanouts as required by UPC.

**K. SEWER LINE MAINTENANCE AND INSPECTION**

1. Clean all sanitary sewer laterals from the construction areas to the sanitary sewer main after all remodels and new construction involving installation of or repairs to sanitary sewer lines and connected appliances. Provide video recordings of the laterals showing condition of the laterals after cleaning. Lines shown not fully clean shall be re-cleaned. Damaged or incorrectly installed lines and connections shall be repaired. Re-accomplish the video recording after re-cleaning or additional repairs are completed.

**L. LEAD CONTENT IN DRINKING WATER PLUMBING:**

1. To comply with amended Section 42 USC 300g-6 of the Safe Drinking Water Act, the allowable lead content of potable water pipes, plumbing fittings, and fixtures shall be no greater than 0.25 percent. Faucets and other end-use devices must meet ANSI-NSF Standard.

**M. FLOOR DRAINS**

1. All restrooms shall have a minimum of one (1) floor drain.

**SECTION 230000 – HEATING, VENTILATING, AND AIR CONDITIONING**

**A. SECTIONAL INFORMATION**

1. Mechanical fire protection features for air handling, heating, ventilation, and exhaust systems must comply with the requirements of NFPA 90A, except as modified by UFC 3-600-01.

**B. ENERGY MANAGEMENT AND CONTROL SYSTEM**

1. Provide mechanical systems with electronic direct digital control (DDC) by interfacing with the existing Fairchild AFB central Energy Management and Control System (EMCS). See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 230900.

**C. LOAD PROFILE**

1. Designs shall include a 24-hour heat/cooling load profile for the facility together with a profile of energy consumption requirements. Energy consumption requirements shall include annual

energy and annual energy per square foot for space heating, space cooling, domestic hot water, and process loads.

#### D. LIFE CYCLE COST ANALYSIS

1. For new construction and major renovation where a large portion of HVAC equipment is being replaced, equipment shall be analyzed for life cycle cost effectiveness, as applicable but not limited to the following: ground source heat pumps, water source heat pumps on a hydronic loop, hydronic boilers, variable speed drives on pumps and fans, demand based ventilation, infrared radiant heat, evaporative heat with and without heat exchange, dedicated outdoor air systems, and heat recovery units.

#### E. NATURAL GAS

1. Natural gas is supplied by Avista Utilities under firm regulated rate schedules. Base gas lines are owned and maintained by Avista Utilities and Honeywell Corp. All natural gas line distribution work must be coordinated through the respective system owner. The on-base distribution system operates at 55 psig. The system is a combination of steel and polyethylene lines buried at a depth of approximately 30 inches. It is recommended that any connections to the steel lines be investigated to check for corrosion prior to final design or any construction. Future major additions to the system shall be sized and planned to provide a natural gas grid system for the base.

#### F. METERS

1. Provide meters (when determined cost effective by 92 CEN) for water, irrigation, natural gas, and power; and ensure compatibility and connection with the base EMCS. See FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 230900, FAIRCHILD AIR FORCE BASE DESIGN GUIDE SPECIFICATION Section's 262713 and 330000.

#### G. HEATING SYSTEMS

1. Heat Sources: Fairchild AFB currently uses a combination of gas fired steam boilers, hot water boilers, unit heaters, and radiant heat located in each facility. All new facility and heating system renovation projects shall evaluate natural gas fired hydronic boilers, gas-fired infrared radiant heaters, ground source heat pumps, and/or water source heat pumps on a hydronic loop (as appropriate) based on lowest life cycle cost analysis. **Gas fired stand-alone, or gas fired instantaneous and/or solar domestic hot water is preferred over electric.** Where boilers are used, maximize the burner turndown ratio as allowed by minimum life cycle cost. For new heating system projects, there shall be a full system design, which utilizes high-efficiency boilers.
2. Boiler Piping: Heating hot water set points shall be capable of being reset based on outside air temperature. Exterior and underground piping may not be of PVC, or have glued joints.
3. Gas-fired infrared radiant heaters shall have ten (10) foot tube lengths with couplings to allow for ease of replacement. The first ten foot section attached at the burner shall be made of stainless steel.
4. Direct-fired gas units shall not be acceptable.
5. Steam boilers shall not be acceptable.

#### H. COOLING SYSTEMS

1. Air-cooled chillers, and air-cooled condensing units shall be considered (as a minimum and as appropriate) on the basis of lowest life cycle cost analysis. **Only Trane chillers shall be used. There will be no substitutions.**
2. For chillers that utilize a flow switch for proving chill water flow, do not employ Variable Frequency Drives (VFD) on the chill water pumps. If a designer would like to propose another control method, which may include VFDs, then that method must be detailed in the chillers sequence of operation portion of the design documents for Fairchild AFB's evaluation and approval.

3. Evaporative cooling, cooling towers, and variable refrigerant systems shall not be approved cooling systems. Chilled water cooling and DX cooling shall be acceptable.
4. All new equipment shall employ HFC refrigerants - Class II ODS refrigerants are not acceptable.
5. Chiller Piping: Exterior and underground piping may not be of PVC, or have glued joints.

I. MECHANICAL SYSTEM SITING AND ROOM LAYOUT

1. All mechanical equipment shall be sited within the mechanical room or on-grade outside the facility - rooftop installations are not acceptable. When located outside, pad-mounted heat exchangers and compressors shall be screened in accordance with the Fairchild AFB *Architectural Compatibility Plan* and Division 32, Section 320000, Paragraph D. Equipment located outside shall have an enclosure with at least one 120V, 20 amp duplex electrical outlet mounted on/near the equipment.
2. Mechanical rooms shall be designed to provide maintenance personnel the space necessary to service the installed equipment and perform major system overhauls efficiently. Maintenance platforms shall be provided as necessary.
3. A source of clean water shall be available in the mechanical room. A connection, hose bib fitting with cap and lanyard, to the domestic water line is preferred.
4. Free space shall be provided to allow easy removal of fan shafts from air handling units, tube bundles from steam converters, changing of air filters, and other large items without removal of another system component.
5. For hydronic systems, removal of a component of equipment shall not require the removal of other equipment items or more than two fittings.
6. Do not mount electrical disconnects, VFDs, or similar devices where they will impede access to equipment. This includes mounting devices directly to the equipment when that location will impede access.
7. VFDs shall be installed at eye level in mechanical rooms. If distance to the mechanical room, available space in the mechanical room, or building type/design prevent the specified installation then the contractor must walk/talk a government representative through the proposed installation locations, and receive that representative's approval prior to installation.
8. All mechanical equipment (not floor mounted) shall be accessible by stairs, platforms, or catwalks with a staging area to allow for maintenance, repair, and replacement of the largest component. In instances where access via stairs, platforms, or catwalks is not reasonably achievable, then access via a lift will need to be maintained; this includes taking into account the placement of the equipment in relation to other existing systems (e.g. fire suppression, lighting, etc.). Unless specifically stated in the SOW, it will be the expectation of Fairchild AFB that the use of stairs, platforms, or catwalks is reasonably achievable and desired.
9. Pumps shall be less than 4 feet off the ground and accessible for maintenance/replacement.
10. Floor slab for mechanical rooms shall have minimum slope of 1% and be provided with appropriate floor drainage connected to the sanitary sewer system. Provide housekeeping pads for pumps, boilers and floor mounted electrical equipment. Pads for other mechanical room equipment will be evaluated on a case by case basis.
11. All thermometers and other gauges shall be mounted to provide unobstructed view of dial face.
12. Condensate overflows and pressure relief piping shall be installed full-size from the point of equipment connection with minimal piping and elbows and routed to within two (2) inches of the floor and directed to allow any flows to dispose properly without creating excess liquid ponding.
13. Glycol system overflows and pressure reliefs shall be piped back to the glycol feed tank. If the new design or existing system does not include a glycol feed tank then overflows and pressure reliefs shall be piped to a suitable container that is accessible for emptying its contents.



14. A copy of the mechanical and HVAC schematics shall be provided in booklet form and placed in the mechanical room.
15. All conduit and/or piping shall be fed to equipment from overhead.
16. The ventilation for HVAC systems serving conference rooms, training rooms and other spaces with variable occupancy shall be controlled using dual technology occupancy sensors.

#### J. DISTRIBUTION SYSTEM

1. Do not specify grooved pipe and fittings for heating and cooling systems.
2. Provide full port ball valves for isolation. All hydronic piping lines leaving the mechanical room, as well as any main line branches, shall have isolation valves installed – isolation valves shall be located in the mechanical room where possible. ALL equipment to isolate it for maintenance/repair, except expansion tanks.
3. Propylene glycol (30 percent) shall be used over nitrates for heating and cooling systems; except for dry-cool systems, which shall be 40% propylene glycol. Glycol shall be DOWFROST HD Heat Transfer Fluid – Dyed.
4. Diaphragm type expansion tanks are preferred over the bladder or compression type expansion tanks.
5. Spiro-vent air/dirt separators with flanged cleanout are preferred.
6. Bell and Gossett pumps are preferred.
7. Provide reheat coils on all VAVs. Do not specify fan-powered VAVs. Reheat coils shall have a minimum of 2 rows.
8. Provide water softeners on the water supply for all humidifiers.
9. All air handling units shall be installed inside in a mechanical room. All ductwork shall be inside the facility. Packaged units with air handling included shall not be specified or installed.
10. Provide sealed bearings for all fractional horsepower motors.
11. Compare systems using variable flow through coils at constant temperature via variable speed drives to systems with variable temperature at constant flow. Specify the system with the lowest life cycle cost. If flow control valves are used to balance a variable flow system, specify manual balancing valves.
12. Do not specify equipment that requires special software to operate, maintain, or troubleshoot. Do not install equipment that requires a separate connection to the Fairchild network
13. Boilers and chillers shall be monitored and enabled by EMCS but shall be controlled by the individual equipment package controls. Equipment alarm inputs to the EMCS controller and supply temperature resets from the EMCS system controller will be utilized to the greatest extent possible.
14. Special consideration shall be given to ease of service of distributed equipment, where possible, filters shall be of a commonly available size for ease of replacement. Filters and other routine service items shall be located in the most accessible locations. Mezzanine floor access is preferred over locations above ceilings, and locations above ceilings in hallways are preferred over locations inside individual or group office areas. At least 4 feet of free space shall be adjacent to any side of equipment that requires access for maintenance.
15. For air handlers with bearings that require greasing, grease fittings shall be extended with copper tube back to the access panel/door if the fittings are not within an arm's length of the access panel/door.
16. For VAV systems, a three way valve at the end of each loop and two way valves for the other VAV boxes are preferred over a three way valve at each VAV box.

17. For glycol filled systems that employ a glycol makeup tank, do not include a connection to makeup water and do not include a bypass feeder.
18. For hydronic systems a filtration system shall be employed – located upstream of the system's pumps unless otherwise dictated by the filtration system manufacture.
19. All mechanical openings shall follow the shutoff damper and associated ductwork insulation requirements of the IECC (section C403) and the WSEC (section C403), regardless of equipment process (manufacturing, industrial, commercial).

**K. REFRIGERANTS**

1. The Contractor shall reclaim refrigerants and return them to the government.

**L. TESTING**

1. Provide for testing, adjusting, and balancing of air and water systems. The work shall be performed by an independent testing and balancing agency other than the mechanical contractor. The testing and balancing agency shall be a subcontractor directly to the general contractor.
2. Provide for commissioning/acceptance testing of all building systems. Commissioning/acceptance testing shall be done by an independent, certified testing agency subcontracted directly to the general contractor. The testing agency shall have a minimum of five years of experience conducting acceptance procedure testing of mechanical systems or in the commissioning of buildings.

**M. OPERATIONS AND MAINTENANCE MANUALS**

1. Operations and maintenance manuals shall be furnished for all mechanical systems (as part of the overall O&M manual requirement.)

**N. TRAINING**

1. Training and instruction will include adjustment, operation, and maintenance, including pertinent safety requirements of the equipment and systems specified. Orient the training specifically to the system installed. For EMCS, a minimum of 4 hours of on-site training for up to 12 HVAC/Controls personnel is required. In addition, a minimum of 8 hours training for EMCS operators and controls technicians will be provided. Instructors shall be thoroughly familiar with the subject matter they are to teach. Training manuals shall be provided which describe in detail the data included in each training program. The manuals shall also include an agenda and defined objectives for each lesson. At a minimum, the training manuals shall include a mechanical systems diagram and control system schematic. Training and manuals shall be provided no later than 10 days prior to the scheduled training. Training presentations will be mandatory. Unplanned, impromptu sessions do not constitute an acceptable training program.

**SECTION 230900 – INSTRUMENTATION AND CONTROL FOR HVAC**

**A. ENERGY MANAGEMENT AND CONTROL SYSTEM (EMCS)**

1. General
  - a. Sequences of operations guidance shall be provided and are required on all systems.
  - b. All installations shall communicate with the central EMCS office and be stand-alone operable for all programmed functions in the case of communications loss with the central computer. Override control of functions shall be possible from the central EMCS computer center. Communications shall therefore include alarm reporting, override control when necessary, and the capability of gathering trending summaries on system points.
  - c. EMCS shall use native BACnet architecture as referenced by the latest version of ANSI/ASHRAE Standard 135. The communication between application controllers shall be BACnet MS/TP.

- d. Provide EMCS control of all systems on the basis of distributed controls using intelligent direct digital controllers (DDC). The existing approved EMCS is the Alerton System.
  - e. The contractor shall return all removed/demolished electronic HVAC controls to the government.
  - f. All fans, including exhaust fans, shall be integrated into the single point EMCS shelter-in-place shutdown switch located in the main fire department control room. When the switch is activated, all fans affecting occupied areas shall be shutdown. This includes fan powered VAV boxes. Essentially, if it has a fan and moves air, then it shall shutdown when the shelter-in-place switch is activated
2. Facility Environmental System Control
- a. Facility environmental system control shall be accomplished via the EMCS installation programming and hardware. Do not specify a traditional pneumatic control system installation with an additional requirement for EMCS interface. Controls shall be electronic; sequences shall be executed by the EMCS DDC equipment using electric motor operated actuators. Pneumatic actuators may be specified based upon application requirements or economic justification with 92 Civil Engineer Squadron Engineering Flight approval.
3. Set points
- a. Specifications shall require that all set points and similar control parameters be capable of being changed or altered from the EMCS central computer to facilitate troubleshooting. Do not install set point values in permanent memory that require a site visit by maintenance personnel for alteration.
4. Graphics
- a. All graphics shall display real time readings. Web based access using Internet Explorer from any computer located on the Fairchild CE VLAN is required.
  - b. Provide a graphic that shows the floor plan of the building. The floor plan graphic shall be the home page for each building and shall display the temperature and set point for each control zone. There shall be a link to the appropriate equipment page from each temperature/set point display on the floor plan. There shall also be a link to all other mechanical equipment graphics from the home page. There shall be a link from all graphics back to the home page. The home page will have a link to the EMCS home page. The outside air temperature shall be displayed on the building home page.
  - c. VAV graphics will have a link to the AHU that supplies air to the VAV. Provide a VAV status page that displays all VAV temperatures, set points, flow set points, flow, discharge air temperature, and re-heat valve position. Each VAV page shall link to the VAV status page. The VAV status page shall also have links to each VAV page.
  - d. Provide graphics that shows a quick view of selected equipment for the entire EMCS system. Provide a separate graphic for AHU status, hot water pumps status, hot water supply temps, chilled water pumps status, chilled water supply temps, domestic hot water pumps status, domestic hot water temps, freeze stats status, flood alarm sensors status, Honeywell owned boiler alarms status, Honeywell owned boilers steam pressure and Fairchild owned boiler alarms status. Animators can be used but are not required. A simple status indication is acceptable. The quick view status pages shall be linked to the EMCS home page and there shall be links between all of the quick view status pages.
  - e. All mechanical equipment graphics will show an accurate representation of the equipment and will have real time readings of all hardware points and set points. Equipment actuators will show the position in a 0-100% format and may also show the actual analog output value. The actuator spring range and normal default position will also be annotated. EMCS operators shall have the ability to change set points and schedules and over-ride all hardware points from the graphical interface.

- f. All point trends shall be accessible through links on the page that is displaying that value.

#### 5. Required Specifications

- a. The following specifications for EMCS equipment shall be employed for all designs.
- b. All new controls shall be the Alerton system. The existing Fairchild AFB Energy Management Control System is used to monitor, schedule, alarm (routed to all workstations and via paging system), program, and trouble-shoot over 120 buildings. An existing server-client network supports technicians in the field for this work.
- c. Communications over the Fairchild AFB metropolitan area network using a T1 connection at 1.5 Mbps up to and including 100 Mbps shall be required. Twisted-Pair 10Base-T cabling systems shall be supported. Field access to area controllers and application specific controllers using existing laptops shall be required; to include full access to the entire installed programming.
- d. The Network Communications Module that provides Ethernet connectivity for the Global Level Controller must be a dedicated device, specifically manufactured for that purpose. A category 5 rated Ethernet compatible network cable shall be run from the installed building networking equipment to the EMCS DDC Global Controller. The cable shall be terminated and plugged into the equipment at both ends. Materials and installation provided by Division 27.
- e. Existing Server-Client-Paging System: The EMCS shall fully and seamlessly support the existing EMCS System Server and Operator Workstation software that is residing on the Fairchild Server-Client-paging Network. EMCS Systems requiring additional operator's terminals, gateways, or routers shall not be acceptable.
- f. The EMCS shall be able to send automated alpha-numeric alarm pages from a single paging unit located in the telephone switch room next to the EMCS office in building 2451. The system shall have the ability to send a single alarm message to multiple pagers using the Fairchild paging system and/or email paging protocols.
- g. System I/O Points: The EMCS operators shall be able to read/write to all points and programming in the area and applications specific equipment remotely from the system server in the EMCS office. The EMCS operators shall have the ability to access, modify all program/point parameters, and install the modified programs in the controllers.

#### 6. Field Hardware

- a. Outside Air Temperature (OAT) sensors: OAT sensors shall be installed with a sun shade. Mount the sensor in the shade on the north wall of the building, approximately 10 feet above the ground level. These sensors are to be sensing actual outside air, not air inside the entrance of a section of ductwork.
- b. Current Transducers (CT): All status inputs on motors shall be through adjustable CTs. Do not install Differential Pressure sensors for status inputs. CTs on belt driven fans shall have the ability to recognize a broken belt as an off condition.
- c. Variable Frequency Drives (VFD): Install VFDs with BACnet interface cards in lieu of mechanical vanes. The interface cards will communicate on the MS/TP communication trunk at a minimum of 38.4 kbs. Fairchild prefers ABB variable frequency drives.
- d. Meters: Meters are required at for all utility system renovations exceeding \$200K, new MILCON, major renovation, Energy Conservation Investment Program projects, and Energy Saving Performance Contract projects. EMCS controls contractor shall provide meters to insure compatibility. Totalizing capability shall reside at the meter for electric meters or at the metering controller for gas and water meters so that consumption is tracked even if connectivity to EMCS is lost. Electric meters will have a BACnet communication interface and will be installed as a BACnet controller on the MS/TP loop. Fairchild prefers Veris power meters with a BACnet interface board.

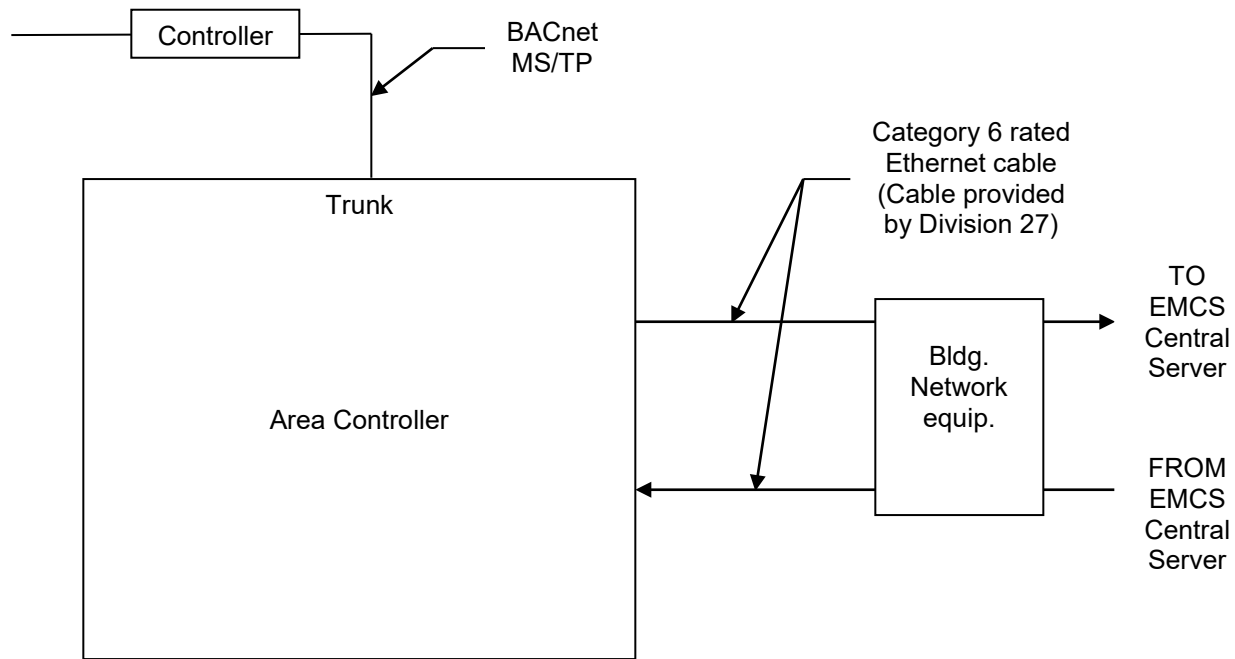
- e. Freezestats are required on air handling units with heating coils and outside air sources. Freezestats shall be hard wired to shutdown fan motors and have alarm inputs to EMCS.
  - f. Emergency air distribution shutoff buttons are required in all facilities to shut down the air distribution and exhaust systems throughout the building and close all dampers leading to the outside. The button(s) shall be wired as an input to an EMCS DDC controller. The EMCS system will shut down all fans (air handlers, exhaust, heaters, VAV fans, etc.) affecting occupied areas when the push button(s) are activated. The button(s) will be push-pull type with a cover and labeled. The buttons shall be mounted in a common area accessible to all personnel. A single button is acceptable to shut down all equipment. Multiple buttons can be used if needed due to the layout of the building.
  - g. Provide a status input from the building fire alarm panel. HVAC equipment supplying air to occupied areas will be shut down when the fire alarm panel is in alarm.
  - h. Air quality sensors are preferred for ventilation control in vehicle bays.
  - i. VAV Wall Sensors: Wall sensors shall have occupant set point control ability for possible future use. Zone temperature set points shall be set in software. Wall sensors shall have an override button to place the system in occupied mode.
  - j. VAV's will have discharge air sensors installed.
  - k. System actuators will be 2-10 VDC analog. This includes VAV dampers and reheat valves. Floating point actuators shall not be used.
  - l. Variable flow systems shall have flow measurement of total actual flow through the system, corresponding to temperature measurement so as to facilitate energy balances as a diagnostic tool. For example, VAV systems shall have flow measurement at the air handling unit discharge and corresponding to discharge temperature measured, as well as at the VAV boxes; and hydronic systems with variable speed drives shall have flow measurement corresponding to system supply or system return temperature measurements.
  - m. Boilers shall operate on their own manufacturer installed controls. Boilers shall have the ability to receive a remote enable command and analog input signal to reset the boiler controller hot water set point from the building EMCS DDC controller. Boilers shall have an alarm point that is sent to the DDC controller. These signals shall be hard wired to the DDC controller.
  - n. Chillers shall operate on their own manufacturer installed controls. Chillers shall have the ability to receive a remote enable command and analog input signal to reset the chiller controller chilled water set point from the building EMCS DDC controller. Chillers shall have an alarm point that is sent to the DDC controller. These signals shall be hard wired to the DDC controller. All new chillers will be Trane.
7. Submittals
- a. Coordinate with Fairchild AFB 92 Civil Engineer Squadron Engineering Flight (CENM) during design process.
  - b. As-built and Operations and Maintenance (O&M) Manual information must be available to the EMCS shop through the Contracting Officer at final acceptance. This stage is crucial to the orderly opening of a new facility.
8. O&M Manual Minimum Content Requirements for EMCS
- a. Flow charts of control sequences shall be provided as a part of the O&M submittal. Each point shall be indexed to show association with the control sequences.
  - b. As-built drawings shall show controller location, terminal numbers in the EMCS controller, and any equipment such as motor starters, air conditioning compressors, etc.
  - c. Catalog cuts included in the O&M Manual shall be marked with indicating arrows to show the specific installed item.

- d. Service and calibration information for all installed equipment.
  - e. A detailed contents and format instruction for O&M Manuals is available on request.
  - f. Commissioning report to include verification that all inputs and outputs operate and read accurately on a laptop at the building controller.
  - g. Provide valve and actuator schedules with operating ranges and default positions.
  - h. Provide two (2) 11" X 17" hardcopies and one (1) electronic copy of the control drawings. One hardcopy for the building control cabinet and one hard and one electronic copy for the EMCS Operators. All hard copies shall be in 8-1/2" x 11" 3-ring binders.
9. Installation
- a. Place all equipment in service accessible area such as a locked cabinet in mechanical room. Coordinate placement of cabinets with other crafts requirements.
  - b. Remotely located equipment must be readily accessible.
  - c. Provide for at least 25% spare point connections in controllers located in Mechanical Rooms.
  - d. Vendor must provide exchange and repair service for all components.
  - e. Install latest version of system software on the EMCS computer(s).
  - f. Vendor must tune all MS/TP LAN trunks in accordance with Alerton System documentation, using an oscilloscope and 80 to 120 ohm terminating resistors.
10. Commissioning
- a. The contractor shall field verify that all physical points are working properly and that the software routines are operating the controlled equipment according to design. Provide documentation showing that all hardware points have been tested. Testing shall include starting and stopping all binary output points, verify correct change of state of all binary input points, modulating the full range of all analog output points and calibrating all analog input points.
  - b. The contractor shall provide printouts documenting the waveforms of MS/TP LAN Trunks.

END OF DATA SHEET

## SECTION 230900 – INSTRUMENTATION AND CONTROL FOR HVAC EMCS

### DETAIL: EMCS BLOCK DIAGRAM



## SECTION 235200 – HEATING BOILERS

### A. BOILERS

1. Hydronic boilers shall be specified - steam boilers are not acceptable. Any non-emergent replacement of a steam boiler will require that all steam related system components/equipment also be replaced; converted to a hydronic system or to another means of heating (e.g. gas fired infrared heaters). Cast iron sectional boilers shall be avoided. Fire-tube boilers with external burners are preferred.
2. When practical, multiple boilers are preferred over one large single boiler. Where common venting of two or more boilers is used, spectacle flanges or other devices shall be employed to allow complete maintenance and inspection of one boiler while one or more boilers are operating under pressure.
  - a. Where redundancy (multiple boilers) is utilized, each boiler shall be sized to accommodate a minimum of 60% of the designed capacity of the boiler system, unless stated otherwise in the specific project contract.
3. For new heating system projects, there shall be a full system design, which utilizes high-efficiency boilers.

## SECTION 260000 – ELECTRICAL

### A. GENERAL

1. The design shall be in accordance with NFPA 70, *National Electrical Code®*, WAC 296-46B, *Electrical Safety Standards, Administration, and Installation*, national and state codes, and Air Force regulations.
2. All work shall be performed in accordance with NECA 1-2010, *Good Workmanship in Electrical Contracting*.
3. Coordinate with Base Electrical Engineering for the best way to connect into the base electrical distribution system. Include connection to the distribution system as part of the project.
4. Exposed conduit shall be allowed only in utility spaces. It shall not be allowed in finished spaces.

### B. REFERENCES

1. National Fire Protection Association (NFPA) <http://www.nfpa.org>
  - a. NFPA 70, *National Electrical Code®*, latest edition
2. Unified Facilities Criteria (UFC)
  - a. UFC 3-501-01, *Electrical Engineering*; latest edition
  - b. UFC 3-520-01, *Interior Electrical Systems*; latest edition

### C. METERS

1. Electrical meters shall be provided for all new facilities and all major remodels. Meters shall measure kilowatt-hours and demand. The meter multiplier shall be clearly marked on the inside of the meter. Calculations showing how the multiplier was obtained shall be submitted by the Contractor to the Contracting Officer for approval. Insure electrical meters are connected with the EMCS.

### D. MECHANICAL AND ELECTRICAL ROOMS

1. Outlets: Electrical and mechanical rooms shall be provided with convenience outlets every 12 feet.
2. Telephone Jack: One RJ-45 telephone jack shall be provided in each electrical and mechanical room.

### E. GENERATORS: Reference Section 263213 for generator requirements.

### F. PANELS AND BREAKERS

1. Breakers shall be provided whenever possible for overcurrent protection. Breakers for new panels shall be of the bolt-on breaker type. In your specifications specifically state that series rated breakers shall not be used. Provide 25% spare breakers on all new panels. Provide load calculations in the Design Analysis. Spare breakers shall be 20A.
2. All circuits shall be marked at the panel identifying what each circuit goes to.

### G. COMPUTER CIRCUITS

1. Computers shall have dedicated circuits and full sized dedicated neutrals. Shared neutrals shall not be used. Where appropriate, dedicated panels shall also be provided.

### H. COLOR CODING

1. Color coding for all three-phase circuits shall be in accordance with the following:



	480V	208V
Phase A	Brown	Black
Phase B	Orange	Red
Phase C	Yellow	Blue
Neutral	White	White
Ground	Green	Green

#### I. CONDUCTORS

1. All conductors shall be copper.

#### J. MOTORS AND CONTROLLERS

1. Motors: Motors shall be high efficiency type and use de-rated values for supply voltages. All motors shall have a disconnect switch as required by NFPA 70, National Electrical Code® (NEC). Motors over 10 HP shall have under-voltage, phase loss, and phase reversal protection.
2. Variable Speed Drives: When provided, variable frequency drive (VFD) controllers shall be enclosed in a ventilated enclosure with separate conduit for input and output power. Basis-of-Design shall be ABB (Asea Brown Boveri) brand VFD's.

#### K. LIGHTING

1. Design: Illuminating Engineering Society of North America's (IESNA) HB-9, *IESNA Lighting Handbook*, and UFC3-530-01 shall be referenced for lighting design.
2. Exit Lights: Exit lights shall be provided in accordance with NFPA 101. Exit lights shall be hardwired, "self-diagnostic" type with LED indicators (no bulb-type) and with replaceable emergency battery capabilities.
3. Emergency Lighting: Emergency lighting shall be provided in accordance with NFPA 101. Lights shall be "self-diagnostic" type with replaceable emergency battery capabilities. Down lighting built into EXIT lights is acceptable if it meets the foot-candle illumination requirements as a means of egress. Wall mounted battery/lamp type units are preferred.
4. Parking and Recreational Lighting: This type of lighting is provided by fixtures mounted at an average height of between 30 and 50 feet and is used in recreational areas and parking areas. Provide rectangular (shoe box) luminaires equal to Holophane Somerset (<http://www.holophane.com>, keyword: Somerset) with a bronze powder coat finish or approved equal. Physical profile of the luminaire shall have a height to width ratio between 1:2 and 1:3, with the depth dictated by the required fixture size. Fixtures shall be LED with equivalent wattage to provide the foot-candle levels recommended in the IESNA Lighting Handbook and in accordance with industry standard practice. Provide square, non-tapered pole (or match existing poles in the vicinity, if different from standard) with bronze powder coat finish. Provide unpainted concrete bases set with the top 30 inches above grade. Lighting must be controlled to automatically reduce lighting power by a minimum of 30%, during any period when no activity has been detected for a time of no longer than 15 minutes. Lights must also automatically turn off when sufficient daylight is available.
5. Roadway Lighting: This type of lighting is provided by fixtures mounted at average heights of between 30 and 50 feet and of the type typically used in roadway applications. Provide standard highway luminaire Cobra-head with full cutoff flat lens style or approved equal. Provide LED fixtures with equivalent wattage to provide the foot-candles recommended in the IESNA Lighting Handbook and in accordance with industry standard practice. A good guide is to provide wattage similar to the other streetlights in the immediate area. Provide round tapered brushed aluminum breakaway poles. Unpainted concrete bases shall be set with the top 3 inches above grade. Lighting must be controlled to automatically reduce lighting power by a minimum of 30%, during

any period when no activity has been detected for a time of no longer than 15 minutes. Lights must also automatically turn off when sufficient daylight is available.

6. Interior Lighting: Fixtures shall be LED with equivalent wattage to provide the foot-candle levels recommended in the IESNA Lighting Handbook, and in accordance with industry-standard practice. Controls should be manual upon the occupant entering the room. Control general lighting in daylighted areas separately through multilevel photocontrols (step dimming or continuous dimming), to reduce light output when daylight is available. There shall be at least one control step between 50% and 70% of design lighting power, and one control step that is greater than 35% (including "off") of design lighting power. Automatically turn off within 15 minutes of no occupant activity.
7. Color Temperature: Fixture lamps shall be 4100K temperature.

#### L. QUALIFICATIONS OF WORKERS

1. The contract shall require all electricians or high voltage linemen to be licensed by the state for the trade in which they are working. All Federal and Washington State labor laws shall be followed.

### SECTION 262000 – 15 KV ELECTRICAL DISTRIBUTION

#### A. GENERAL

1. The base electrical distribution system is rated 13.2 KV phase to phase and 7620 volts phase to ground. The system is 3 wire with concentric neutral, 60 Hertz, 3 phase, grounded wye. The area north of the runway is fed by an underground distribution system. The area south of the runway is fed by a combination underground/overhead system.
2. The existing distribution system is a loop system. All additions to the underground distribution system shall be designed as loop systems unless specifically authorized to do otherwise by 92 CES/CENM. Provide fused switches whenever conductors are being powered from the distribution system main trunk lines.

#### B. REFERENCES

1. Institute of Electrical and Electronic Engineers (IEEE) <http://www.ieee.org>
  - a. C2, *National Electrical Safety Code*®
2. National Fire Protection Association (NFPA) <http://www.nfpa.org>
  - a. NFPA 70, *National Electrical Code*®, latest edition
3. *The Lineman's and Cableman's Handbook*, latest edition. (Published by McGraw-Hill)
4. Unified Facilities Criteria (UFC)
  - a. UFC 3-501-01, *Electrical Engineering*; latest edition
  - b. UFC 3-550-01, *Exterior Electrical Power Distribution*; latest edition

#### C. UNDERGROUND DISTRIBUTION SYSTEM

1. 15KV Cable shall be copper conductors, 15 KV, URD construction, 133% EPR insulation, 1/3 concentric neutral 3 phase circuits, full concentric neutral for single phase circuits, full ~~PVC or~~ polyurethane jacket over the concentric neutral, 250 MCM conductor for main trunk line feeders, #2 AWG conductor for loop feeders.
2. Corona / Tape shields shall not be used as neutrals. All extensions of the base distribution system shall be color coded to identify the phasing of the conductors. Color notation for phases is left to right, Brown-Orange-Yellow for 13.2 KV. Ground all neutrals, lock all cabinets with Exterior Shop locks, label all lines, where they originate and terminate.

3. 15 KV underground cable shall be installed in concrete encased duct banks. Provide 5 inch Schedule 80 PVC or EB conduit. Provide spare conduit with pull wire for future use. Place duct bank 36 inches below grade. Provide rigid galvanized steel elbows wrapped in corrosion inhibiting tape at all transformers, junction cabinets, and short bends. Encase elbows in concrete. Secure conduit in position before placing concrete. Provide plastic warning tape with metallic wire above all duct runs.
4. All exterior equipment shall be painted according to the standard colors identified in FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION Section 09, Section 090000.
5. 15 KV splices and terminations shall be rated for the full ampacity of the cables being connected. All 15KV cable shall be Very Low Frequency (VLF) tested before energization. "T" type splices shall not be used. Dead break or Load break elbows shall not be installed in manholes. DC Hi-Pot testing shall not be allowed.
6. Transformers for the underground distribution system shall be oil filled, pad mounted, dead front construction, loop feed capable with six 200 amp load break integral bushings. Three phase transformer primary windings shall be rated 13.2 KV phase to phase, Delta connected primary (3 phase), grounded wye secondary. If used in a radial application – 15KV M.O.V.E. lighting arrestors shall be installed. Single phase transformers shall be rated 7620 volts phase to ground, grounded secondary. If used in a radial application – 10KV M.O.V.E. lighting arrestors shall be installed. All transformers shall be provided with 95 BIL, gang operated load break switch are not allowed, provide three individual switches (two switches for the loop H1A & H1B and one switch for the Secondary), primary bayonet fusing, taps + 2-2 1/2 %, de-energized tap changer switch, high voltage parking stand, penta-head locking bolt, 200 amp load break integral bushings, pressure relief valves, separate primary and secondary compartments. Provide minimum 10-foot clearance on operable sides for "hot stick" work and 4' clearance on all other sides when installing block/brick walls around pad mounted transformers. All transformer feeder cabling (high and low voltage) shall be fed from below grade, through the concrete pad and ground sleeve assembly. Above ground / side access will NOT be permitted. See Section 320000, Paragraph D. 5. for screening wall requirements.
7. 15 KV Junction Cabinet (Sectionalizing Terminals) shall be 12-gauge steel, with stainless steel hardware, one-piece construction, top-hinged, removable door, recessed lock pocket with padlock, ~~hasp~~ and penta-head silicon bronze door bolt, door stop, hinge retainer, hold down cleats, one parking stand per phase, ground clamp nuts welded in place (one per phase). Junction points shall be rated 15 KV, 200 amps (load break) for #2AWG cable. Equipment shall be pad-mounted type. Provide minimum 8' 10-foot clearance on operable sides for "hot stick" work and 4' clearance on all other sides when installing block/brick walls around pad mounted junction cabinets. See Section 320000, Paragraph D. 5. for screening wall requirements.
8. All 15 KV switches shall be pad-mounted oil switches (Cooper MOST-9B brand preferred). Key interlocks are not allowed. All "Dead-front" type switches shall have windows in them, to provide visual verification of the blades being in contact with each other, or having a visual "open" between them.
9. All pad-mounted equipment (transformers, switches and junction enclosures) shall be mounted on a reinforced concrete pad (or approved equal) with ground sleeve installed. A grounding ring of 4/0 bare copper shall encircle the pad and be buried 24 inches below grade. Provide four ground rods (one at each corner of the pad). Provide a 4/0 copper cable from the ground ring to inside the equipment enclosure for grounding in accordance with Institute of Electrical and Electronic Engineers' C2, *National Electrical Safety Code*® and National Fire Protection Association's NFPA 70, *National Electrical Code*®. All connections between the ground rods and the 4/0 cable shall be exothermic type equal to Cadweld brand.
10. Electrical distribution manholes shall be concrete, rated H20, have round manhole covers (spring loaded lids are preferred), minimum size 6 ft long, 4 ft wide, 6 ft high. Shall come complete with pulling irons, ground rods, and cable racks.

#### D. OVERHEAD DISTRIBUTION SYSTEM

1. Primary lines shall be copper hard/semi-hard drawn cable. Strain insulators shall not be used. Stirrups shall be placed at all distribution taps. CSP transformers shall not be used. External taps for transformers shall have two primary bushings. Provide transformer-rated lightning surge arrestors and fused disconnects on all transformer Primary Connections. Provide riser-class lightning surge arrestors and fused disconnects on all aerial/underground pole transitions.
2. Secondary lines and service drops shall be copper, duplex, triplex, or quadraplex. Weatherheads shall be used. Dead end with wedge clamps and insulators. Use compression connectors for secondary distribution, split-bolts shall not be used.
3. Service laterals shall be copper and installed in conduit. Conduit shall be PVC (preferred) or rigid galvanized steel wrapped in corrosion inhibiting tape.

## **SECTION 263213 – ENGINE GENERATORS**

### **A. PERMITTING REQUIREMENTS**

1. Refer to Section A.3, *Environmental*, to determine permitting requirements for equipment that includes, but is not limited to generators and other combustion-style engines.

### **B. AIR FORCE PROGRAMMING AND DESIGN REQUIREMENTS**

1. All RPIE generator designs must be approved in writing by AFCEC/CO or designee prior to finalizing project purchase and/or programming and/or design. Submit the generator authorization request during project initiation (programming) and design approval request at the 65 percent design milestone. If electrical design changes are made after the 65 percent design submittal, another design approval request is required.
2. All generators shall be specified with a factory installed Exhaust Gas Temperature (EGT) probe.
3. For generator installations sized 250 kW and higher, the design must include provision for portable load bank/generator connection at the ATS or distribution equipment (not at the generator). Size the connection at a minimum of the generator kW rating.
4. Generator fuel tanks shall be provided. The size of the fuel tank will have a minimum 72-hour local capacity tank based on the full-load fuel consumption rate of the engine. UFC 3-540-07 paragraph 8-6.5.5.
5. The sizing of all generators shall be in accordance with UFC 3-540-07 paragraph 8-3.2.2.2. Generators will be sized to a minimum of 50% of rated capacity.
6. Exterior generators, fuel tanks and ATS shall be painted to match "Sierra Tan" colored facilities paint to match as directed by the Government.
7. All generators shall be BACnet compatible and connected to EMCS for remote monitoring and control.
8. All generators shall be compatible with InPower software.

### **C. AUTOMATIC TRANSFER SWITCHES (ATS) REQUIREMENTS**

1. All ATS shall be specified to be four pole units.
2. Four pole requirement: Any project replacing a generator that is connected to a 3 pole ATS shall replace the 3 pole ATS with a 4 pole ATS. The electrical wiring shall be modified to allow the correct function of the 4 pole ATS.
3. All new ATS switches shall be specified four pole.
4. All new ATS will include an on-board battery charger properly sized to charge the generators batteries.

5. Bypass switches: All ATS switches shall be specified/designed to allow bypass of the ATS to allow maintenance and testing of the ATS without interrupting power to the facility. The bypass function shall be accomplished using a combination of manual disconnect switches. The disconnect switches shall be immediately adjacent to the ATS. Variances to these requirements due to space limitations will be considered on a case by case basis and require Base Civil Engineering approval. Existing auto transfer switches are Cummins and Asco.
6. All ATS switches shall be BACnet compatible and connected to EMCS for remote monitoring and control.
7. All ATS switches shall be compatible with InPower software.
8. All ATS switches shall have a manual disconnect between the commercial power and the ATS.

#### D. GENERATOR ROOMS

1. Emergency Generator Rooms: Where generator rooms are being provided, provide generator rooms with automatic louvers and exhaust fans for ventilation. Provide overhead and side lighting to minimize shadows. Provide water outlet, bay or double doors to allow replacement of generator, minimum 30 inches (800 mm) working clearance all sides. Provide sound dampers. Auto-transfer switches and start panels shall be located in the generator room.
2. If a generator room is not being provided, the generator needs to be in an insulated enclosure with a minimum 30 inches (800 mm) working clearance on all sides between the generator and the enclosure. Provide generator enclosures with automatic louvers and exhaust fans for ventilation.

### SECTION 264200 – CATHODIC PROTECTION

#### A. REFERENCES

1. National Association of Corrosion Engineers (NACE) International (<http://www.nace.org>)
  - a. Corrosion Specialist Certification
  - b. Cathodic Protection Specialist Certification

#### B. LOCATIONS REQUIRING PROTECTION

1. Cathodic protection shall be provided for all metallic underground utility lines, storage tanks, and structures in contact with the earth associated with the following systems:
  - a. Petroleum, Oils, and Lubricants (POL) systems
  - b. Fuel storage systems
  - c. Natural Gas piping
  - d. Water tanks (interior and exterior surfaces)
  - e. Steam piping

#### C. EXISTING PROTECTION

1. Existing utility systems are protected by:
  - a. The POL system is protected by coatings, sacrificial anodes, and five overlapping impressed current systems. No additions to this system will be allowed without an additional impressed current system.
  - b. Underground steel piping associated with POL, fuels, and natural gas are protected by coatings and cathodic protection.

- c. Natural gas lines are protected by coatings and three overlapping impressed current systems. There are **only two cathodic systems for natural gas lines which is maintained by Avista Utilities.**
- d. All water tanks are protected by coatings and cathodic protection.
- e. Fire protection systems receive water from base mains with no special measures to control corrosion unless underground steel piping is used. If steel piping is used, sacrificial anodes are installed. If the main and service are of dissimilar materials then an insulated coupling shall be installed between them.
- f. Sewer systems shall require no corrosion control.

#### D. DESIGN

- 1. Soil resistivity varies widely across the base. All cathodic protection design calculations shall be based upon actual soil resistivity measurements taken at the project site. Soil resistivity tests shall be taken by a certified NACE Corrosion Specialist.
- 2. All cathodic protection designs provided by the A-E shall be designed by a NACE certified Corrosion Specialist or NACE certified Cathodic Protection Specialist and be coordinated with the Base Cathodic Protection Engineer or Technician.
- 3. The preferred method of protection is impressed current; however, sacrificial anodes may be used as design conditions dictate.
- 4. All cathodic protection designs will consider the effect of interference upon existing cathodic protection systems and the structures they protect.
- 5. Design calculations shall be submitted for approval to the Contracting Officer.

#### E. INSTALLATION

- 1. A NACE International certified Corrosion Specialist shall supervise the installation and adjustments of all cathodic protection systems.

### SECTION 275116 – MASS NOTIFICATION SYSTEM

#### A. GENERAL DESIGN REQUIREMENTS

- 1. Design for all Mass Notification Installations shall comply with, but not limited to.
  - a. UFC 4-021-01, *Design and O&M: Mass Notification Systems*
  - b. UFC 3-600-01, *Fire Protection Engineering for Facilities*
  - c. All applicable Tri-Service Fire Protection Engineering Working Group (TSFPEWG) Guides
  - d. All Applicable NFPA standards, except where modified by UFC 3-600-01
  - e. All applicable Fairchild specific requirements
  - f. The Designer shall confirm that this guidance has not been superseded by any subsequent DoD directives

#### B. DESIGN

- 1. The system shall be designed under the supervision of a registered fire protection engineer, by a registered professional engineer having at least four years of current experience in the design of fire protection and detection systems, or by an engineering technologist qualified at NICET Level IV in fire alarm systems. Intelligibility modeling shall be performed. The Architect of Record shall be included in this process.

#### C. EQUIPMENT

1. Only Mass Notification Systems recommended by the fire alarm systems manufacture shall be used and installed IAW the latest edition of UFC 4-010-01 and UFC 4-021-01.
2. The acceptable manufacturer for the Mass Notification System shall be listed and “UFC 4-021-01 Compliant”
3. All batteries necessary to maintain the fire alarm control panel, transmitter, and/or accessories shall be gel-type.
4. Provide surge protection in accordance with UFC 3-520-01
5. All system equipment or components that are keyed are to be keyed the same as the fire alarm panel; # C415A key or Cat 45 Key shall be acceptable.
6. All Local Operating Consoles (LOC) are to be accessible at all times to the occupants, but must be protected from tampering by the use of a thumb-lock device.
7. All LOC shall have a microphone for building wide announcements.
8. All Local Operating Consoles shall have signage on the outside of the enclosure that state “Mass Notification” and if HVAC shutdown is provided “HVAC Emergency Shutdown”
9. All programming codes or passwords required to access, update, modify, and maintain the system shall be provided to the DOD installation no later than the date of final system acceptance.

#### D. ALERT MESSAGES

1. The system shall be capable of a minimum of 8 pre-recorded messages. The following pre-recorded messages shall be programmed into and clearly labeled on all LOC's:

Note: For single-story Facilities, delete "or exit stairway. Do not use the elevators" from the voice message.

- a. ALTERNATE EGRESS (Female Voice): (Temporal 3 Alert Tone)

"Attention all personnel. An emergency has occurred in the building. Please evacuate the building by alternate means." <Provide a 2 second pause> "May I have your attention please..." (Repeat the message).

- b. FORCE PROTECTION (Male Voice): (Alert Sound – Hi-Lo - 780 to 600 hz alternately, 0.52 each (repeat 2 cycles)

"Attention all personnel. The Force Protection Condition has been changed. All personnel are to immediately implement prescribed actions." <Provide a 2 second pause.> "May I have your attention please..." (Repeat the message).

- c. BOMB THREAT (Male Voice): (Alert Sound – Hi-Lo - 780 to 600 hz alternately, 0.52 each (repeat 2 cycles)

"Attention all personnel, a bomb threat has been issued for this building. Please leave the building by the nearest exit or exit stairway. Do not use the elevators. This is not a drill." <Provide a 2 second pause> " Attention all personnel..." (Repeat the message).

- d. HOSTILE THREAT (Male Voice): (Alert Sound – Hi-Lo - 780 to 600 hz alternately, 0.52 each (repeat 2 cycles)

"Attention all personnel, a hostile threat has been reported. Please take appropriate actions. This is not a drill." <Provide a 2 second pause> " Attention all personnel..." (Repeat the message).

- e. SHELTER IN PLACE (Male Voice): (Alert Sound – Hi-Lo - 780 to 600 hz alternately, 0.52 each (repeat 2 cycles)

"Attention all personnel, please proceed to your designated shelter-in-place location immediately and wait for further instruction. This is not a drill.." <Provide a 2 second pause>  
"Attention all personnel..." (Repeat the message).

- f. WEATHER WARNING (Male Voice): (Alert Sound – Hi-Lo - 780 to 600 hz alternately, 0.52 each (repeat 2 cycles)

"Attention all personnel, a severe weather warning has been issued. Take appropriate action and tune in to the local radio or television stations for the latest updates. This is not a drill."  
<Provide a 2 second pause> "Attention all personnel..." (Repeat the message).

- g. ALL CLEAR (Male Voice): (Alert Sound – Hi-Lo - 780 to 600 hz alternately, 0.52 each (repeat 2 cycles)

"Attention all personnel, the emergency has now ended. Please resume normal operations. Thank you for your cooperation. <Provide a 2 second pause> "Attention all personnel..." (Repeat the message).

- h. MNS TEST (Male Voice): (Alert Sound – Hi-Lo - 780 to 600 hz alternately, 0.52 each (repeat 2 cycles)

"Attention all personnel, this is a test of the Mass Notification system. This is only a test. <Provide a 2 second pause> "Attention all personnel..." (Repeat the message).

2. All MNS messages shall temporarily override fire alarm audible messages and visual signals, and to provide intelligible voice commands during simultaneous fire and terrorist events. All other features of the fire alarm system, including the transmission of signals to the fire department, shall function properly. MNS messages shall take priority and continue to override fire alarm audible messages until the MNS message is either manually or automatically ended. If not manually ended, the MNS message shall automatically end after 10 minutes.
3. When not overriding fire alarm messages, all MNS messages shall remain activated until manually reset.

#### E. MESSAGE PRIORITIZATION

1. The live-voice and pre-programmed messages shall be prioritized as follows:
- a. Live Voice announcement
  - b. HOSTILE THREAT
  - c. SHELTER IN PLACE
  - d. ALTERNATE EGRESS
  - e. BOMB THREAT
  - f. FORCE PROTECTION
  - g. WEATHER WARNING
  - h. ALL CLEAR
  - i. TEST
2. Only messages prioritized (a-e) shall be allowed to temporarily override fire alarm audible messages and visual signals, and to provide intelligible voice commands during simultaneous fire and terrorist events. All other features of the fire alarm system, including the transmission of signals to the fire department, shall function properly. The MNS message shall continue to override fire alarm audible messages until the MNS message is either manually terminated or automatically end after 10 minutes.
3. Provide a supervisory signal if the MNS is used to override fire alarm audible messages and visible signals during simultaneous fire and terrorist events. The supervisory signal shall be annunciated at the FACP and any remote fire alarm annunciators and be transmitted to the fire



department. The visual annunciation of the separate supervisory signal shall be distinctly labeled or otherwise clearly identified.

#### F. TESTING AND ACCEPTANCE

1. All Acceptance testing shall be conducted IAW applicable standards and scheduled with and witnessed by the Base Fire Prevention Office.

### SECTION 275400 – KLAXON AND NAOC ALARM SYSTEMS

#### A. ALERT KLAXONS AND NAOC ALARMS

1. The klaxon is the primary alerting system. The normal klaxon pattern is a 30-second blast, followed by a 15-second pause, for three soundings.
2. Certain facilities on base require alert klaxon and National Airborne Operation Center (NAOC) alarm systems. Designers shall retain existing alarm systems whenever a structure is remodeled. Designers shall specifically ask for direction from the base project manager if alert klaxon and NAOC alarm systems are required for new facilities.

#### B. KLAXON AND NAOC SYSTEMS

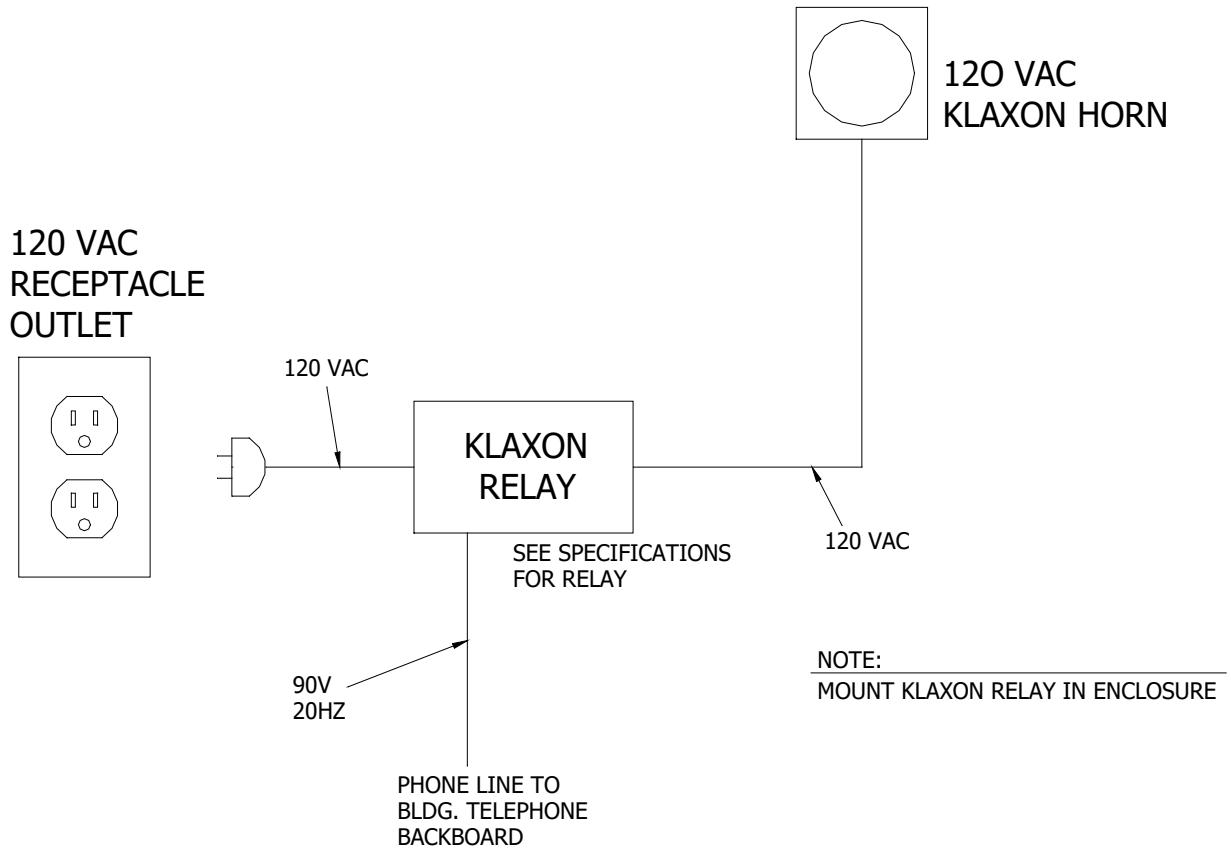
1. Both these systems are audio devices located to notify aircrews of the need to return to their aircraft. The audio alarms are located in specific buildings and some outdoor areas.
2. KLAXON SYSTEM: The klaxon system is for Fairchild aircrews. The command post initiates the alarm by sending a 90 volt 20 Hz signal through the phone system to the location of the klaxon horn. The 90 volts activates a relay that controls 120 volt power to the klaxon horn.
3. NAOC SYSTEM: The NAOC system is for aircrews of special visiting aircraft. A crewmember of the visiting aircraft initiates the alarm from the aircraft via a phone line plugged into the aircraft. A switch is thrown in the plane that completes a 48 volt DC circuit from the command post. The circuit activates a relay (located at the Command Post). That relay sends a 90 volt 20 Hz signal over a phone line to a relay. The relay controls 120 volt power to a 120AC/12VDC transformer rectifier. The 12 Volt DC powers the NAOC horn. The NAOC horn is a yelping sounding horn different from the KLAXON horn.

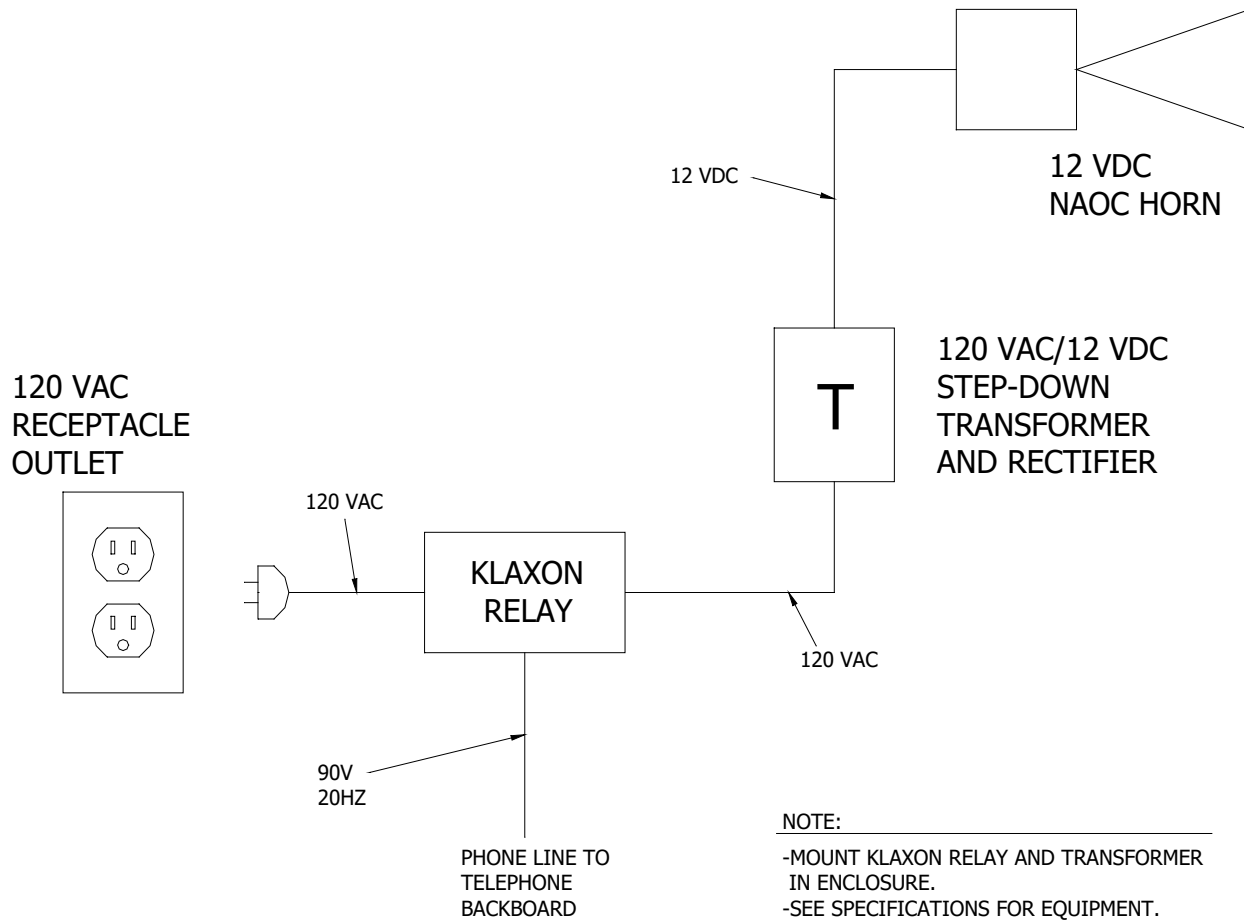
#### C. EQUIPMENT TO BE USED INSIDE A BUILDING

1. KLAXON and NAOC Relay: The relay used for both systems is a CRT-T-40, manufactured by Wheelock Signals Inc. (<http://www.wheelockinc.com>). The relay coil is rated 90 volts, 20 Hz. The contacts are rated 5 amp, 60 HZ 115 volt.
2. NAOC Horn: Yelping sound. The horn used for the system is 12 volt DC, Moose Model # MPI-37 (<http://www.gesecurity.com>, keyword MPI-37). This horn was last purchased through CARR Sales of Spokane Washington.
3. KLAXON Horn: Adaptahorn manufactured by Edwards Signaling & Security Systems, part of GE Security (<http://www.edwards-signals.com>). Draws 0.13 amps. For indoor locations use part number 874-N5. Provide mounting box. For outdoor locations use part number 876-N5. For hazardous areas use part number 878-N5.
4. NAOC POWER SUPPLY: Magnetek (<http://www.magnetektelecom.com>) Model WDU 12-1200. Input is 120VAC, 60 Hz, 24 watt. Output is 12 VDC, 1.2 amp, class 2 transformer.

#### D. WIRING DIAGRAMS

1. The details at the end of this section show how the NAOC and KLAXON system components are wired together in the buildings.

**DETAIL 1 – KLAXON SYSTEM AT FACILITY**

**DETAIL 2 – NAOC SYSTEM AT FACILITY**

NOT TO SCALE

## **SECTION 284611 – CARBON MONOXIDE DETECTION AND ALARM**

### **A. CARBON MONOXIDE**

1. Detectors
  - a. Carbon Monoxide (CO) detectors shall be specified for installation at all new construction and/or renovation projects. Permanent hard-wired CO detectors with a detection element service life of not less than five (5) years shall be used.
  - b. Detectors shall be listed by Underwriters Laboratories UL 2034, *Single and Multiple Station Carbon Monoxide Alarms*.
2. Locations
  - a. Install CO detectors in all Air Force-owned and -leased housing units with natural gas-, oil- or LPG-fired systems. Recommend one CO detector per housing unit near the sleeping areas; units with multiple floors shall install one CO detector per floor.
  - b. Install CO detectors in facilities housing natural gas-, oil- or LPG-fired equipment or appliances.
  - c. CO detectors in boiler rooms shall be located directly above gas-fired equipment.
3. Instructions
  - a. Contractor shall include the manufacturer's instructions regarding operation and proper maintenance of the detectors in the Operations and Maintenance Manuals.

## **SECTION 284620 – FIRE-ALARM SYSTEM**

### **A. GENERAL DESIGN REQUIREMENTS**

1. Design for all new construction and major projects shall comply with, but not limited to:
  - a. UFC 3-600-01, *Fire Protection Engineering for Facilities*
  - b. UFC 4-010-01, *Design and O&M: Mass Notification Systems*
  - c. All applicable Tri-Service Fire Protection Engineering Working Group (TSFPEWG) Guides
  - d. All Applicable NFPA standards, except where modified by UFC 3-600-01
  - e. All applicable Fairchild specific requirements
  - f. The Designer shall confirm that this guidance has not been superseded by any subsequent DoD directives

### **B. MANUAL STATIONS**

1. Devices shall be of the internal toggle switch type (not push button) with a key lock for reset and testing WITH NO GLASS RODS OR BREAK GLASS DEVICES.

### **C. BATTERIES**

1. All batteries necessary to maintain the fire alarm control panel, transmitter, and/or accessories shall be gel-type or sealed lead acid type.

### **D. FIRE ALARM/MASS NOTIFICATION SYSTEM CONTROL PANEL**

1. All zones shall be marked at the panel identifying locations. The labeling of all device addresses at the panel shall be approved by the Base Fire Prevention office before being programmed.
2. Reset control panel passwords to the default passwords.
3. Submit manufacturer's documents including operators, users, and programming manuals. These documents shall be submitted through the contracting officer to 92 CES/CEOE.

4. Panel shall be accessible to the fire department when the building is not occupied.
5. The complete Fire Alarm System shall be the product of only one manufacturer and shall be capable of communicating with the Monaco D-21 System.
6. There shall not be any relays between Fire Alarm panel(s) and Radio Transmitter, hardwired in only.
7. Fire alarm panel shall have Point to Point capability through the Monaco D-21 System.
8. Only Mass Notification Systems recommended by the fire alarm systems manufacture shall be used and installed IAW the latest edition of UFC 4-010-01 and UFC 4-021-01.
9. Smoke detector over fire alarm panel shall be no higher than 5 ft.
10. All wires shall be clearly identified for bell circuit and/or speaker/audio for MNS.
11. The AHJ shall be notified after conduit is installed for visual inspection. No panels shall be installed without coordination or location(s).
12. The last device installed must have an engraved sign stating the value and location of the end of line resistor.
13. On all false ceiling grids the cross "T"s shall be marked with a RED dot indicating the location of fire 'J' boxes.
14. Post a laminated 11 x 17 schematic drawing next to the fire alarm systems and MNS panels and clearly mark on the drawing the location of all fire 'J' boxes. (Hand written marking and/or labels is not acceptable).
15. Post a laminated 11 x 17 Floor Plan drawing next to the fire alarm systems and MNS panels and clearly mark on the drawing the room numbers, the location of all fire Pull Boxes and Detection devices. (Hand written marking and/or labels is not acceptable).

E. TRANSCEIVER (TRANSMITTER)

1. The transceiver shall be a Monaco Radio Alarm System Transceiver and be capable of transmitting a Zone Identification (ZID) to the Monaco D-21 VHF Radio Alarm System located in the fire stations (FM frequency 138.925 MHz).
2. With the following applicable hardware:
  - a. Antenna, ground plane, fixed station, cut to frequency.
  - b. Antenna Bracket (depending on preferred mounting):
    - (1) Lightning arrester kit.
    - (2) Rain tight enclosure for lightning arrestor.
    - (3) Coaxial cables with connectors, Type 1 (from lightning arrestor to transceiver):
    - (4) Coaxial cable with two PL-259 connectors, Type 2 (from antenna to lightning arrestor).
3. Lightning Protection: All antennas shall be provided with coaxial lightning arrestors located outside of the building and connected to the antenna grounding system. Lightning protection shall be installed in accordance with NFPA 70. Transceivers shall not exhibit mis-operation or failure when electrical transient per IEEE Standard 587 Category B are applied to the AC power line.
4. Location: Radio transceivers shall be installed in locations easily accessible for maintenance.
5. Programming: Radio transceiver shall provide a means for programming zone and transceiver identification in the field. Transceivers shall be designed to allow complete interchangeability and reprogramming of transceiver identification in the field without additional parts or equipment.

#### F. KEYS

1. All fire panels, associated panels, fire pull stations are to be keyed the same; # C415A key or Cat 45 Key shall be acceptable.

#### G. SUPERVISION

1. Tamper switches shall be provided for all post indicator and OS&Y valves to indicate a trouble condition in the event the valves or tamper switch covers are shut off or removed.

#### H. TESTING AND ACCEPTANCE

1. All Acceptance testing shall be scheduled with and witnessed by the Base Fire Prevention Office.

#### I. KNOX BOXES

1. The transceiver shall be a Monaco Radio Alarm System Transceiver and be capable of transmitting a Zone Identification (ZID) to the Monaco D-21 VHF Radio Alarm System located in the fire stations (FM frequency 138.925 MHz).
  - a. For new construction, boxes shall be recessed mount type.
  - b. For existing construction, surface mount type is acceptable.
2. "Knox Boxes" conforming to the fire departments key plan shall be used. Contact the base Fire Prevention office for key code information.
3. All "Knox Boxes" shall be tied into the facilities Fire Alarm Control Panel.
4. All "Knox Boxes" shall be located per directional and approval of the FAFB Fire Prevention Office.

#### J. GENERAL REQUIREMENTS

1. Tamper switches required for all post indicator and OS&Y valves to indicate trouble
2. Panel shall be accessible to the fire department when the building is not occupied.
3. Provide transmitter zone schedule. A minimum of 16 Zones shall be supplied with the capability to expand to 32 or 64 depending on the size of the facility being built.
4. The complete Fire Alarm System shall be the product of only one manufacturer. And shall be capable of communicating with the Monaco D-21 System.
5. There shall not be any relays between Fire Alarm panel(s) and Radio Transmitter, hardwired in only.
6. Fire alarm panel shall have Point to Point capability through the Monaco D-21 System.

Only Mass Notification Systems recommended by the fire alarm systems manufacture shall be used and installed IAW the latest edition of UFC 4-010-01 and UFC 4-021-01

Smoke detector over fire alarm panel shall be no higher than 5 ft.

All wires shall be clearly identified for bell circuit and/or speaker/audio for MNS.

The AHJ shall be notified after conduit is installed for visual inspection. No panels shall be installed without coordination or location(s).

The last device installed must have an engraved sign stating the value and location of the end of line resistor.

On all false ceiling grids the cross "T"s will be marked with a RED dot indicating the location of fire 'J' boxes.

## **SECTION 312000 – EARTH MOVING**

### **A. TOPSOIL AND FILL**

1. No topsoil or fill is available on Fairchild AFB.

### **B. EXCAVATED MATERIAL**

1. Excavated material shall be hauled off base to a certified landfill site approved by the Contracting Officer. Copies of all dump receipts shall be submitted to the Contracting Officer, including quantities intended for recycling purposes.

### **C. PETROLEUM-CONTAMINATED SOIL**

1. Refer to FAIRCHILD AIR FORCE BASE DESIGN GUIDE Section 013543, Paragraph 1.09.

## **SECTION 320000 – EXTERIOR IMPROVEMENTS**

### **A. GREEN PROCUREMENT PROGRAM**

1. Fairchild Air Force Base has adopted the *Green Procurement Program Plan* regarding recycling and conserving resources. The Plan requires that some construction materials be composed of a minimum percentage of recycled products. See FAIRCHILD AIR FORCE BASE DESIGN GUIDE Section 016000, *Product Requirements*, for details.

### **B. AIRFIELD PAVEMENTS**

1. The United States Air Force has very stringent and specific requirements for airfield pavements. Consult the Air Force project manager to obtain a copy of the latest guide specifications/handbooks for any airfield pavement projects.

### **C. BASE ROADS AND PARKING LOTS**

1. Base roads and parking lots shall be designed for the appropriate level of vehicle traffic. Parking lots shall be located away from the front of the building. Parking lot designs shall allow for removal of snow and ice. Provide integral, rolled Portland Cement Concrete curb and gutter for both roads and parking lots.
2. Street/road and parking lot repairs shall be completed within 48 hours of demolition operations. If repair is scheduled for more than 48 hours after demolition operations, then a cold mix shall be used as a temporary installation until the hot mix becomes available.
3. Base roads/streets are composed of asphalt concrete (AC) pavement, while some overlay existing Portland cement concrete (PCC) roadway. Road/street lane widths range from 10 feet (3.0 meters) to 15 feet (4.6 meters). All new pavement lane widths shall be 12 feet (3.7 meters) where possible, measured to the edge of the asphalt.
4. All projects calling for the installation of new paved roads or the resurfacing of existing paved roads, designer shall specify the installation of two Schedule 80, 4"-diameter conduits, concrete-encased sleeves under the road to be paved for the accommodation of future power and communication lines. Two such sleeves shall be installed beneath each branch of each intersection and also beneath the roadway at reasonable intervals between intersections.
5. If recycled PCC is to be used for base course, designer shall specify that appropriate conditions shall exist (e.g., documented resistance to sulfate attack), as well as, compliance with WSDOT or USACE specifications.

### **D. SCREENING WALLS**

1. Site utility elements such as transformers, electrical switch gear, gas regulators, back flow assemblies, mechanical units, dumpsters, and the like shall be provided with screening elements

to minimize their negative visual impact while not compromising necessary accessibility considerations.

2. Screen walls constructed of concrete or UNIT MASONRY materials compatible with the surrounding architecture are frequently utilized on base and their use is encouraged. (See FAIRCHILD AIR FORCE BASE DESIGN GUIDE Section323100).
3. Planted materials may be considered as well; however, hard wall screens shall be provided for all major mechanical air handling equipment and all dumpsters. Views from inside of the building as well as outside shall be considered.
4. Split block/brick fence shall be installed to protect/shield all gas regulators, transformers, exterior HVAC, back flow assemblies, mechanical units, dumpsters, etc. from vehicle damage and as a vision screen.
5. Screening walls shall be provided for all dumpsters, exterior electrical/ mechanical equipment, etc. Ensure sufficient clearance for maintenance access. Electrical equipment (e.g., transformers and junction cabinets), requires 8' minimum clearance on operable sides for "hot stick" work. Provide 4' minimum clearance on all other sides of electrical equipment.
6. There are three types of screening walls found on Fairchild AFB.
  - a. Walls located next to block facilities shall be constructed of blocks per Detail 1 and Detail 2, FAIRCHILD AIR FORCE BASE DESIGN GUIDE Section323100.
  - b. Screening walls located next to bricked facilities shall be bricked per Detail 3, FAIRCHILD AIR FORCE BASE DESIGN GUIDE Section323100.
  - c. Walls located next to facilities that are "Sierra Tan" in color but not of brick or block construction shall be constructed per Allen Block Corporation's mortar-less concrete block wall system. Plans and specifications can be obtained by contacting the Allen Block Corporation at 1-800-899-5309.
  - d. Block shall be standard gray color to be painted with color as approved and selected by Government.
7. See Section 042000, *Unit UNIT MASONRY*, for Fairchild AFB standard colors.
8. See *Architectural Compatibility Plan* section "Screens and Enclosures."

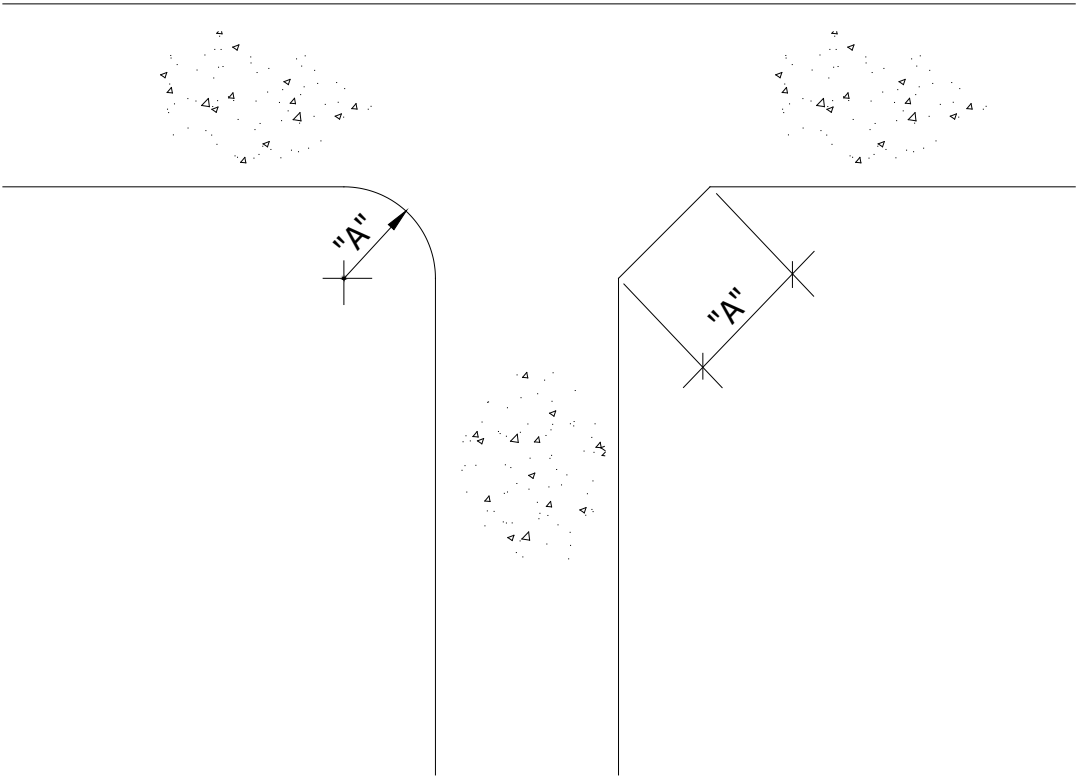
## SECTION 320000 – MISCELLANEOUS DETAILS

### A. DETAILS

1. Sidewalk Intersection
2. Bollards
3. Bike Rack
4. Outdoor Bench



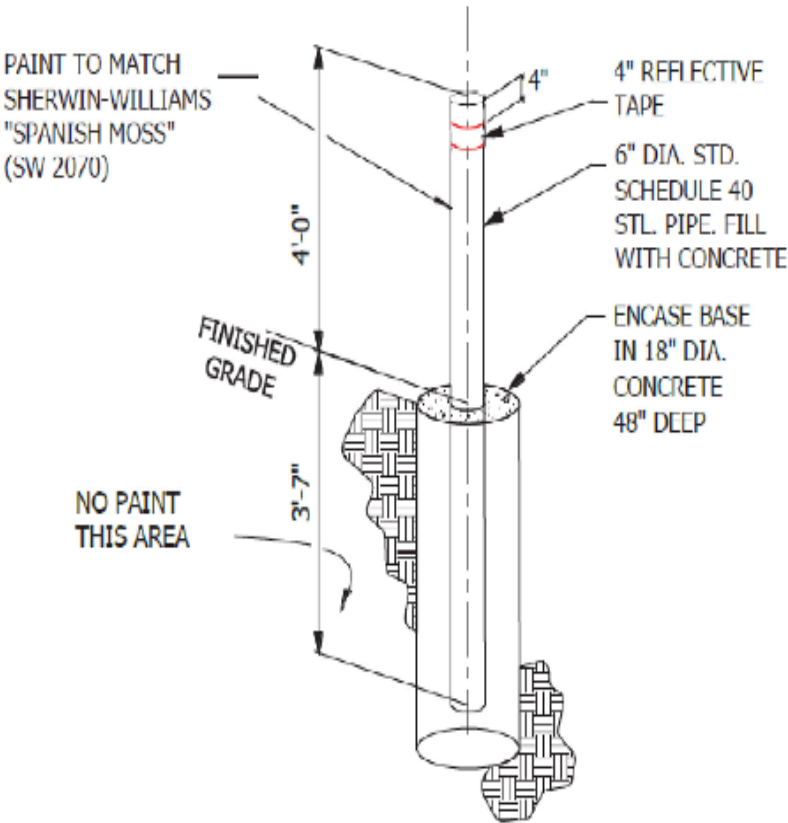
DETAIL 1 – SIDEWALK INTERSECTION



"A" = 3'-0" MINIMUM

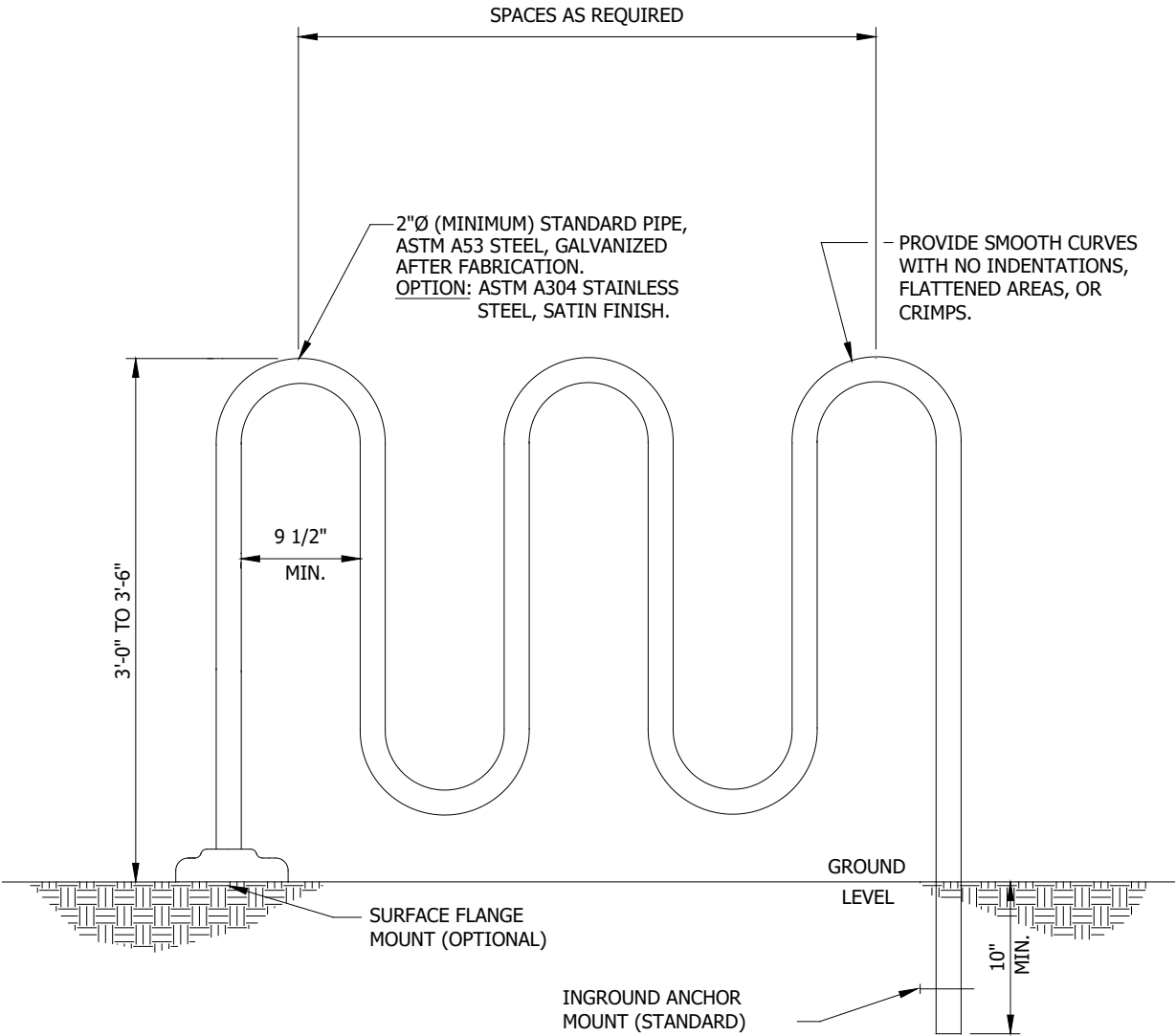
SCALE: NONE

DETAIL 2 – BOLLARDS



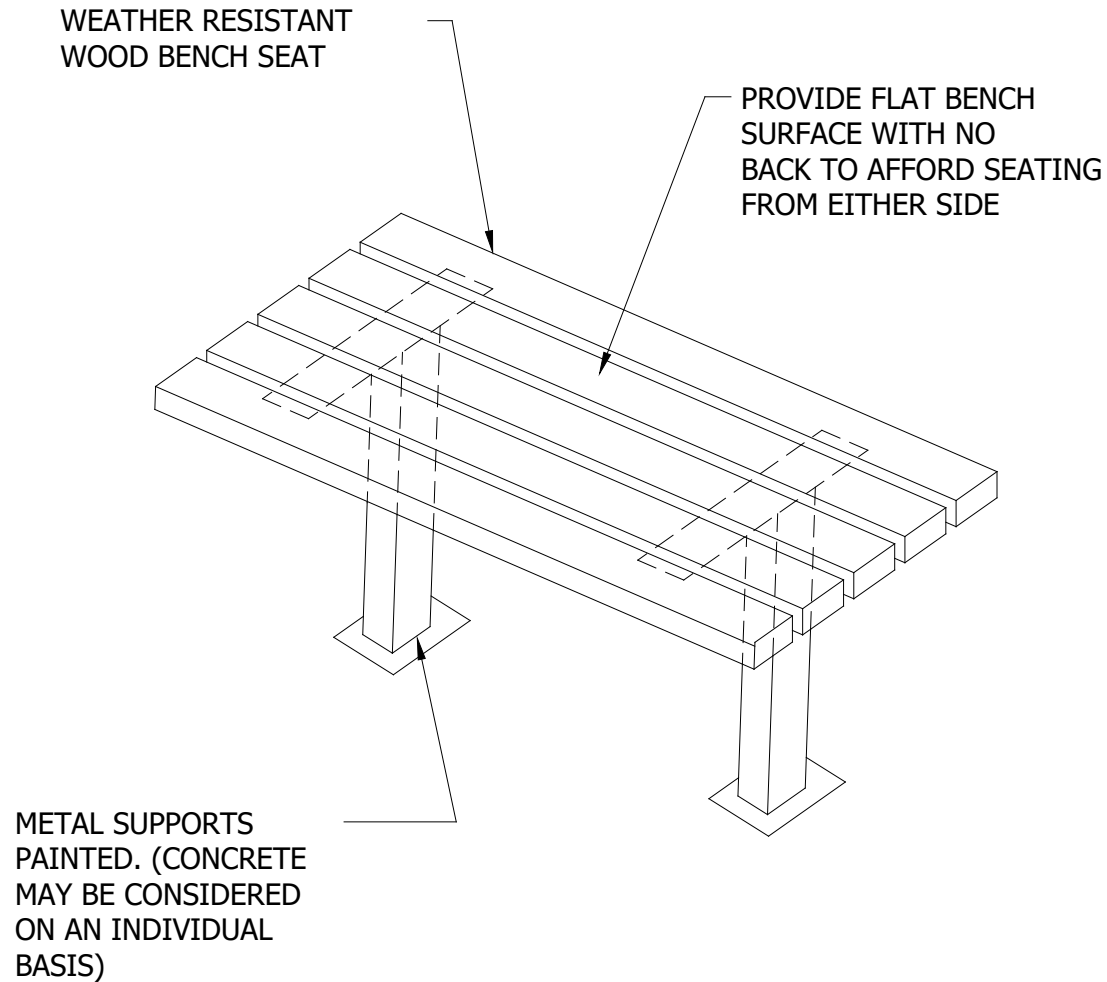
SCALE: NONE

DETAIL 3 – BIKE RACK



SCALE: NONE

## DETAIL 4 – OUTDOOR BENCH (TYPICAL)



NOTE:  
CONFIGURATIONS MAY VARY, BUT  
COMPONENTS MATERIAL SHALL  
MATCH THOSE INDICATED.

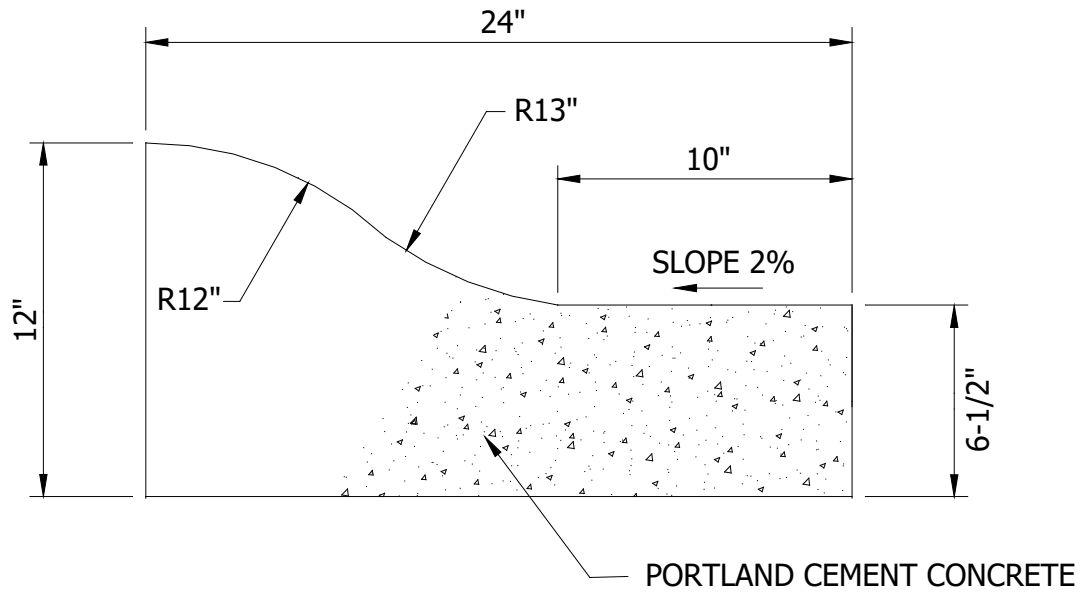
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## SECTION 321600 – CURBS AND GUTTERS

### A. CURB DETAILS

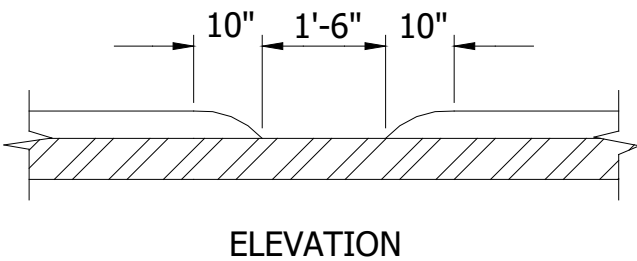
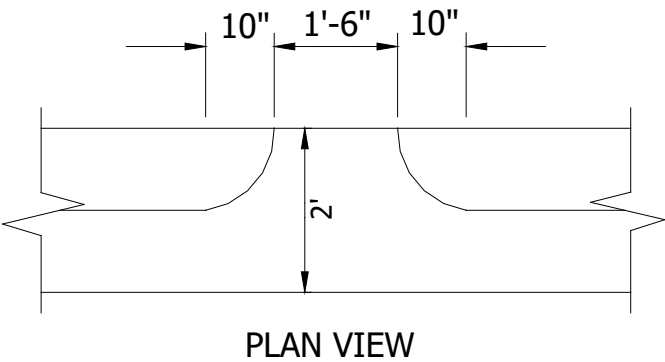
1. Typical Curb and Gutter
2. Typical Curb Cut
3. Asphalt Curb Backing
4. Earthen Curb Backing

### DETAIL 1 – TYPICAL CURB AND GUTTER



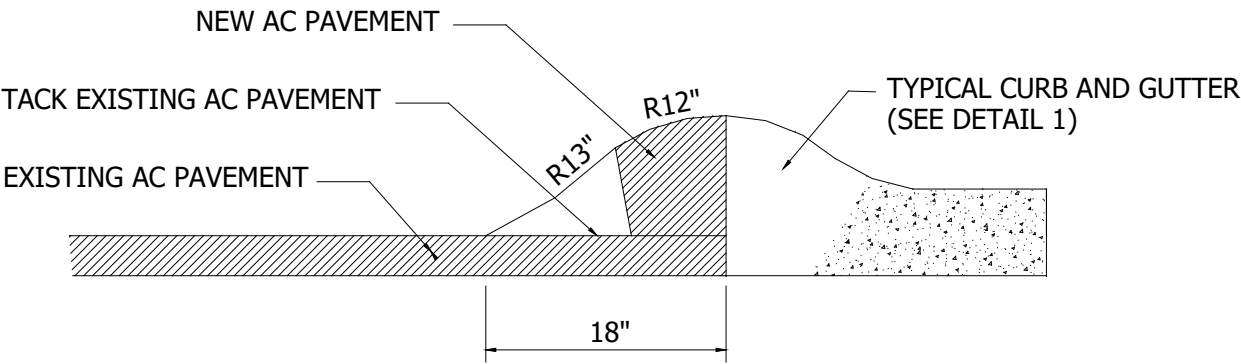
SCALE: NONE

DETAIL 2 – TYPICAL CURB CUT



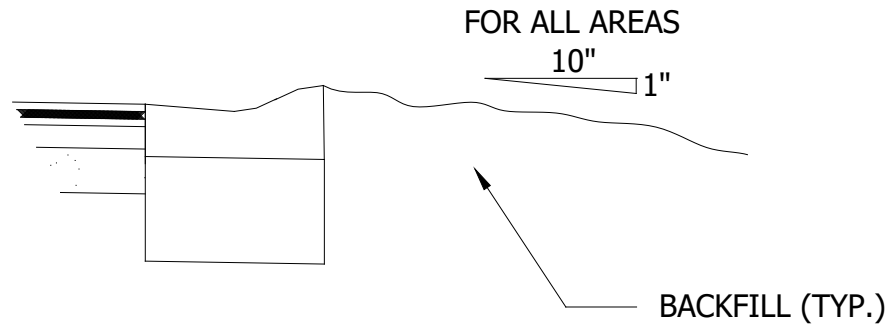
SCALE: NONE

DETAIL 3 – ASPHALT CURB BACKING



SCALE: NONE

## DETAIL 4 – EARTHEN CURB BACKING



SCALE: NONE

END OF DETAILS

### SECTION 323100 – FENCES AND GATES

#### A. GENERAL

1. Requirements for fencing by type of installation and application are stated in AFMAN 31 series for restricted areas, AFI 31-101 for controlled areas, and DoD 5100.76-M for base defense. Details on installation of Type A fencing are found in USACE Specification, which guides Air Force construction.
2. The standard at Fairchild AFB for installation perimeter, restricted area and controlled area fence and gates is Type A fencing.

#### B. REFERENCES

1. Department of Defense, <http://www.wbdg.org>
  - a. AFMAN 32-1084, *Facility Requirements*
  - b. UFC 4-022-01, *Security Engineering: Entry Control Facilities / Access Control Points*
  - c. UFC 4-022-02, *Selection and Application of Vehicle Barriers*
  - d. UFC 4-022-03, *Security Fences and Gates*
  - e. AFI 31-101,
2. Air Force Instruction (AFI)
  - a. AFI 31-101, *Integrated Defense*

b. AMC Supplement 1 to AFI 31-101, *Integrated Defense*

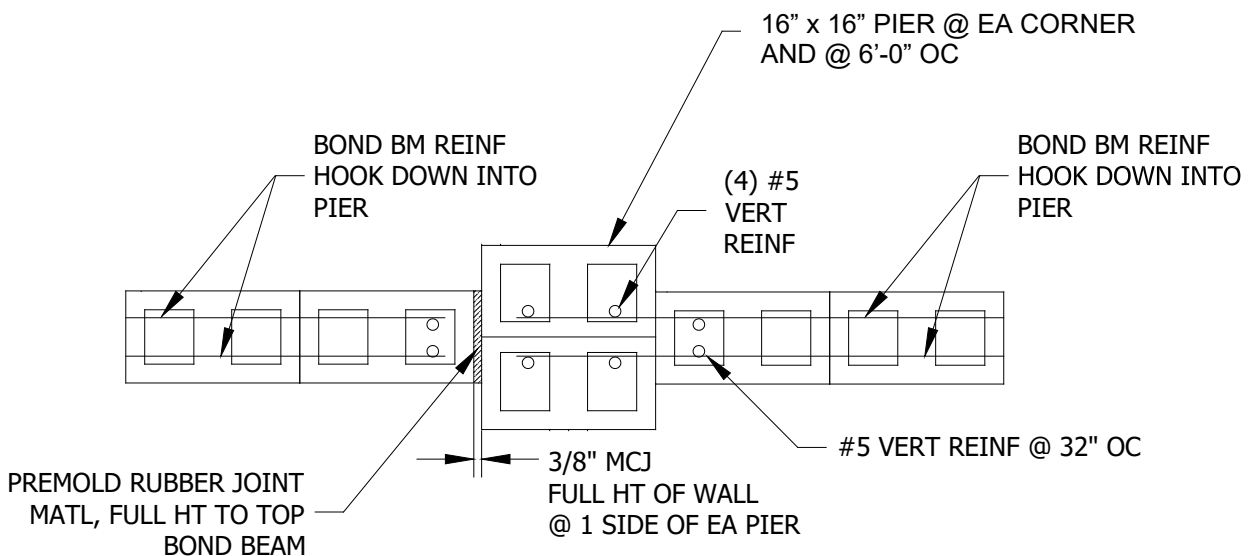
**SECTION 323100 – FENCES AND GATES**

**C. SCREENING WALL DETAILS**

1. Wall Column
2. Screen Wall
3. Wall Screen or Enclosure

**DETAIL 1 – WALL COLUMN**

(TYPICAL PLAN VIEW)



NOTE: BOND BEAM REINF SHALL BE TERMINATED EA SIDE OF MCJ EXCEPT BOND BEAM AT TOP OF WALL WHICH SHALL BE CONTINUOUS

SCALE: NONE



Technical drawing of a wall section showing vertical and horizontal dimensions and material specifications.

**Vertical Dimensions:**

- 6'-4" MAX (Total height)
- 4'-0" (Height from field grade to top)
- 1'-0" (Height of base)

**Horizontal Dimensions:**

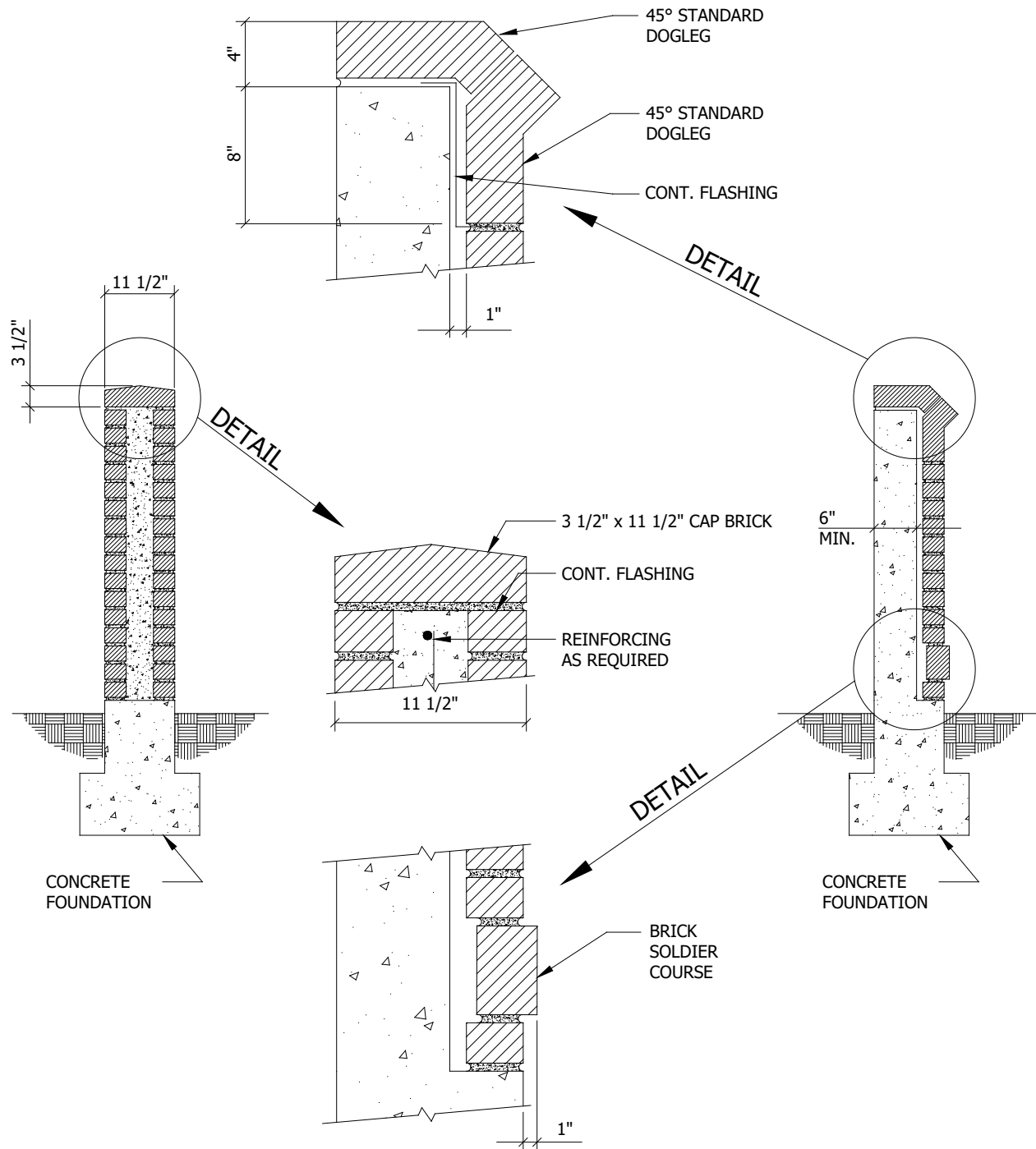
- 8" (Top width)
- 3'-0" (Base width)

**Material and Construction Details:**

- 2" CAP
- 8" X 8" X 16" SPLIT FACE LINTEL BLOCK
- RECESSED (1" MAX.)
- STREET FACE
- 1:6 OFFSET
- 3/4" CLR TYP
- (2) #5 VERT @ 32"
- 8" X 8" X 16" DOUBLE SIDED SPLIT FACE BLOCK
- (2) #4 REBAR in 8" BOND BEAM @ TOP, BOT AND 4'-6" FROM BOT
- FIELD GRADE
- #5 DWL W/ STD 90° HK TO ALIGN W/ VERT REINF
- (4) #5 RE-BAR
- #5 RE-BAR 32" OC
- 2'-1" LAP

SCALE: NONE

### DETAIL 3 – WALL SCREEN OR ENCLOSURE



SCALE: NONE

END OF DETAILS

## SECTION 328400 – PLANTING IRRIGATION

### A. MAINTENANCE ISSUES

1. Irrigation and Building Walls: Overspray of irrigation water onto building walls stains, may damage, and causes efflorescence on walls. Due to persistent wind conditions at the Base, it is impractical to irrigate turf areas adjacent to buildings without spraying the walls.
  - a. There shall be no turf irrigation within 10 feet of building walls, and the first row of turf heads nearest the building shall be directed away from building face.
  - b. When irrigating turf areas near buildings with large radius heads, use low angle nozzles when available.
  - c. Drip and/or bubbler irrigation shall be used for all shrub, groundcover, and flower beds.
2. Generally, it is recommended that a 10' strip along building foundations be maintained in 1"-2" washed river gravel over weed fabric, and/or groundcover plantings, such as low ground hugging junipers, sedums, or drought-tolerant perennials irrigated by drip and/or bubbler irrigation. Where vandalism is a concern, gravel shall not be specified.
3. Water Efficient Irrigation: The irrigation design specifications shall require that the irrigation contractor provide the owner and maintenance contractor proper training to learn the operation and maintenance of the irrigation system and that the irrigation system shall be maintained to operate at optimum efficiency.

### B. IRRIGATION SYSTEMS

1. General
  - a. Fairchild AFB is located in a semi-arid to arid environment and is subject to persistent winds in the range of 10 to 25 mph. Adequate recognition of these factors is essential to the design of irrigation systems for Base facilities to avoid poor performance and resulting dry spots.
  - b. Planting design and irrigation design should be integrated to establish a water budgeting scheme. For example, zones of landscape/irrigation intensity should be developed to provide plantings and irrigation according to areas of importance in terms of appearance, image, and use. Visually less important areas should be developed with less planting and only minimal to no irrigation. The zones shall be determined by function as follows: (See Exhibits 1-3 at end of FAIRCHILD AIR FORCE BASE DESIGN GUIDE Section329000)
    - Public Landscape Zone – High visibility areas where both military and civilian personnel and guests will be present, such as entry features, community facilities, recreation centers, etc.
    - General Landscape Zone – Moderately visible areas where predominantly base personnel are present, such as residential dormitories, staff administration facilities, classroom facilities, etc.
    - Industrial Landscape Zone – Low visible areas where the industrial, utilitarian functions predominate to serve the operation and function of the Base, such as aircraft areas and hangers, military training facilities, public works facilities, etc.
  - c. System components (piping, valves, etc.) shall be sized to accommodate future modifications to the system including a 25% increase in water flow in excess of the immediate need. Where future projects are planned for a given area, adequate provisions shall be made to extend the system into the planned development or to share appropriate system components. Refer to Details for irrigation system component details.
  - d. System components selected shall be appropriate for their use and location. In turf areas, the head chosen for any given area shall have the largest radius which can be accommodated within the most intricate section of that area to be irrigated. However, care

- must be exercised in the vicinity of buildings to avoid irrigation spray from being carried by the wind onto building walls and windows. Low angle nozzles shall be used whenever available. Where sandy soils predominate, heads with stainless steel shafts shall be specified. Shrub, groundcover, and flower beds shall be irrigated with drip and/or bubbler irrigation systems.
- e. Shrub areas and lawn areas shall be placed on separate irrigation circuits. However, where low-height shrub areas lie in the middle of large open lawn areas, large radius lawn heads may be used to irrigate the lawn and shrub areas together, provided all heads are located sufficient distances from the shrubs such that no blockage of the irrigation stream occurs immediately, and in the future when plants have reached mature size.
  - f. Shrub/groundcover beds shall be grouped on separate irrigation zones based on sun exposure, soil characteristics, plant type, moisture requirements, etc.
  - g. The system shall be designed such that one full cycle, operating all circuits, can be completed between 2100 hours and 0600 hours. If drip circuits are included, they will be wired to the last station on the controller and can be operable outside the time frame specified above. The time required for each station will be dependent upon the type of irrigation head used. The system shall be designed to provide at least 1-1/2 in. of precipitation per week. This is normally provided by applying 1/2 in. of precipitation three times per week (or every other day), although other schedules can be used. If the above criteria can not be met with one controller, another controller shall be added and the system supply line and main lines shall be upsized. Where more than one controller is used to operate the system, main-line piping shall be sized based upon the assumption that one station from each controller may be operating simultaneously.
  - h. All irrigation system components specified and/or used shall be of commercial quality. Residential grade materials are not acceptable. No products shall be specified and/or used for which replacements, spare parts, or services are not readily available within the Spokane area.
  - i. Shop drawings for irrigation system components shall be included with the contractor as-built.
2. Head Types
- a. Irrigation systems at the Base shall be designed and engineered based on the performance specifications of the following products:
    - (1) Small (up to 15-ft radius)
      - (a) Hunter MPR40 Rotator 1000 Series (12-ft to 15-ft)
      - (b) Hunter MPR40 Rotator Corner Series (10.5-ft to 15-ft)
      - (c) Hunter Pro Spray and Institutional Spray Series (5-ft to 17-ft)
      - (d) Rain Bird 1800 Series (plastic nozzles), (Rotary Nozzles)
      - (e) Toro 570Z Series (plastic nozzles)
    - (2) Mid-range (15-ft to 30-ft radius)
      - (a) Hunter MPR40 Rotator 2000 Series (16-ft to 21-ft)
      - (b) Hunter MPR40 Rotator 3000 Series (25-ft to 30-ft)
      - (c) Hunter I-10/I-20 Ultra (18-ft to 25-ft)
      - (d) Hunter PGJ Series Stream Rotor
      - (e) Toro Mini 8 Series Stream Rotor (20 ft to 35 ft)
      - (f) Toro 340 Series Stream Rotor (16 ft to 30')
      - (g) Rainbird 3500 Series & 5500 Short Radius.

- (3) Large (25-ft to 50-ft radius)
    - (a) Hunter PGP
    - (b) Hunter I-20
    - (c) Rain Bird 5000 Series, & 5500 Series
    - (d) Toro XP-300
    - (e) Toro T5, Super 800 Series, & TR50 Series
  - (4) Maximum (40-ft radius and above)
    - (a) Hunter I-25, I-35 SIERRA
    - (b) Hunter I-40, I-40, & I-60
    - (c) Rain Bird 8005 Series
    - (d) Toro T7 Series, TR70P Series, TR70XTP Series, 2001 Series, TS90 Series, & Toro 640 Series,
  - (5) Strips
    - (a) Hunter MPR40 Rotator Strip Nozzles
    - (b) Hunter Pro Spray & Institutional Spray Strip Nozzles.
    - (c) Rain Bird 1800 Series Strip Nozzles
    - (d) Toro 570z Strip Nozzles
  - (6) Bubblers & Stream Spray
    - (a) Hunter Bubbler & Multi-Stream Bubbler Nozzles.
    - (b) Hunter Stream Spray Nozzles.
    - (c) Hunter RZWS Root Zone Watering System.
    - (d) Rain Bird RWS Root Watering Series
  - b. The manufacturers listed represent the bulk of systems currently in use on the Base. They also represent the extent of commercial grade systems readily available in the Spokane area. Should other product lines become established in this area, their use will be considered by the Base on a project-by-project basis.
  - c. Water conserving features, such as factory installed drain check valves, low angle trajectory for wind resistance, stream rotor features as opposed to spray, adjustable arc and radius adjustment to control overspray onto hardscape areas, lower precipitation rate nozzles, etc. should be specified as appropriate for the particular application and site.
3. Head Spacing
- a. Irrigation systems at the Base shall be controlled by "Smart" weather based controllers that have the capability of integrating with a Central Controller system. The Central Controller system will be capable of stopping the irrigation based on a preset maximum wind speed.
  - b. The maximum head spacing, when triangular spacing is used, shall be "head to head" spacing. The maximum row spacing, when triangular spacing is used, shall be 89% of the head spacing (this creates an equilateral triangle layout). If square spacing is used, the maximum head and row spacing shall be 90% of the "head to head" spacing. This compensates for the weak spots inherent in square spacing.
4. Electric Remote Control Valves
- a. Irrigation systems at the Base shall be designed and engineered based on the performance specifications of the following products:

- (1) Hunter PGV Series, & ICV Series
- (2) HunterICV Series & ICV Filter Sentry Series for non-potable, reclaimed water use.
- (3) Rain Bird PEB Series, & PGA Series
- (4) Rain Bird PESB-R Series for non-potable, reclaimed water use.
- (5) Toro 252 Series
- (6) Toro P-220 Series for pressure regulation.
- (7) Toro P-220S Series for non potable, reclaimed water use.
- b. Refer to Detail 3.
- c. Valves should have the pressure regulating option specified for control of pressure fluctuations.
5. Quick Coupler Valves
  - a. Quick coupler valves shall be provided at the point of connection to the domestic water supply system (for winterization) and elsewhere along the irrigation system main line where access to the irrigation water supply is desired.
  - b. The quick coupler valve shall consist of a two-piece assembly of heavy duty brass construction with a rubber cover. Two operating keys with hose swivels shall be provided. (See Detail 4)
6. Manual Drain Valves
  - a. A manual drain valve shall be provided at the point of connection immediately downstream from the backflow preventer.
  - b. The drain valve shall consist of a manual angle valve of heavy duty brass construction with a cross handle designed for key or hand operation.
7. Automatic Drain Valves
  - a. Automatic drain valves shall be installed at all low points on the irrigation lines.
8. Isolation Valves
  - a. Isolation valves in combination with quick coupler valves shall be used to divide the main line of large systems into sections to facilitate maintenance and to assist in the winterization of loop mains.
  - b. Isolation valves shall consist of 150 psi WOG gate valves of heavy duty brass construction with a non-rising stem designed for key or hand operation.
9. Valve Sizing
  - a. Valves shall be sized to accommodate future modifications to the circuit which might result in an increase of up to 25% in the water flow. Performance characteristics vary from model to model, but the following guidelines would generally apply:

<u>Valve Size (inches)</u>	<u>Maximum Flow (gpm)</u>
1	22.5
1-1/2	55
2	100
3	225

- b. Many areas of the Base are characterized by low water pressure. The Designer is responsible for verifying water pressure during the design of the irrigation system. As a general rule, water pressure on Base is approximately 40 psi, however, it varies based on the point of connection to the main water line.

#### 10. Valve Adjustment for Windy Conditions

- a. The contractor shall be instructed to adjust the flow control on all valves such that the heads produce the largest water droplets possible while still maintaining head-to-head coverage.

#### 11. Backflow Preventers

- a. A backflow preventer shall be provided at each point of connection to the domestic water supply system. The backflow preventer shall consist of a double check valve assembly with resilient seated shutoff valves and test cocks, and shall be of heavy duty bronze construction (up to 2 in. size) or epoxy-coated cast iron (2-1/2 in. and above). Backflow preventer shall be installed below ground level (Refer to Detail 6). The design specifications shall contain the requirement that all backflow preventers shall be tested by a Washington State certified inspector prior to connecting the irrigation system to the potable water system. A certified test report shall be a submittal item and shall be approved prior to activation of the irrigation system.
- b. All backflow prevention assemblies shall be manufactured by Febco or Wilkins and shall, at time of installation, reside on the current publication of Washington State Department of Health – Division of Environmental Health – Office of Drinking Water's Publication 331-137, *Backflow Prevention Assemblies Approved for Installation in Washington State*.
- c. Backflow Preventer Sizing
  - (1) Backflow preventers shall be sized to accommodate future modifications which may result in an increase of up to 25% in the water flow. Performance characteristics vary from model to model, but the following guidelines would generally apply:

<u>Double Check Valve Size (inches)</u>	<u>Maximum Flow (up to gpm)</u>
1	38
1-1/2	75
2	125
Two 1/2	150
Two 2	250

#### 12. Automatic Controllers

- a. For general purposes, irrigation systems at the Base shall be controlled by means of electronic irrigation timers, and shall operate on 120 volts a.c. building power, providing 24 volts a.c. power to the valves. The controller shall also provide for manual and semi-automatic operation, have an internal transformer and a lockable weatherproof cabinet. Electronic controllers shall be provided with surge protection and a battery backup to protect station programming during power outages. All controllers shall be "Smart" Weather-Based and have central controller compatibility, and after such time that the Base installs central irrigation controls, all future controllers shall be compatible with it.
- b. For interior installations, an external transformer and non-weatherproof, non-locking cabinet are acceptable.
  - (1) Irrigation systems at the Base shall be designed and engineered based on the performance specifications of the following products:
    - (a) Rain Bird ESP-LX Modular, ESP-MC, ESP-LXD & ESP-SMT.
    - (b) Hunter PRO-C, ICC, & ACC.

- (c) Toro Custom Command Series Toro Intel-Sense Series, TDC Series, & TMC-424 Series.
  - (d) Baseline System Basestation 3200 controller.
  - (e) Calsense ET2000e controller.
  - c. Battery-operated or solar-powered controllers may be considered in special cases only, and only for temporary use. The Energy Manager and Resource Efficiency Manager (92 CES/CENP) shall be consulted when solar-powered type controllers are being considered. Solenoids designed for use with direct currents must be used on valves operated by battery powered controllers. Water conserving features shall be a part of any battery or solar powered controller.
  - d. The irrigation system controller (timer) shall be located in the building mechanical/electrical room or in an inaccessible exterior location, such as a mechanical/electrical equipment enclosure. However, if a controller cannot be placed in a building or other enclosure, an outdoor weather-proof cabinet shall be installed to contain the controller. The standard of quality for the weather-proof cabinet and/or pedestal shall be steel, NEMA 3R/outdoor rated box, painted, and commercial grade.
  - e. Water Budgeting – During drought periods and when Base water storage reaches low levels, the irrigation system shall have the capability of automatically shutting down. Furthermore, controller schedules and timing shall automatically adjust to provide minimal irrigation during low level water periods to provide just enough water to keep plants alive. The Base central controller shall be wired directly to the water storage tanks, and have a preset water level that will signal the controller to shut the irrigation system down and go to a deficit watering cycle until water levels return to normal.
13. Master Valve
- a. A Master Valve shall be included at all points of connection to the Base main water line and wired to the controller to allow automatic control of the water supply.
14. Flow Sensor
- a. A Flow Sensor shall be included at all points of connection to the Base main water line and wired to the controller to allow data gathering on flow and automatic control of the water supply and flow to the irrigation system.
15. Valve Boxes
- a. Valve boxes shall be provided for all remote control valves, backflow preventers, and similar equipment located out in the field. Valve boxes shall be of sufficient size to facilitate easy removal and/or maintenance of equipment.
  - b. In landscape areas, utilize products meeting the general specifications of Carson or Ametek standard structural plastic valve box and cover with a lock bolt. In paved areas, precast concrete valve boxes with cast iron covers shall be specified.
16. Pipe and Fittings
- a. Main line piping shall be as follows:
    - (1) Pipe under 3" diameter shall be PVC Class 200 solvent weld with PVC Schedule 40 socket-type solvent weld fittings. Concrete thrust blocks shall be installed at all tees and changes in direction.
    - (2) Pipe 3" and larger diameter shall be PVC Class 200 gasketed bell-joint with gasketed ductile iron fittings with joint restraints (knuckles on the end of all fittings).
- Lateral line piping shall be PVC Class 200 with PVC Schedule 40 socket-type solvent weld fittings.



- b. Pipes passing under walks and drives and through walls, etc. shall be placed in pipe sleeves. The pipe sleeve shall be at least twice the diameter of the pressure or circuit pipe it serves. Under walks and light duty driving surfaces, pipe sleeves shall be constructed of PVC plastic pipe, Class 200. Under heavy traffic driving surfaces, pipe sleeves shall be constructed of PVC Schedule 40 pipe for sizes 4" in diameter and less, and PVC Class 200 for sizes 6" in diameter and larger.. Pipe sleeves shall be buried 12 in. minimum under walks and 18 in. minimum under drives.
- c. Each point of connection to the domestic water supply system shall include the following items:
  - (1) 3/4-in. minimum manual drain valve.
  - (2) Backflow preventer (double check valve assembly).
  - (3) 3/4- or 1-in. quick coupler valve (for winterization).
- d. When the point of connection occurs within a building, all piping inside the building and the first 5 ft of piping outside the building shall be Type K copper water tube with soldered fittings. The quick coupler valve may be located just outside the building wall to facilitate access.
- e. When the point of connection occurs in a large precast concrete utility vault, all piping inside the vault and for the first 5 ft outside the vault shall be galvanized steel pipe, Schedule 40, with malleable iron threaded fittings.
- f. In other situations, PVC plastic pipe may be used, except that for systems requiring a 2-1/2- or 3-in. main line, galvanized steel pipe shall be used until 5 ft beyond the quick coupler valve. On systems requiring a 4-in. main line, galvanized steel pipe shall be used until 10 ft beyond the quick coupler valve. Where a loop main line 2 in. or larger is utilized, all piping between the point of connection and the loop shall be galvanized steel.
- g. Manual drain valves and vacuum relief valves shall be installed at suitable locations in very large systems to facilitate draining of the main line.

#### 17. Pipe Sizing

- a. Pipe shall be sized such that water velocity does not exceed 5 ft/s. Main lines must be sized to accommodate the maximum water flow for all circuits which might be operating simultaneously and incorporate a 25% allowance for increases in water flow due to future system modifications. The following guidelines are for PVC plastic pipe, Class 200:

<u>Pipe Size (inches)</u>	<u>Maximum Flow (up to gpm)</u>
3/4	10
1	16
1-1/4	26
1-1/2	35
2	55
2-1/2	80
3	120
4	200
6	425

- b. Where low working pressure at heads is a concern or where long pipe runs are involved, pipe sizes should be increased to reduce pressure losses.

## 18. Pipe Burial

- a. Provide a minimum main line burial of 18 in. and a minimum lateral line burial of 12 in. On very large systems, where main line size exceeds 4 in., a main line burial depth of 30 in. and a lateral line burial depth of 18 in. shall be specified.
- b. Where existing soils contain numerous rocks or coarse gravel, piping shall be bedded in clean sand, 2 in. below and on the sides of the pipe, and 4 in. above.

## 19. Wiring

- a. The wire from the controller to the remote control valves shall be Type UF, solid copper, UL rated for direct burial and sized according to Rain Bird wire sizing recommendations with No. 14 AWG minimum size. Wire shall be continuous without splices except at control valves and splice boxes. Splices shall be made with 3M Scotch-Lok, Rain Bird Pen-Tite, or an equivalent waterproof device. Tape wires together and run in the trench along the main line pipe. Provide expansion curls at each valve and elsewhere at 100-ft intervals. Run at least one spare wire from the controller to all valve locations, looping the spare wire at each valve.
- b. Color code wires as follows:
  - (1) Hot wire: red or black
  - (2) Common wire: white
  - (3) Spare wire: orange
- c. Two-Wire Decoder system replaces the conventional wiring method described above and is available with newer controllers by some manufacturers. This method allows an easy way to add zones to an existing irrigation system by the wiring method connecting a new control valve to an existing controller.

## 20. System Installation

- a. All turf irrigation heads shall be pop-up heads. Shrub beds shall only be irrigated by drip and/or bubbler systems. If bubblers are used, they shall be on their own zone and placed on fixed risers.
- b. Design specifications shall impose the following requirements on the contractor:
  - (1) Main lines shall be pressure tested to a minimum of 100 psi prior to backfilling.
  - (2) Lines shall be flushed with clean water to remove debris prior to installing irrigation heads.
  - (3) All heads shall be mounted on swing joints. (See Detail 7.) As a minimum, the swing joint shall include two Marlex street ells, a standard threaded ell, a 6-in. horizontal nipple and a vertical nipple as required up to the base of the irrigation head (see detail). Quick coupler valves shall be mounted on swing joints constructed of galvanized steel pipe and malleable iron fittings.
  - (4) Shrub bubbler heads shall be mounted 1/2 in. to 1 in. above the level of bark mulch. Turf heads shall be mounted slightly above the thatch line in sod areas and approximately 1/2 in. above the soil line in seed areas. Sod thickness tends to build up over time.
  - (5) Control wires located within buildings shall be placed in conduits.
  - (6) Following installation, the contractor shall bring all heads to proper grade and shall adjust system components as needed to provide uniform coverage, to eliminate overspray on non-irrigated surfaces, and otherwise to optimize system performance.
  - (7) The contractor shall be responsible for initial programming of the controllers.

- (8) The contractor shall be required to record initial settings and affix the recording to the inside of the controller. A description of each station shall also be affixed to the inside of the controller.
- (9) Irrigation systems at the Base shall be designed to accommodate winterization by blowing out the piping system with compressed air.
- (10) The contractor shall be required to provide as-built drawings for the irrigation systems, and the as-builts shall be incorporated into the project as-builts. Furthermore, the contractor shall modify the as-built sheet index to show the added sheets for the irrigation system drawings.

#### 21. Drip Systems

- a. Drip irrigation systems shall always be specified for shrub and groundcover beds for water conservation, and to direct moisture directly to the roots of the plant material. Also, for short-term use in the establishment of dryland plantings, drip type systems and/or temporary above-ground systems shall be provided. However, the designer shall consult with the Air Force Project manager to determine whether temporary systems will be required for turf establishment.

#### 22. System Training

- a. Irrigation designers shall include, as part of the irrigation design specifications, that the contractor is responsible for training Base maintenance personnel, and/or Base maintenance contractors in the operation and maintenance of the irrigation system prior to final acceptance.

#### 23. Warranty Periods

- a. Contract documents shall require the installer of the system to warranty the complete installation (parts and labor) for one full year.
- b. Any extended warranties or guarantees provided by the manufacturer shall be provided to the Base.

#### 24. Maintenance Periods

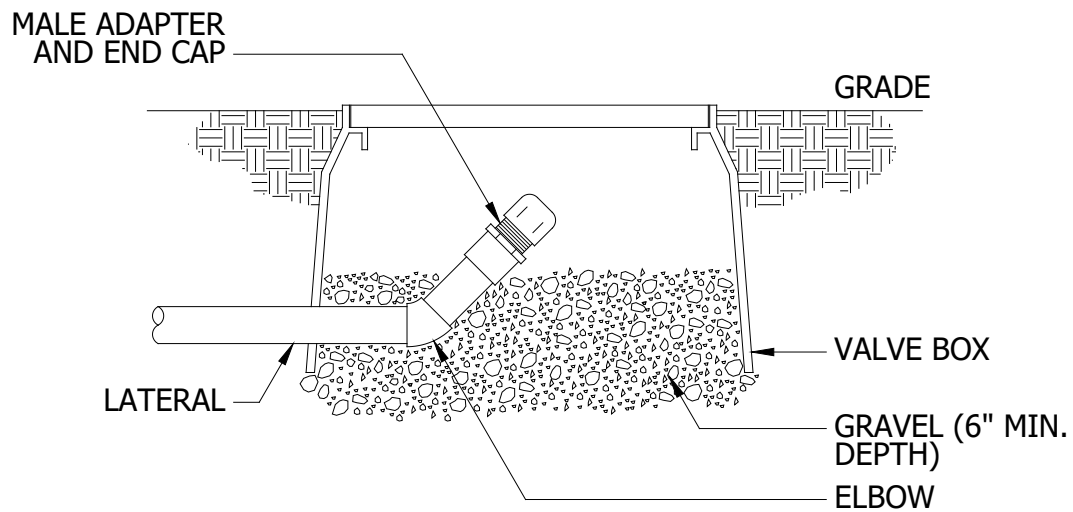
- a. System specifications shall require that the first year's winterization and spring start-up are the responsibility of the system installer. This will eliminate the possibility of any kind of dispute regarding whether the winterization was properly performed, with respect to the warranty. This also provides an opportunity for the installer to instruct those who will be maintaining the system in proper winterization and start-up procedures.

## SECTION 328400 – PLANTING AND IRRIGATION

### D. DETAILS

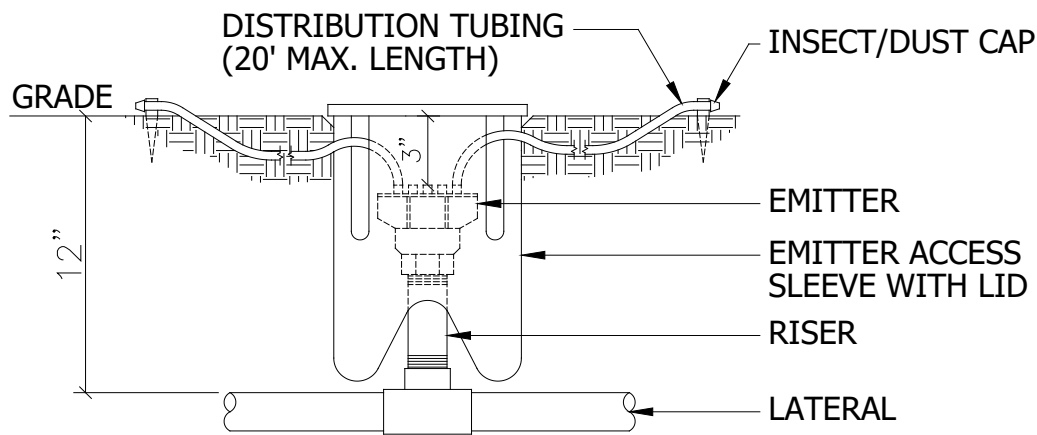
1. Flush Point
2. Emitter
3. Electric Control Valve
4. Quick Coupler Valve
5. Auto Drain Valve
6. Backflow Preventer
7. Swing Joint

### DETAIL 1 – FLUSH POINT



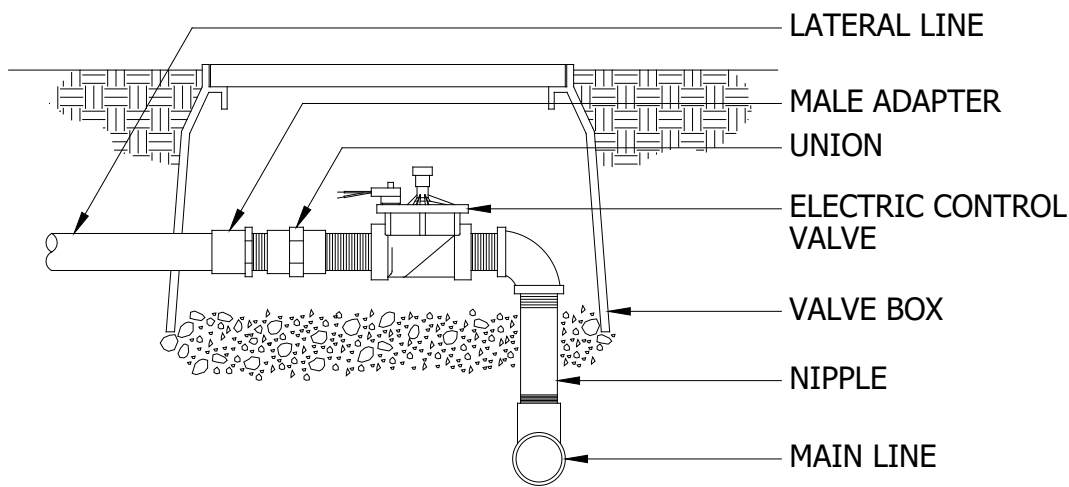
SCALE: NONE

DETAIL 2 – EMITTER



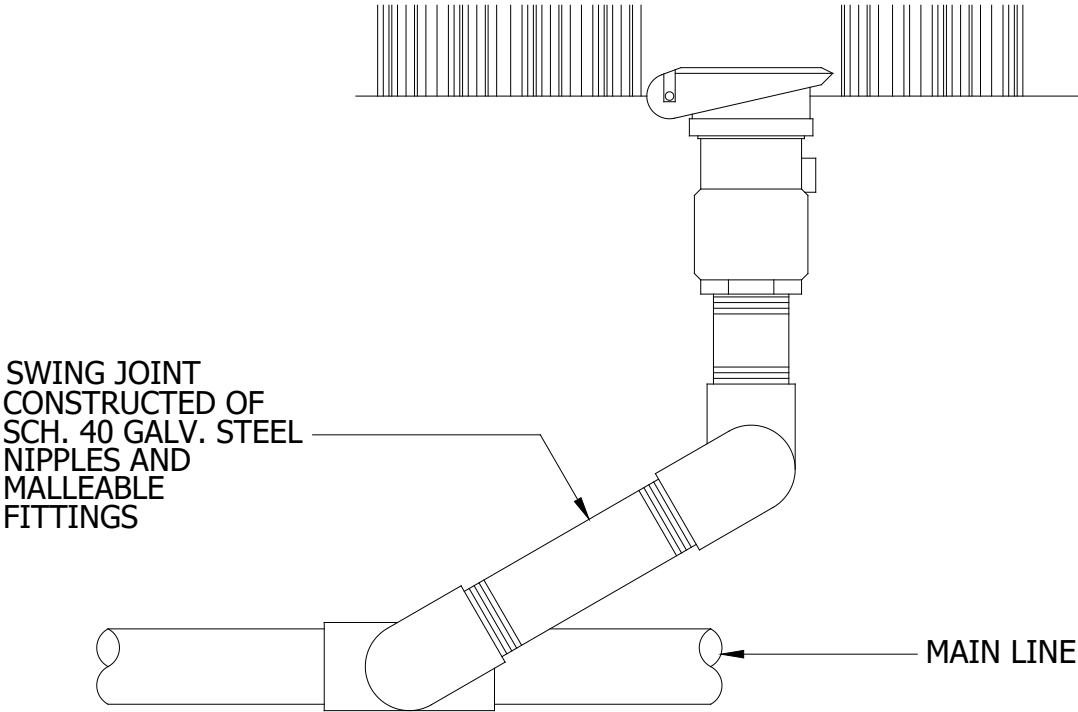
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DETAIL 3 – ELECTRIC CONTROL VALVE



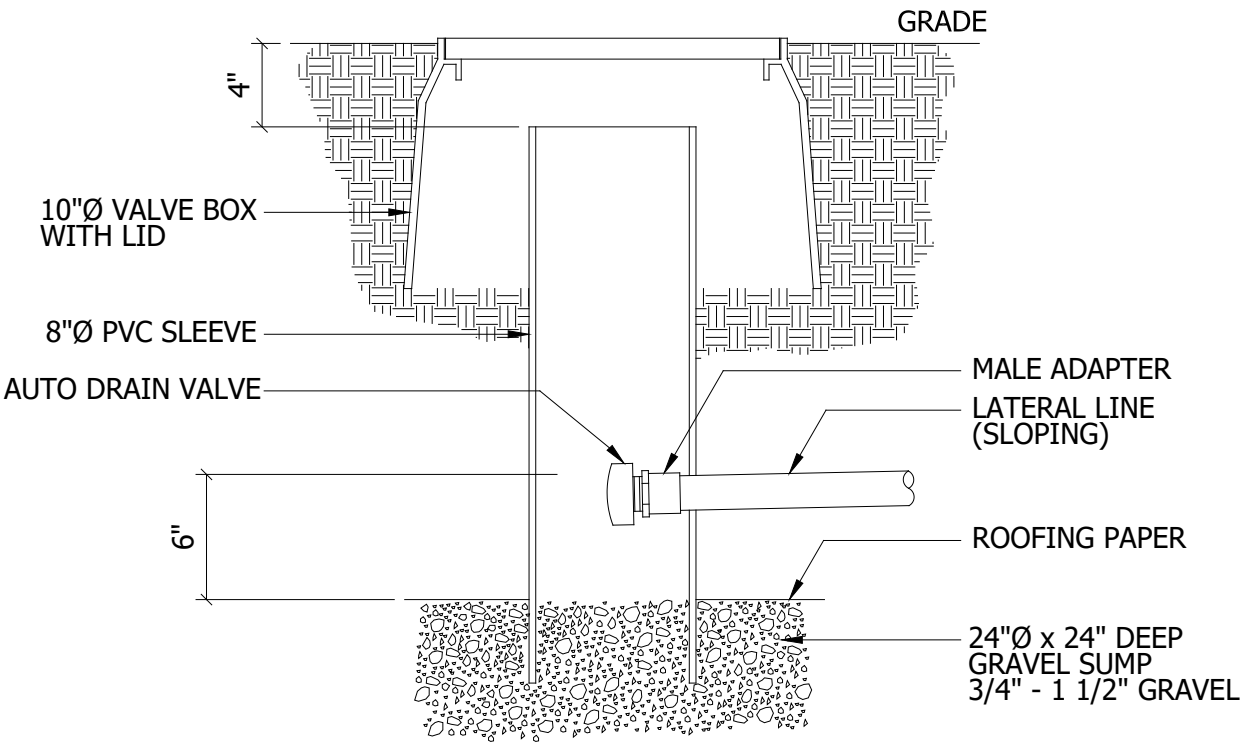
SCALE: NONE

DETAIL 4 – QUICK COUPLER VALVE



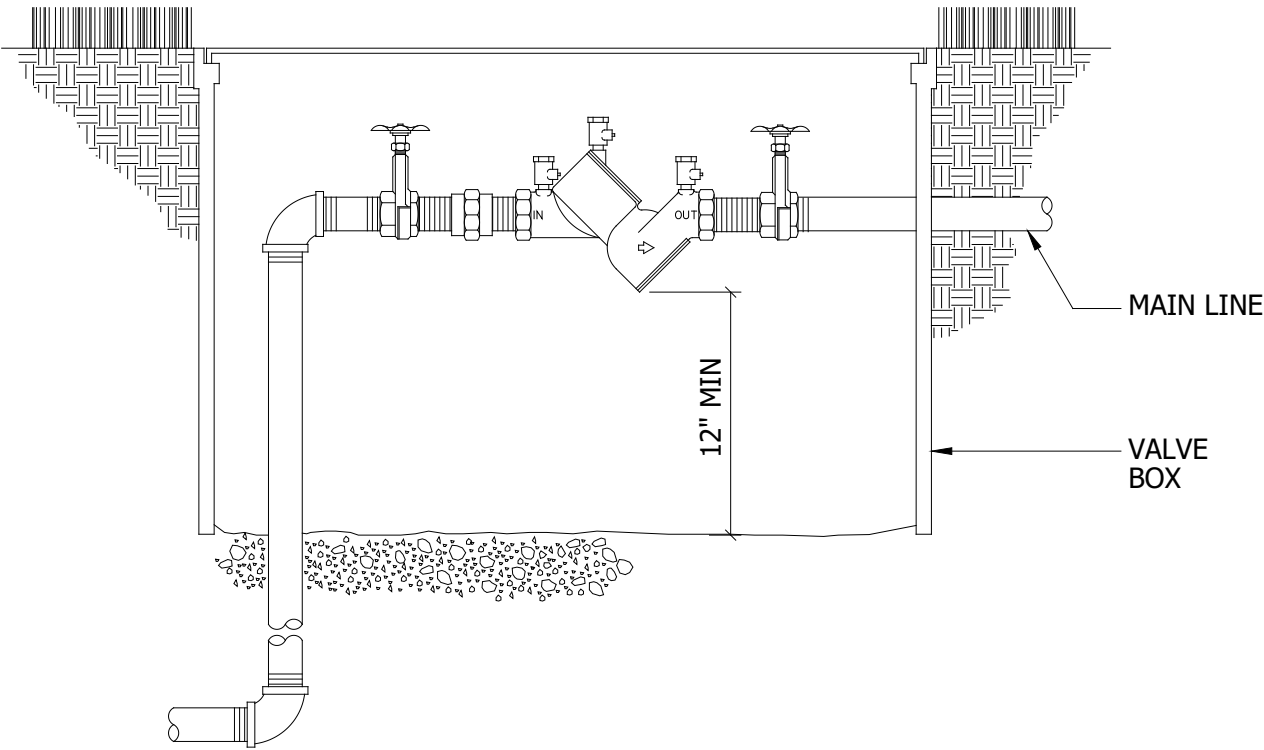
SCALE: NONE

DETAIL 5 – AUTO DRAIN VALVE



SCALE: NONE

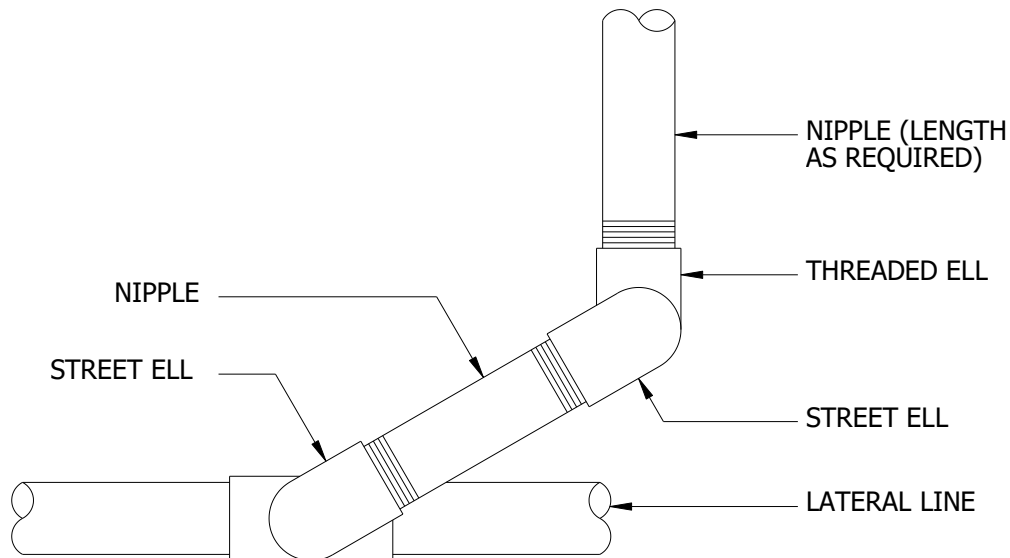
DETAIL 6 – BACKFLOW PREVENTER



SCALE: NONE



## DETAIL 7 – SWING JOINT



SCALE: NONE

END OF DETAILS

### SECTION 329000 – PLANTING

#### A. OVERVIEW

1. This section supplements requirements set forth in UFC 3-201-02, *Landscape Architecture*.
2. The Base's landscaping policy is to provide an attractive, low-maintenance landscaping environment that promotes the appearance of the Base. The landscaping policy also requires that water conservation be a major part of the design criteria. Shade and sun tolerance of the plants, as well as insect, disease, and drought resistance have been taken into consideration in these guidelines. The planning and design of all landscaping shall assume that the planting will receive little or no maintenance after a one to two year establishment period.

#### B. GENERAL DESIGN GUIDELINES

1. Planting Restrictions
  - a. No trees, shrubs, flower beds shall be planted around facilities in the Munitions and Operations and Maintenance districts. Dryland grass is acceptable along with xeriscaping.

- Any loose rock used, shall be contained by curbing to keep it from traveling onto operational airfield pavements.
- b. Cranes, bucket trucks, high lifts cannot be used on Fairchild AFB to include SERE side and the airfield unless it has been pre-approved by Airfield Management and Terminal Instrument Procedures (AMC/A3A TERPS). Cranes, bucket trucks, high lifts in use, but not previously approved by Airfield Management and TERPS, shall be immediately lowered until the information is submitted and approved. The following information needs to be submitted to the Airfield Manager.
    - Obstacle description
    - MSL height in NAVD88 & AGL to the nearest foot
    - WGS 84/NAD83 location in deg, min, & 100th sec
    - Survey accuracy per FAAO 8260.19.
    - EXAMPLE: Crane, 1100' AMSL (80 AGL'), N00° 00' 00.00" E123 ° 45' 56.00" (NAD83), 1A.
2. Design of Turf Areas
    - a. When designing turf areas, keep in mind the requirements of mowing equipment. Most turf areas should be designed to accommodate large gang mowers or riding mowers.
    - b. Avoid small turf areas, steep slopes, and turf areas delineated by complex or detailed edges containing numerous sharp corners which require hand mowing.
    - c. Wherever possible integrate tree plantings into shrub planting areas. Trees in lawn areas represent an obstacle to mow around; "planting rings" tend to be ineffective and increase maintenance requirements. However, where trees are proposed in grass areas, they shall have a maintained mulched ring of at least 6' radius around the trunk to reduce competition for moisture and nutrients from grasses, and for tree protection from mower and/or weed eater damage. The mulched ring diameter shall be increased as the tree trunk expands to maintain at least 6' of mulched area around the trunk.
    - d. There shall be no turf irrigation within 10 feet of building walls.
  3. Shrub & Tree Plantings
    - a. Use native and adapted non-native drought-tolerant plant materials and group native plantings according to natural plant communities. Natural plant communities have similar water, microclimate, and soil requirements.
    - b. Combine shrubs and trees in planting beds to avoid individual tree plantings in turf areas, or spotty plantings. Utilize natural plant associations as much as possible.
    - c. Where possible place plants requiring more water in natural, or man-made storm water collection areas, such as, inverted parking islands, depressions, and swales.
    - d. Zones of landscape intensity should be developed to provide plantings according to areas of importance in terms of appearance, image, and use. Visually less important areas should be developed with less planting.
  4. Existing Vegetation
    - a. Save and protect existing desirable native vegetation (trees and shrubs) and incorporate into the overall landscape.
    - b. Supplement existing vegetation with additional native plantings that already occur in the area.
  5. Traffic Routes
    - a. Designs at Fairchild AFB shall enhance and provide for the safe separation of bicycles, pedestrians, and motor vehicles. Clear vision lanes shall be maintained such that blind

- corners are not created and high levels of safety are consistently maintained. The design of separation elements shall take into account the effects of planted materials at initial size as well as at maturity. Design of landscaping elements shall be coordinated with lighting plans and fixture locations to insure that safety is not diminished.
- b. Screening of parking areas incorporating berms, planted buffer zones, etc. shall take winter conditions into account. Snow removal involving plowing and potentially large snow pile accumulations require the designer to provide sufficient space and clear plowing lanes. Islands, berms, and perimeter screening elements shall not result in difficult or complex snow removal requirements.
6. Transition Zones
- a. For projects bordering an undeveloped area, provide a 20 ft minimum width transition zone in the design. Transition zone shall consist of dryland grass and individual tree or shrub plantings.
  - b. All shrub and tree landscaping installed in transition zones, and dryland areas on the Base shall be provided with drip irrigation, and/or bubblers to facilitate plant establishment.
7. Wind Control
- a. Fairchild AFB is characterized by fairly consistent winds between 10 and 25 mph. Landscaping can play an important role in mitigating the effects of this condition. Plants perform better than fences or walls for windbreaks because they permit some degree of wind penetration, reducing turbulence on the leeward side of the screen.
  - b. Mitigating prevailing persistent winds shall be considered in development of landscaping designs. It would be inappropriate to emphasize this design element to an excessive degree, resulting in an undesirable wind row or barricaded environment.
8. Maintenance Issues
- a. Plant Selection: Selected plant materials should provide an attractive landscape with minimal maintenance requirements. The following guidelines shall be followed:
    - (1) Plant selection shall be based on design intent, and compatibility with the specific site and microclimate conditions.
    - (2) Select plants with a uniform and compact habit of growth; avoid plants which get "leggy" or require routine pruning.
    - (3) Be cognizant of potential abuse areas. Select sturdy plants for high traffic areas such as parking lot islands. Restrict the use of more delicate plants to protected landscape sites such as near building walls, fences, etc.
    - (4) A mixture of evergreen and deciduous plants is desirable. Utilize deciduous trees on the South and West sides of facilities to provide summer shading.
    - (5) Plants shall be selected for drought tolerance utilizing native plants in groupings according to natural plant associations. Ornamentals and natives can be mixed in special landscaped areas at entry points, entry signage, pedestrian plazas, gathering areas, and other special site areas as appropriate that will be irrigated.
  - b. Fringe Areas: Do not ignore the undeveloped areas adjacent to developed sites. The creation of a transition zone between maintained, landscaped areas and native, non-landscaped areas is to be incorporated. The transition zone should be seeded with dryland seed and planted with indigenous and/or drought tolerant plants such as pines, Common Chokecherry, Rocky Mountain Juniper, Ocean Spray, Snowberry, and Common Ninebark. Trees, shrubs, and ground covers installed in the transition zone shall be drip and/or bubbler irrigated to facilitate plant establishment.

- c. Irrigation and Building Walls: Overspray of irrigation water onto building walls stains, may damage, and causes efflorescence on walls. Due to persistent wind conditions at the Base, it is impractical to irrigate turf areas adjacent to buildings without spraying the walls.
  - (1) There shall be no turf irrigation within 10 feet of building walls.
  - (2) When irrigating turf areas near buildings with large radius heads, use low angle nozzles when available.
  - (3) When irrigating shrub areas along buildings, drip irrigation or bubblers shall be used. Eliminate the use of heads which throw water toward the building wall.
- d. For additional information, refer to the irrigation standards section of this document.
- e. Traffic and Wear: Be alert to potential or obvious pedestrian traffic patterns. Pedestrian traffic which traverses landscape areas results in damaged and dead plants. Where pedestrian traffic crosses landscaping, provide periodic sidewalks, stepping stones, or other hard surfacing to direct traffic patterns and protect landscaping. Landscaped traffic and parking islands which cross or interrupt pedestrian traffic routes shall be provided with stepping stones or walkways at a maximum spacing of 20 ft to discourage foot traffic across plantings. Do not use 90 degree corners at sidewalk intersections; provide a 3-ft minimum radius or short diagonal (45 degree) to minimize wear on turf or other landscape materials. (See Detail 2).

#### 9. Planting Period

- a. To the fullest extent possible design documents shall provide for planting of trees, shrubs, and ground cover to occur during the optimum planting period of April 1<sup>st</sup> through June 25<sup>th</sup> and August 25<sup>th</sup> through Oct. 1<sup>st</sup>, however these dates are only guidelines; weather patterns vary each year, and thus suitable planting times will also vary. When planting during optimum times is not possible, the A/E shall clearly specify any necessary measures to ensure proper establishment of planted materials.

#### 10. Maintenance Periods

- a. For trees, shrubs, ground covers, and sod, a minimum maintenance period of 30 days or until final project acceptance, whichever is later, shall be required from the date of planting completion.
- b. Maintenance period for irrigated turf grasses shall be through the third mowing and until turf establishment. It shall include one herbicide application to control broadleaf weeds after the third mowing. Each mowing shall be spaced a minimum of seven (7) days apart. Irrigated turf grass shall be considered established when plant density exceeds 150 plants per square foot with no bare spots exceeding 9 square inches in size. Required maintenance on dryland seed areas shall include one herbicide application one year after seeding. Dryland seed shall be provided temporary irrigation to establish dryland seed until it reaches specified plant density.

#### 11. Warranty Periods

- a. The warranty of newly planted trees and shrubs shall be one year from the date of planting completion. All plants not in a vigorous condition at that time shall be removed and replaced. Replacements are limited to one for each plant and are typically installed immediately following the end of the warranty period. Plants damaged by vandals or other circumstances beyond the control of the installer are normally not covered by the warranty. Turf areas shall be warranted through the required maintenance period.
- b. Design documents shall specify that final acceptance of landscape work will include consideration of the following limits:
  - (1) No evidence of disease.
  - (2) Normal growth rates observed.

## C. PLANT SELECTION

### 1. Plant Matrices

- a. The attached spreadsheet (FAFB\_AprovedSpecies.xls) lists species which are drought tolerant and expected to perform well at Fairchild Air Force Base under average conditions. The matrices are included to provide the designer with maximum flexibility and as diverse a selection of plants as possible.

## D. PLANT SETBACKS AND PROTECTION

### 1. Setbacks

- a. No landscaping components that create a sight obstruction or a hazard to the traveling public shall be permitted within the area designated as the "clear view triangle." This area can be determined by measuring 110 ft from the center of two intersecting roadways along the centerline of the through street and 55 ft along the centerline of local access streets, then connecting the two points with a straight line forming the hypotenuse of the clear view triangle. (See Detail 1). Trees within the clear view triangle shall have their branches removed at the trunk from ground level to a minimum of 7 ft above ground level. Shrubs or other vegetation not constituting a sight obstruction within the clear view triangle shall have a mature height no greater than 3 ft above grade elevation of the centerline of the adjacent street. These provisions are adapted from current local municipality ordinances and have been revised to reflect relatively low speed limits throughout the Base. In cases in which the "clear view triangle" will not provide adequate sight distance, 92d Civil Engineer Squadron Engineering Flight shall determine the required area needed to reduce hazards to the traveling public.

### 2. Protection of Existing Plant Materials

- a. Landscaping plans must provide for protection of existing trees and shrubs to remain within project work limits and immediately adjacent to construction sites. These plants will be protected by placement of a chain-link fence (or other barrier sufficient in size and strength) to prevent damage. Barricades shall be located no closer to the plant(s) than the crown circumference as defined by the outer drip-line of the plant(s) crown. Construction contractor shall irrigate and maintain landscaping within pre construction irrigated areas affected by the construction project.

## E. TURF MATERIALS

### 1. Playfields/Recreation Areas

- a. The primary consideration for playfields/recreation areas is wear resistance. For Fairchild AFB the following mixture shall be used:

<u>Seed</u>	<u>Percent</u>
Audubon or Aruba Creeping Red Fescue	25
Sheeps Fescue	25
Hard Fescue	25
Chewings Fescue	25

- b. The seeding rate shall be 5.5 lbs/1000 sf (240 lbs/acre).

2. Dryland (Non-irrigated areas that shall be prepared and seeded in late summer or early spring for seed establishment during times when rain is more frequent.)
  - a. Primary considerations for dryland areas are drought tolerance as well as minimal maintenance. At Fairchild AFB, the following mixture shall be used:

<u>Seed</u>	<u>Percent</u>
Hard Fescue – Minimus	14
Sheeps Fescue – Covar*	14
Kentucky Bluegrass – SPF30	14
Red Fescue – Boreal	8
Snake River Wheatgrass – Secar	36
Idaho Fescue – Nespurs**	14
No noxious weeds	

\* or other approved cultivar

\*\* or other approved native cultivar

- b. The seeding rate shall be 0.3 lbs/1000 sf (12 lbs/acre).
3. Seed Application Methods
  - a. The application of seed by means of mechanical seed drill is the preferred method. Drill to an average depth of 1/2 in.
  - b. Broadcast seeding may be used for small Playfield/Recreation areas. Grass seeding shall be installed on a minimum 4-in. loose topsoil. If the seed is broadcast, it shall be lightly raked into the soil following application. Apply one-half of the seed in one direction. Apply the other half at a 90 degree angle to the first application. Designs shall specify that turf areas shall be maintained by the contractor through the first three cuttings. Grass shall be cut when it has attained a height of 2-1/2 in. and shall be cut to a height of 1-1/2 in.
  - c. Hydroseeding is acceptable on sloping sites and on other areas where it can be shown to be economically advantageous. Increase the seeding rate by 100% for hydroseed application. The components and rates of application include:
    - (1) Seed (see type for rates of application).
    - (2) Wood cellulose fiber: Apply at 2,000 lbs/ac.
    - (3) Tacking agent: The contractor shall apply at the rate as recommended by the manufacturer.

#### 4. Topsoil

- a. At Fairchild AFB, sandy loam is sufficient for most turf installation purposes. Sandy loam shall consist of not more than 80% sand and 1% gravel, shall have an organic content of not less than 1.25%, and shall have a pH between 5.5 and 7.5.
- b. Where there is a particular concern for water retention in the soil, Washington State Department of Transportation (WSDOT) Type "A" (Black Dirt) may be specified. Black Dirt shall consist of a mixture of sand, silt, and decayed plant fiber. The sand content shall not exceed 60% and 1% gravel, the organic content shall not be less than 4%, and the pH shall lie between 5.5 and 7.5.

## F. OTHER MATERIALS

1. Planting Mixture for Trees, Shrubs, and Ground Covers
  - a. Planting mixtures provide a medium to enhance plant growth. At Fairchild AFB, the planting mixture shall be:
    - (1) 1/2 on-site soil

- (2) 1/4 compost
  - (3) 1/4 peat humus
  - b. Use of imported topsoil in planting mixtures shall be minimized. Maximum use of on-site soils will encourage root growth beyond the original planting excavation.
2. Mulch
- a. A coarse grade of shredded or ground bark shall be used as the mulching material in shrub and ground cover planting areas. A 3-in. minimum depth (or greater as determined by the A/E) shall be used to retard weed growth, and for moisture retention. Rock mulching materials shall be used only as specifically approved by the Base. Where approved, rock mulch to be 1½" to 3" washed river rock 4" deep. Design of perimeter elements around mulched areas shall take into consideration containment of these materials. Care will be exercised during design to avoid the use of bark mulches along drainage routes and in areas subject to ponding or flowing water.
3. Lawn Edging
- a. Lawn edging separates lawn areas from shrub planting areas. At Fairchild AFB, 2 x 6 fir/larch pressure treated with water-borne preservative for ground contact use, which complies with AWPB LP-22, shall be used as the lawn edging material in most situations. The edging shall be anchored with 1 x 2 stakes at least 18-in. long located 3 ft on center and driven 1 in. below the top of the edging. Two stakes, one on each side, shall be provided at the ends of each 2 x 6. Stakes shall be secured to the wood edging with two galvanized nails.
  - b. On high profile commercial, industrial, or administrative projects where appearance and durability are a high priority and where budgets permit, a 6-in. wide by 12-in. deep concrete "curb" edging, reinforced with #4 bars top and bottom shall be used.
4. Tree Staking and Wrap
- a. All deciduous trees, 1-1/2 in. in caliper and larger, and all conifer trees, 5 ft in height and taller, shall be staked. Guying of trees is generally not acceptable since the tree guys present a safety hazard.
  - b. Three stakes are required, spaced equidistant around the tree. Stakes shall be 2 x 2 or 2-in. round driven in a minimum of 2 ft of total embedment with no less than 1 ft into undisturbed soil and shall be stained dark brown with semi-transparent penetrating oil stain. Trees shall be tied to stakes with 2-strand twisted 12-gauge galvanized wire. Tree trunks shall be protected by feeding the wire through a suitable length of 1/2-in. diameter black rubber or plastic hose. "ChainLock" #5 1-in. wide rubber tree ties (or equivalent) may be used in lieu of twisted wire and hose. Prior to staking, wrap the trunks of deciduous trees with 4-in. wide tree-wrap tape designed to prevent borer and freeze damage. Tree-wrap tape shall consist of paper laminated with asphalt, and shall be crinkled to provide a stretch factor of approximately 30% to allow wrap to conform to irregular surfaces. Secure with twine. The trunks of deciduous trees planted in lawn areas shall be protected from damage by lawn mowers and weed trimmers by an expandable polyethylene trunk guard ("Tree Gard" or equivalent) located at the base of the trunk. Trees planted in full leaf should be sprayed with an emulsion type anti-desiccant to retard excessive moisture loss from the tree.
  - c. Specify that the contractor shall remove the tree stakes and tree wrap at the end of the one-year warranty period. (If this is not done, these materials tend to remain in place for years, frequently damaging to the tree, as well as detracting from the attractiveness of the landscaping.)

## G. FERTILIZATION

- 1. Utilize organic and non-chemical methods as much as possible for fertilizer applications, such as, a compost tea that can be sprayed onto turf areas and shrub areas.

2. The following represents the minimum recommendations for fertilization. Many fertilizer formulations are available. Adjust recommended application rates to suit the specific formulation used.

3. Wear Resistant Turf Grasses

- a. Turf grasses shall be fertilized at the time of planting, with a water retention fertilizer, whether in sod or seed form, by mixing fertilizer into the top 2 in. of the prepared sod/seed bed.
- b. Minimum Recommended Nutrient Analysis:

<u>Nutrient</u>	<u>Percent</u>
Nitrogen	20
Phosphorous	4
Potassium	4
Iron	2

- c. Application Rate: 5 Lbs/1,000 ft<sup>2</sup>
- d. At least 25% of nitrogen shall be in slow release form. Fertilizer shall be applied at the time of planting and three times per season through the establishment period and over the life of the stand of grass.

4. Dryland Grasses

- a. Dryland grasses shall be fertilized at the time of planting by mixing fertilizer into the top 2 in. of the prepared seed bed or by mixing the fertilizer into the hydroseed slurry. Fertilizer should be applied at the time of seeding only.
- b. Minimum Recommended Nutrient Analysis:

<u>Nutrient</u>	<u>Percent</u>
Nitrogen	21
Phosphorous	14
Potassium	14

- c. Application Rate: 600 lbs/ac
- d. At least 50% of nitrogen shall be in slow release form.

5. Trees, Shrubs, and Ground Covers

- a. Trees, shrubs, and ground covers shall be fertilized at the time of planting by mixing fertilizer into the planting mix. Subsequent fertilizations are not generally required.
- b. Minimum Recommended Nutrient Analysis:

<u>Nutrient</u>	<u>Percent</u>
Nitrogen	5
Phosphorous	10
Potassium	10

- c. Application Rate: 5 lbs/cy
- d. Slow release plant food tablets may be used in lieu of mixing fertilizer with planting mix. The application rate shall be that recommended by the tablet manufacturer.

## H. WEED CONTROL

1. Shrub Planting and Mulched Areas

- a. The A/E shall specify the use of weed-barrier fabric for weed control in shrub planting and mulched areas. Herbicides are not to be specified. Landscape fabrics shall be spun-bonded,



woven, needle-punched, or a combination polypropylene fabric designed to permit air, water, and nutrients to penetrate to the soil below. Sheet plastic shall not be used.

Minimum Weight (for bark mulch)	1.9 oz/yd <sup>2</sup>
Minimum Weight (for rock mulch)	3.0 oz/yd <sup>2</sup>
Minimum Tensile Strength	70 lbs
Minimum Puncture Strength	20 lbs
Minimum Permeability	30 gpm/ft <sup>2</sup>

- b. Fabrics shall be anchored to the ground with 1 x 6 U-shaped 11-gauge staples located at 2 feet maximum on center at edges and overlaps and 4 feet on center otherwise. Fabric shall be overlapped a minimum of 4 inches at the seams.

## 2. Turf Areas

- a. A single application of herbicide to turf grass seeded areas by the installation contractor shall be specified after the third mowing to control broadleaf lawn weeds. The herbicide shall be applied by a licensed applicator following the manufacturer's recommendations. Following application, treated areas shall be posted as prescribed by all applicable Washington State Department of Agriculture regulations.

## I. PESTICIDES

### 1. Applicator Certification

- a. All contract personnel applying pesticides must be certified by the State of Washington in the categories for the pesticides that they are applying. Contractors are responsible for ensuring their employees are certified and carry a copy of certification with them whenever on Base. Project specifications shall require certification papers to be submitted to the Contracting Officer before individuals are allowed to begin pesticide application. The required documentation shall include the applicator's full name, certification expiration date, all categories certified in, and state certification number.

### 2. Application Record

- a. Specifications must also include documentation needed to fulfill MAJCOM requirements, including date application was performed, application site, building number or street site, operation type (baiting, residual, etc.), labor hours/survey hours, name of the applicator, name of pest, area treated/surveyed (square feet, acres, etc.), EPA registration number, amount of finished product applied, pesticide name, percent finished product or amount of concentrate used, and finished form. Use the *Contractor Pesticide Documentation Requirements* data sheet located at the end of this section for inclusion in specifications involving the use of pesticides. Provide a copy of data sheet to Grounds Contract QAE (92 CES/CEOES), 92 CES Pest Management Shop, and 92 CES/CEIE.

### 3. Chemical Handling

- a. Specify that Contractors shall not store or mix pesticides/adjuvants on Fairchild AFB and that Contractors shall not clean dispersal equipment and safety gear on Fairchild AFB.
- b. Specify that Contractors shall refill sprayers/dispersal equipment at site(s) designated by the Government. Ensure that water source(s) used for mixing have a functional, state-certified backflow prevention device installed.
- c. On improved or semi-improved grounds, specify that the Contractor shall post warning signs (in the areas to be treated) to the base populace to advise them that pesticides are being applied, in accordance with Washington agricultural requirements. The signs shall stay in place until the pesticide is dry, or longer if so required in the Material Safety Data Sheets or label(s) for the pesticide(s).

### 4. Pesticide Approval

- a. All pesticides and adjuvants used on Fairchild AFB must be approved by all of the following authorities:
  - (1) HQ AMC/ESOF, Air Mobility Command Entomologist
  - (2) 92d Medical Group/BSC (Chief, Military Public Health)
  - (3) 92d CES/CE (The Civil Engineer)
  - (4) 92d CES/CEI (Chief, Installation Management Flight)
  - (5) Contracting Officer or his/her authorized representative for the contract
  - (6) Approved Pesticide List
  - (7) For list of approved pesticides currently authorized for use on Fairchild AFB and tenant units, refer to AFPMB Standard Pesticide NSN Listing FY 2020.

J. MAINTENANCE

1. Landscape designers shall include, as part of the landscape design specifications, that the contractor is responsible for training Base maintenance personnel, and/or Base maintenance contractors in the proper maintenance of the landscape prior to final acceptance. The maintenance training shall include proper care of plants including any special care required for specific plant types, pruning, fertilizing, mulching, lawn care, watering, weed prevention, and winterization.

CONTRACTOR PESTICIDE DOCUMENTATION REQUIREMENTS

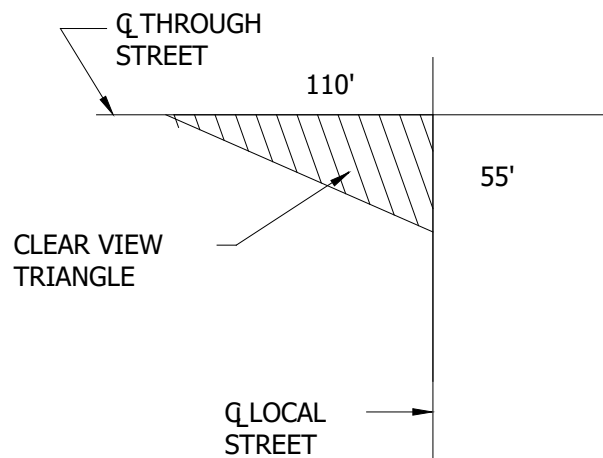
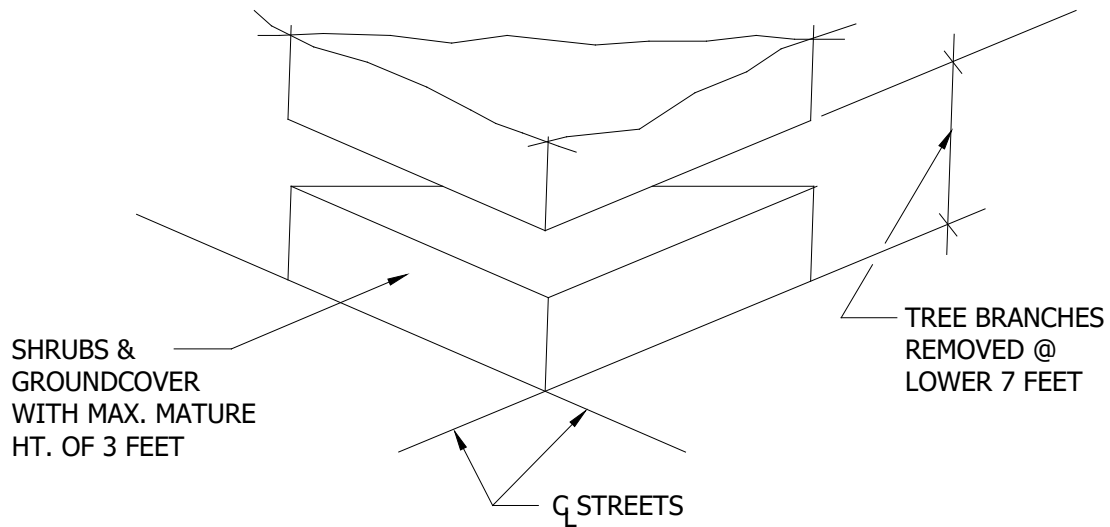
Date of Application	Application Site
Operation Type	Building Number/Suffix
Street Address/Area Applied	
Labor Hours/Survey Hours	Amount of Area Treated
Name of Pest	Amount of Finished Spray
Pesticide Registration Number	Percent or Ratio of Finished Spray
Pesticide Name	Amount of Concentrate Used
Pesticide Finished Formulation	
Name of Applicator	
Applicator's Certification Number	
Certification Expiration Date	
Categories Certified in	

## SECTION 329300 – PLANTS

### A. DETAIL SHEETS

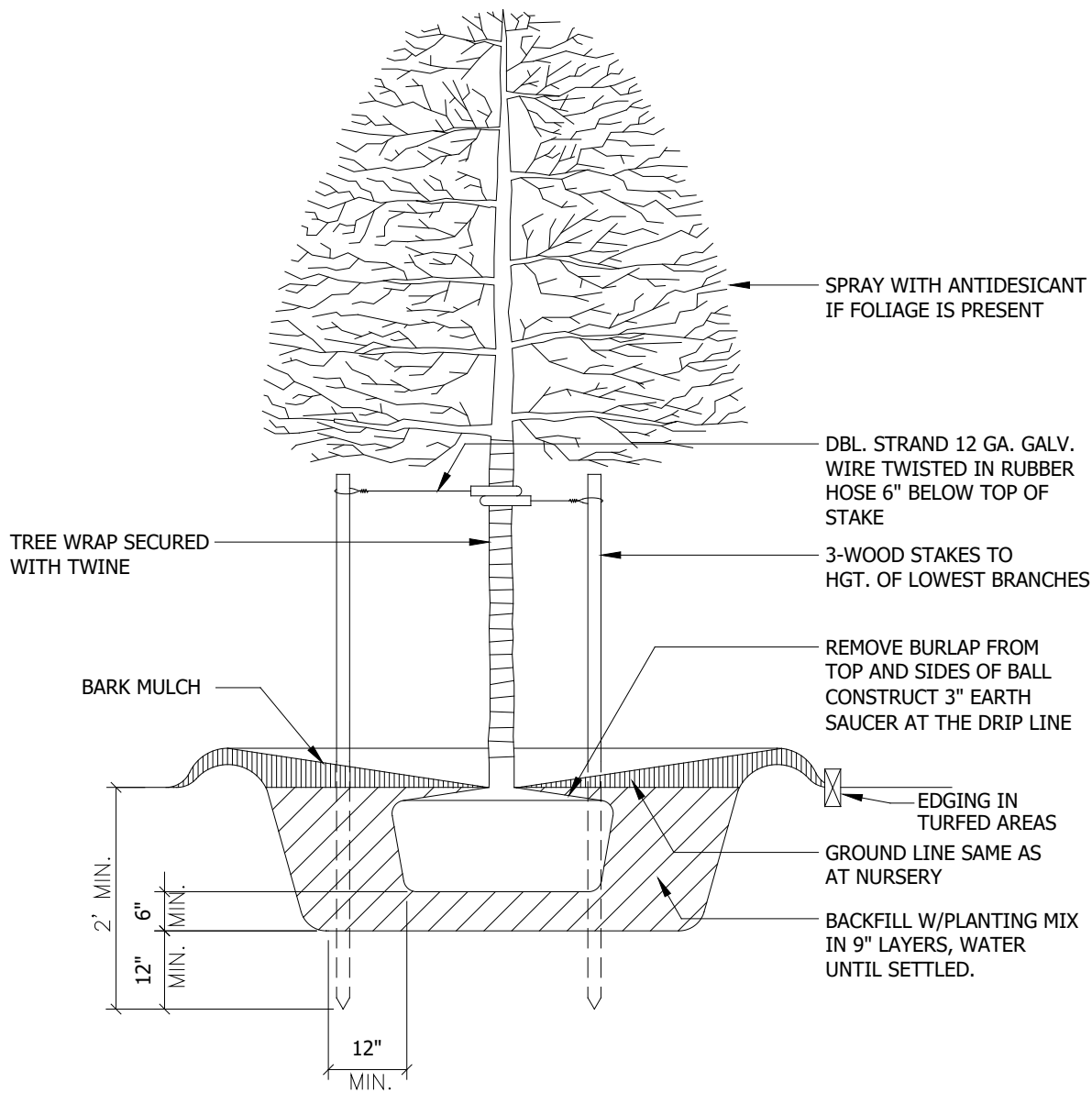
1. Clear View Triangle
2. Tree Planting (Conifers Similar)
3. Shrub Planting (Small Trees Similar)
4. Ground Cover Planting

### DETAIL 1 – CLEAR VIEW TRIANGLE



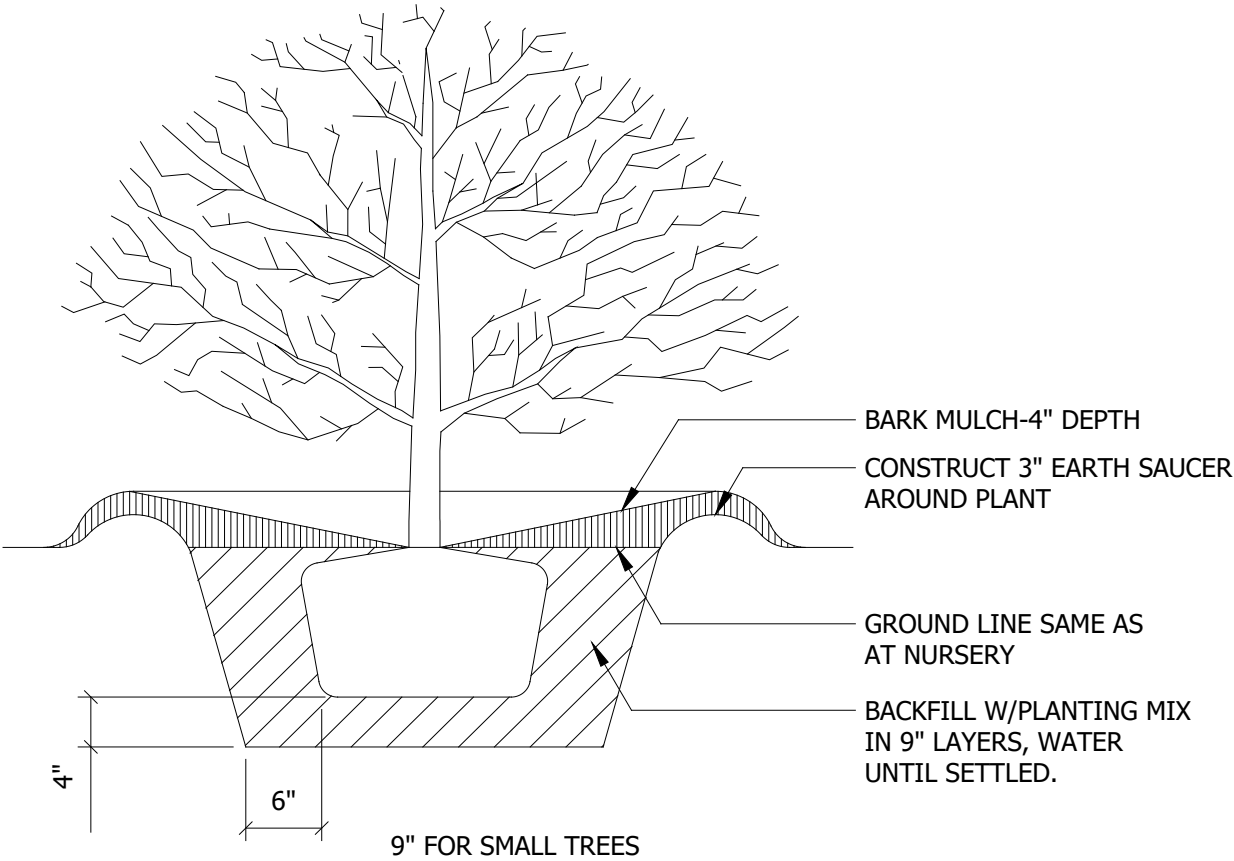
SCALE: NONE

**DETAIL 2 – TREE PLANTING**  
(Conifers Similar)



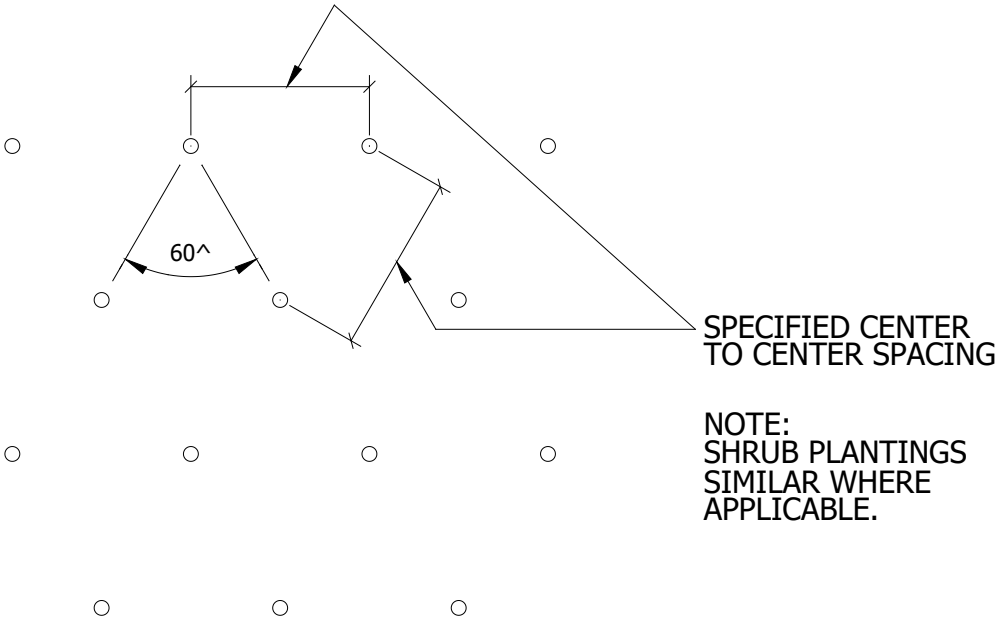
SCALE: NONE

**DETAIL 3 – SHRUB PLANTING**  
(Small Trees Similar)



SCALE: NONE

DETAIL 4 – GROUND COVER PLANTING



SCALE: NONE

END OF DETAILS

FAIRCHILD AIR FORCE BASE DESIGN GUIDE – DATA SHEETS

Fairchild AFB Approved Species List

Type	Plant	Common Name	Ht/Width	Bloom	Sun/Shade	Hardiness Zone	Comments	Administrative	Community	Munitions	Operations and MX	Residential	Training
Grass	Bouteloua dactyloides	Buffalo grass	4-6"		Sun		stoloniferous perennial	Y	Y	N	N	Y	Y
Grass	Elymus glaucus	Blue wild rye	4-5'		Sun		utilitarian grass/ erosion control, wildlife and agroforestry	Y	Y	N	N	Y	Y
Grass	elymus wawawaiensis	Secar Snake River Wheatgrass	16-32"		Sun		area stabilization	Y	Y	N	N	Y	Y
Grass	Sporobolus heterolepis	Prairie dropseed	2-3'		Sun		fountain-like mound of foliage w/fine texture	Y	Y	N	N	Y	Y
Grass	Festuca glauca	Blue Fescue	10' x 18"	bluish-green	Sun		Drought tolerant, keeps color through winter	Y	Y	N	N	Y	Y
Grass	Festuca idahoensis	Idaho Fesue	18-24"x 12-18"	Bluish	Sun		Drought tolerant, grows taller in moist sites	Y	Y	N	N	Y	Y
Grass	Panicum Virgatum	Shenandoah' Switchgrass	3-5' x 3-5'		Sun		Desert garden or perennial border	Y	Y	N	N	Y	Y
Grass	Schizachyrium scoparium	Little Bluestem	2' x 18"		Sun		Changes color throughout season	Y	Y	N	N	Y	Y
Ground Cover	Antennaria dioica 'rubra	Pink Pussy-toes	4-6" x 10-12"	Deep pink	Sun		Perennial low mat of tiny silver-gray leaves and deep pink flowers in late Spring	Y	Y	N	N	Y	Y
Ground Cover	Arabis blepharophylla	Rock Cress	6-8" x 1'	Varies	Sun/pt shade		Herbaceous perennial. Border plant	Y	Y	N	N	Y	Y
Ground Cover	Delosperma cooperi	Pink Hardy Ice Plant	6' x 24"	Pink	Sun	5+	Succulent. Does not tolerate heavy snowpack or winter moisture	Y	Y	N	N	Y	Y
Ground Cover	Delosperma nubigenum	Hardy Yellow Ice Plant	1-3"x12-16"	Yellow	Sun	4+	Fast spreader, deer tolerant. No foot traffic or heavy snow	Y	Y	N	N	Y	Y
Ground Cover	Deosperma cooperi	Hardy Purple Ice Plant	3 x 18"	Fuchsia Purple/?	Sun	5+	Vigorous spreader, succulent	Y	Y	N	N	Y	Y
Ground Cover	Sedum spurium	Two-row stonecrop	3-6"x12-24"	Pink-rust	Sun/dapple	5+	Not dense enough to crowd out weeds but can overtake small plants	Y	Y	N	N	Y	Y
Ground Cover	Thymus "Reiter Thyme"	Reiter Creeping Thyme	3 x 30"	Lav./mid Sum.	Sun	4+	Thick foliage chokes out most weeds	Y	Y	N	N	Y	Y
Ground Cover	Thymus lanuginosus	Wooly Thyme	2 x 18"	Rarely	Sun	4+	Can take high traffic areas	Y	Y	N	N	Y	Y
Ground Cover	Thymus pseudolanuginosus	Wooly Thyme	1-2" x 18"	Pink/summer	Sun/shade	4+	Ground cover for rock gardens, between stepping stones	Y	Y	N	N	Y	Y
Perennial	Achillea ageratifolia	Greek Yarrow	4"-18"	White/lt sp	Sun	4+	Ground cover	Y	Y	N	N	Y	Y
Perennial	Achillea f. "Moonshine"	Moonshine Yarrow	18 x 24"	Yellow	Sun	3+	Silver foliage	Y	Y	N	N	Y	Y
Perennial	Achillea serbica	Serbian Yarrow	4 x 15"	White/late spring	Sun	4+	Slow growing. Tight mat of evergreen-gray foliage	Y	Y	N	N	Y	Y
Perennial	Achillea x kelleri	Keller's Yarrow	8" x 15"	White/sp-sum	Sun	5+	Silver foliage	Y	Y	N	N	Y	Y
Perennial	Agastache canna	Wild Hyssop	2-3' x 2'	Rose/purple	Sun	3+	Deer resistant, attracts butterflies	Y	Y	N	N	Y	Y
Perennial	Alchemilla mollis	Lady's Mantle	12-18"x12-15"	Yellow-green	Dapple sun	4+	Needs more water in full sun. Prefers moist to somewhat dry	Y	Y	N	N	Y	Y
Perennial	Alyssum saxatile	Basket of Gold	9-12"x15"	Bright yellow	Sun	3 to 7	High maintenance	Y	Y	N	N	Y	Y
Perennial	Anemone pulsatilla	Pasque Flower	9-12"	Purpleish/ea Spr	Pt shade	5+	Seed clusters resemble feathery smoke-gray pompoms	Y	Y	N	N	Y	Y
Perennial	Antennaria microphylla	Rosy Pussytoes	4-12" x 8-12"	White/Pink/early sum	Sun	2+	Spreads & self-sows rapidly, good for ground cover. Very dry tolerant. Great pollinator	Y	Y	N	N	Y	Y
Perennial	Asclepias tuberosa	Butterfly Weed	12-18"x12-24"	Orange	Sun	3+	Attracts butterflies, especially swallowtails & monarchs	Y	Y	N	N	Y	Y
Perennial	Bergenia cordifolia	Heartleaf Bergenia	12" x 12-15"	Pink or white	Shade/pt sh	4+	Bold, glossy foliage. Moist to somewhat dry soil	Y	Y	N	N	Y	Y
Perennial	Calytophus serrulatus	Dwarf Sundrops	6" x 10"	Yellow/lt spring	Sun	4+	Heavy bloomer	Y	Y	N	N	Y	Y



FAIRCHILD AIR FORCE BASE DESIGN GUIDE – DATA SHEETS

Type	Plant	Common Name	Ht/Width	Bloom	Sun/Shade	Hardiness Zone	Comments	Administrative	Community	Munitions	Operations and MX	Residential	Training
Perennial	Catananche caerulea	Cupids Dart	24" x 12"	Lav blue/summer	Sun	5+	Grass-like foliage with flowers on 8-12" stems	Y	Y	N	N	Y	Y
Perennial	Centaurea montana	Cornflower	2-3' x 2-3'	Blue	Sun	3 to 8	Sprawls in too much shade	Y	Y	N	N	Y	Y
Perennial	Cerastium tomentosum	Snow-in summer	4-8"x18"	Small white	Sun	3 to 7	Spreads rapidly-short lived due to rotting	Y	Y	N	N	Y	Y
Perennial	Cichorium intybus	Chicory	2 x 3' H	Blue	sun	4 to 8	Can be very aggressive	Y	Y	N	N	Y	Y
Perennial	Coreopsis 'Moonbeam' verticillata	Threadleaf	2-3'x2'	Yellow/gold	Sun	3 to 8	Seems to prefer more moisture. Divide every 2-3 years	Y	Y	N	N	Y	Y
Perennial	Coreopsis grandiflora	Sunray	24" x 18"	Gold/yellow	sun	3+	Blooms all summer. Spread by self-seeding	Y	Y	N	N	Y	Y
Perennial	Dianthus barbatus	Sweet William	10" – 20"	Pink, red, white	sun	3 to 9	Dense clusters, vigorous. Spicy sent	Y	Y	N	N	Y	Y
Perennial	Erigeron speciosus	Daisy (Fleabane)	1 – 7' H	Violet	sun	2 to 8	Can be very aggressive. Great pollinator	Y	Y	N	N	Y	Y
Perennial	Eriogonum umbellatum	Sulphur Flower	6-12"x1-2'	Yellow/summer	Sun	3+	Needs pruning to keep compact. Very drought tolerant. Great pollinator	Y	Y	N	N	Y	Y
Perennial	Gaillardia aristata	Blanket flower	2-3' x 2-3'	Yellow w/red	Sun	3+	Reseeds. Deadheading required to prolong bloom season. Great pollinator	Y	Y	N	N	Y	Y
Perennial	Geranium sanguineum	Blood-red Cranesbill	12-18x24"	Purple to pale pk	Sun/pt sun	4+	Deeply lobed leaves turn red in fall	Y	Y	N	N	Y	Y
Perennial	Helianthemum nummularium	Sunrose	6-12"x12-18"	Multi	Sun	5 to 7	Good drainage-likes rocky dry alkaline conditions	Y	Y	N	N	Y	Y
Perennial	Hemerocallis species	Daylily	Varies	Varies	Sun	4+	Moderately drought tolerant. Beautiful display of flowers	Y	Y	N	N	Y	Y
Perennial	Hesperaloe parviflora	Texas Red Yucca	5' x 36" w	Red flowers	Sun/prt s	5+	Very drought tolerant, once established	Y	Y	N	N	Y	Y
Perennial	Iris germanica	Bearded Iris	2-3' x 2'	purple/varies	Sun/pt sh	4+	best in full sun	Y	Y	N	N	Y	Y
Perennial	Iris pumila	Dwarf Iris	8-16"	purple/varies	Sun/pt sh	4+	best in full sun	Y	Y	N	N	Y	Y
Perennial	Lewisia	Bitterroot	4-8" x 5-10"	Various	Sun	4 to 7	Good rock garden plant	Y	Y	N	N	Y	Y
Perennial	Lewisia cotyledon	Siskiyou Lewisia	6"+x 1.5'	Various	Sun	4 to 7	Good rock garden plant	Y	Y	N	N	Y	Y
Perennial	Linum perenne "Lewisi"	Blue Flax	18" x 18"	Blue	Sun/pt sun	3+	Favorite of gardens & meadows. Reseeds	Y	Y	N	N	Y	Y
Perennial	Monarda fistulosa	Wild Bergamot	3-4'	Lilac to purple	Sun/pt sh	4+	Plants spread quickly	Y	Y	N	N	Y	Y
Perennial	Nepeta x "Six Hills Grant"	Giant Catmint	36" x 30"	Violet-blue/lt sp	Sun/pt sun	4+	Tough, long lived, reliable bloomer	Y	Y	N	N	Y	Y
Perennial	Nepeta x faassenii	Catmint	18" x 30"	Lav-blue/sum	Sun/pt sun	4+	Adapts to wet or dry soils. Fast growing	Y	Y	N	N	Y	Y
Perennial	Oenothera missouriensis	Missouri Evening Primrose	10" x 36"	Yellow	Sun	4+	Long blooming	Y	Y	N	N	Y	Y
Perennial	Oenothera speciosus "Rosea"	Showy Pink Evening Primrose	10" x 18"	Pink/summer	Sun	5+	Spreads rapidly	Y	Y	N	N	Y	Y
Perennial	Papaver orientale	Poppy	2-4'x2'	Red/or/pink/white	Sun	3 to 7	Long lived-top root challenge to transplanting	Y	Y	N	N	Y	Y
Perennial	Perovskia atriplicifolia "Filagran"	Cutleaf Russian sage	3' x 3'	Lav-blue/sum	Sun	4+	Spreads below ground	Y	Y	N	N	Y	Y
Perennial	Phlox subulata	Creeping phlox/Moss phlox	4-6"	Pink/blue/white	Sun	3 to 9	Spring color for rock gardens and edgings	Y	Y	N	N	Y	Y
Perennial	Polygonum affine	Himalayan Fleeceflower	6-10" x 30+"	Pink/lt summer	Sun/pt sh	4+	Use in rock gardens, ground cover, borders	Y	Y	N	N	Y	Y
Perennial	Rudbeckia spp	Gloriosa Daisy	Varies	Yellow/gold	Sun	2 to 6	Reliable bloomer-good seed heads in fall	Y	Y	N	N	Y	Y

FAIRCHILD AIR FORCE BASE DESIGN GUIDE – DATA SHEETS

Type	Plant	Common Name	Ht/Width	Bloom	Sun/Shade	Hardiness Zone	Comments	Administrative	Community	Munitions	Operations and MX	Residential	Training
Perennial	Salvia nemerosa	Meadow sage	18 x 18"	Purple/lit sp	Sun	4+	Flowers from midsummer and onward	Y	Y	N	N	Y	Y
Perennial	Salvia officinalis	Garden sage	18-24"x12-18'	Violet-blue	Sun	4+	Several cultivars available	Y	Y	N	N	Y	Y
Perennial	Salvia picheri "Grandiflora"	Pitcher's Blue Sage	48" x 24"	Blue/violet	Sun	4+	Great butterfly plant	Y	Y	N	N	Y	Y
							Fine plant for matching with other late blooming						
Perennial	Sedum "Ruby Glow"	Rosy glow	8" x 15"	Ruby-red/lit sum	Sun	3+	plants	Y	Y	N	N	Y	Y
Perennial	Sedum spectabile	Showy stonecrop	18-24"x10-15"	Pink, red, white	Sun/pt sun	3+	Moderately drought tolerant	Y	Y	N	N	Y	Y
Perennial	Sempervivum species	Hens and Chicks	2-4" x 6-12"	Various	Sun/pt sun	4+	Container, rock gardens. Does best in gravelly soil	Y	Y	N	N	Y	Y
Perennial	Sphaeralcea incana	Orange Globe Mallow	3-4' x 24"	Orange/mid sum	Sun	4+	Will thrive in deep clay. Very drought tolerant	Y	Y	N	N	Y	Y
Perennial	Thymus vulgaris	English Culinary Thyme	12" x 15"	Lav-pk/ea sum	Sun	4+	Fragrant gray-green leaves. Easy grown	Y	Y	N	N	Y	Y
Perennial	Thymus vulgaris "orange balsam"	Culinary Thyme	6-8" x 15"	Pale pink	Sun	4+	Hint of citrus. Rambling orange tinged stems	Y	Y	N	N	Y	Y
							Aromatic; gnarled branches at maturity; good						
Shrub	Artemisia tridentata	Big Sage	4' x 3'		Sun	4+	wildlife plant	Y	Y	N	N	Y	Y
Shrub	Atriplex canescens	Four-wing Saltbush	1-6' x 4-8'	4-winged bract	Sun	2+	Extremely tolerant of all conditions	Y	Y	N	N	Y	Y
							Bright yellow pea-like bloom, 2" seedpods; Good						
Shrub	Caragana arborescens	Siberian Pea Shrub	7-20'	Yellow	Sun	2+	screen/windbreak	Y	Y	N	N	Y	Y
							Prune in Spring, blooms on new growth. Attracts						
Shrub	Caryopteris spp	Bluebeard	3-4' x 3-4'	Blue/lit sum	Sun	5+	bees	Y	Y	N	N	Y	Y
							Pink, silky plumed seed heads cover plant for						
Shrub	Fallugia paradoxa	Apache Plume	4' x 4'	White/late spring	Sun	4+	many months	Y	Y	N	N	Y	Y
							Profuse bloomer. ½ - 1 inch leaves. Upright						
Shrub	Genista tinctoria	Woadwaxen	3' x 12'	Yellow	Sun	5+	shrub	Y	Y	N	N	Y	Y
Shrub	Penstemon spp	Penstemon	varies	varies	Sun		Ground cover or rock garden plant.	Y	Y	N	N	Y	Y
							Newer varieties in other colors, flowers best in						
Shrub	Potentilla fruticosa	Shrubby Cinquefoil	1-4' x 2-4'	Yellow/summer	Sun/pt sun	2+	full sun	Y	Y	N	N	Y	Y
Shrub	Rhus aromatica "Gro-Low"	Fragrant Sumac	3' x 8'	Yellow/lit spring	Sun/pt sun	4+	Beautiful fall color, very tough ground cover	Y	Y	N	N	Y	Y
Tree	Acer campestre	Hedge Maple	30' x 30'	Green	Sun/Pt Shade	5+	Tolerates drought/compacted soil; slow growing	Y	Y	N	N	Y	Y

FAIRCHILD AIR FORCE BASE DESIGN GUIDE – DATA SHEETS

Type	Plant	Common Name	Ht./Width	Bloom	Sun/Shade	Hardiness Zone	Comments	Administrative	Community	Munitions	Operations and MX	Residential	Training
Tree	Acer ginnala	Amur Maple	15-20'	Yellow	Sun/Pt Shade	2+	Multi-trunked; fall color; adaptable	Y	Y	N	N	Y	Y
Tree	Acer glabrum	Rocky Mtn. Maple	20' x 15'	Green/yellow	Sun/Pt Shade	4+	Multi-trunked, best in moist, partly sunny areas	Y	Y	N	N	Y	Y
Tree	Cercis spp	Redbud	10-15'	Pink/early spring	Sun/Pt Shade	5+	Brilliant magenta blossoms, heart-shaped leaves	Y	Y	N	N	Y	Y
Tree	Pinus aristata	Bristlecone Pine	20-30' x 10-15'		Sun	2+	Very slow-growing; water during dry spells	Y	Y	N	N	Y	Y
Tree	Pinus mugo	Mugo Pine	3-10' x 10-15'		Sun/Pt Shade	2+	Sawfly and pine needle scale can be a problem; may need pruning	Y	Y	N	N	Y	Y
Tree	Pinus nigra	Austrian Pine	40-60' x 20'		Sun	4+	Good city/windbreak tree; Diploia tip blight may be a problem	Y	Y	N	N	Y	Y
							Very drought tolerant, easy to propagate in poor soil. Not recommended as street tree; needs room						
Tree	Pinus ponderosa	Ponderosa Pine Tree	80-100' x 25-30'		Sun/Pt Shade	3+		Y	Y	N	N	Y	Y

End of Section

## SECTION 330000 – UTILITIES

### A. NATURAL GAS

1. Natural gas is supplied by Avista Utilities under firm regulated rate schedules. Base gas lines are owned and maintained by Avista Utilities and Honeywell Corp. All natural gas line distribution work must be coordinated through the respective system owner. The on-base distribution system operates at 55 psig. The system is a combination of steel and polyethylene lines buried at a depth of approximately 30 inches. It is recommended that any connections to the steel lines be investigated to check for corrosion prior to final design or any construction. Future major additions to the system shall be sized and planned to provide a natural gas grid system for the base.

### B. METERS

1. Provide meters for electric, water, natural gas, and irrigation, where determined cost effective by 92 CEN, and ensure connection with the EMCS.
2. Metering requirements are subject to changes mandated by higher levels of the Air Force in response to communication security issues. At the time of this revision, memory at the meter is not required for water or natural gas meters, but is required for electric meters at point of base electrical service entry and on buildings > 35,000 square feet. Memory at the electric meter shall be sufficient to accumulate 15 minute trended readings for at least 30 days. All meters are required to be open protocol, with BACnet preferred. Please check with 92 CES for any subsequent changes to these requirements.
3. See Division 26 for UFG spec 26 27 13.10 30, Electrical Metering, and edit the template specification as appropriate for the specific project. See Division 33 for UFG spec 33 12 33.00 30, Water Metering, and UFG spec 33 51 13.00 30, Natural Gas Metering, and edit the template specifications as appropriate for the specific project.

### C. CATHODIC PROTECTION

1. See Section 264200, *Cathodic Protection*.

#### D. UTILITY LOCATE

1. It shall be the responsibility of the designer to correctly locate existing utilities. During the design phase, all utilities shall be located using state-plane coordinates and marked on the utility site plan. (Refer to Attachment 1 at the end of this Section for Utility Verification Procedures). As-built drawings of facilities showing utilities shall be confirmed. Site plans showing utility locations shall also include the depth of the utility. Project utility site plan(s), with dimensioned, designer-verified existing utilities, shall be used in the approval of the FAFB Form 103, Base Civil Engineering Work Clearance Request.

#### E. UTILITIES

1. All utility lines provided shall have a plastic marker tape installed above line and 8-10 inches below grade. The plastic marker tape shall include a metallic wire for detection purposes and shall indicate the type of utility line buried below. Utility line monument markers shall be installed every 200 feet along straight runs and at each change of direction. Provide #12 AWG tracer wire along utility; and provide grounding point near each manhole, and terminate wire.
2. No gas regulators, transformers, exterior HVAC, fire hydrants, etc. shall be provided at entryways to facilities.
3. Exterior equipment such as bollards, gas regulators, transformers, exterior HVAC, etc. shall be painted to match Sherwin-Williams' color, #SW2070, "Spanish Moss" when located in open areas or adjacent to brick facilities. When located adjacent to "Sierra Tan" colored facilities paint to match as directed by the government.
4. All underground utilities shall be placed parallel to roads/streets within a 50-foot (15-meter) corridor. Service connections shall be installed perpendicular to mains and avoid crossing large developable spaces.
5. Where new utilities must cross under existing roads, base policy is to run them through existing duct banks, if possible. If new duct banks/lines are needed, they shall be horizontally bored/drilled under the road/pavement. Street cutting will be an exception justified only by the road already being in such bad shape that a patch is better than the existing road or the extent of the new utilities makes boring/drilling impossible. (Justification for any and all street cuts shall be included in the Design Analysis). In the event that street cutting and patching is permitted, the trench shall be backfilled with "flowable fill" (controlled density fill, CDF) to prevent rutting under traffic loads. Completely restore sites disturbed by boring/drilling operations.
6. All utilities shall be metered at the building, with all services marked.
7. Split block/brick fence shall be installed to protect/shield all gas regulators, transformers, exterior HVAC, back flow assemblies, etc. from vehicle damage and as a vision screen. See FAIRCHILD AIR FORCE BASE DESIGN GUIDE Section 320000, Paragraph D.
8. All existing underground utility lines that are decommissioned shall be cut and capped at the mains; lines exiting building shall be terminated by cutting and capping at point of exit from the building and a minimum 5 feet out from the building foundation. The remainder of the line may be abandoned in place; both ends of any line abandoned in place shall be capped. All caps, valves, elbows, etc., shall be GPS located.
9. GPS coordinates for all utility line connections and changes in utility direction shall be included in the as-built drawings. Drawings shall also include GPS coordinates for all locations where utilities have been abandoned and capped.

#### F. POTABLE WATER PIPING

1. All new potable water piping mains shall be AWWA C900 or C905 PVC material. The base utilities shop does not have equipment to repair ductile iron (DI) or high-density polyethylene (HDPE) pipe.
2. All new potable water piping service lines to buildings shall be Type K Copper material.

G. UTILITY OUTAGES IMPACTING FIRE SUPPRESSION OR FIRE ALARM SYSTEMS

1. See Section 330000 UTILITY VERIFICATION PROCEDURES Attachments 1 BDG requirements and procedures for utility outages impacting fire suppression and fire alarm systems.

H. THRUST BLOCKING

1. Pre-cast thrust blocks shall not be used to support underground installed utilities.
2. All thrust blocks shall be constructed of formed concrete. The concrete thrust block shall have a thickness of one pipe diameter and a contact face area that shall be formed against the pipe. The back of the thrust block be placed against undisturbed soil. Backfill shall be placed on all sides of the thrust block and to the sides of the excavation.

## ATTACHMENT 1 – UTILITY VERIFICATION PROCEDURES

### A. PURPOSE

1. The designer is tasked with the responsibility for verifying the location of existing utilities within their project site. Through the verification process, better information is provided to contractors for bidding and construction; the number of unplanned utility outages is greatly reduced; and there is less redesign, fewer construction delays, and fewer modifications after contract award.

### B. PROCEDURES

1. Development of Project Limit Line (PLL): The designer determines the PLL at 35% design. The PLL must take into account perimeter fencing requirements and all utility corridors.
2. Initiating the FAFB Form 103, *Base Civil Engineering Work Clearance Request*: The designer is responsible for initiating the FAFB Form 103. See FAFBI 32-1001, *Preparing Base Civil Engineering Work Clearance Request* for instructions.
3. Designers shall use Ground Penetrating Radar (GPR) to verify the location of known and unknown utilities in areas of excavation on the project site. All GPR data will be incorporated into GEOBASE as built data.
4. Overlaying the Comprehensive Utility Plan (CUP): The designer draws the PLL on the CUP provided by the BCE.
5. Marking the PLL at the Project Site: The designer marks the PLL at the project site in accordance with the APWA Uniform Color Code standards and FAFBI 32-1001.
6. Requesting a FAFB Form 103: The designer clearly annotates on the CUP how the PLL was marked in the field (e.g., "The site was marked with white stakes at all corners"). The designer then attaches 2 copies of the annotated CUP to an FAFB Form 103 and provides it to the BCE PM for processing.
7. Processing the FAFB Form 103: The BCE PM or CM is responsible for processing the FAFB Form 103 within 10 business days.
8. Assigning a Tracking Number and Obtaining Signatures: The BCE PM/CM will submit the FAFB Form 103 through the Fairchild GeoBase Portal / Base Civil Engineering Work Clearance Request page. The permit tracking number will be assigned automatically. Signatures for all coordination blocks will be provided by the organizations responsible for utility markings.
9. Marking Existing Utilities at the Project Site: Utilities within the PLL will be marked on the ground by the responsible organization. All marking will be in accordance with the APWA Uniform Color Code standards. In some instances, the organization responsible for utility marking will annotate the FAFB Form 103 with words similar to "Call 48 hours prior to digging". When this occurs, the Requestor is responsible for calling the organization to coordinate marking after the FAFB Form 103 has been returned.
10. Approval of the FAFB Form 103: The FAFB Form 103 is considered approved when the Chief Engineer signs the approval block. Upon approval, the BCE PM notifies the Requestor that the permit is ready for pick up. The BCE PM gives the original copy of the FAFB Form 103, with attachments, to the Requestor and keeps a copy, with attachments, for the BCE project file.
11. Maintenance of Utility Markings: Once utilities are marked, the Requestor is responsible for maintaining the marks for the duration of the project.
12. Coordinating Final Utility Markings: Upon receipt of the approved FAFB Form 103, the Requestor makes contact with any organizations that require 48 hours notice prior to marking utilities. If the Requestor has difficulties in getting AF personnel to physically mark the location of existing utilities, he/she will contact the BCE PM for assistance.

13. **Verification of Existing Utilities:** The designer is responsible for ensuring that all existing utilities are accurately shown on a Site Utility Plan and that all discrepancies in the CUP are brought to the attention of the BCE.
14. **Questionable Utility Markings:** If there is a question about the actual location of any utility, it is the responsibility of the designer to determine the actual location of the utility. This process includes, but is not limited to, investigating physical features at the project site (nearby manholes, curb stops, fire hydrants, steam pits, etc.); calling the appropriate agency, as shown on the FAFB Form 103, to verify it's markings; and digging up the utility to determine its actual location.
15. **Missing Utility Markings:** If a utility line is shown on the CUP, but a corresponding mark is not on the ground at the project site, the designer is responsible for resolving the discrepancy. The procedures described in the previous paragraph are to be used in the verification process.
16. **Creation of the Site Utility Plan:** The designer is responsible for surveying the actual location of all utilities within the PLL and showing the information (including grid coordinates and depth where critical for utility tie-ins, utility crossings, etc.) on a Site Utility Plan for the project.
17. **Notifying the BCE of Errors in the CUP:** The designer is responsible for formally notifying the BCE PM of all discrepancies between the actual location of existing utilities and the location shown on the CUP within 14 days after the creation of the Site Utility Plan. The notification shall be in the form of an annotated CUP that shows the actual, verified location (including grid coordinates and depth) relative to the location shown on the CUP.
18. **Updating the CUP:** The BCE PM is responsible for formally notifying the Geobase Section, 92 CES/CENME, of discrepancies in the CUP within 14 days. CENM is responsible for updating the CUP, and related base maps, within 30 days.

END OF DATA SHEETS

# **TABLE OF CONTENTS**

<b><u>Description</u></b>	<b><u>Pages In Section</u></b>
<b><u>Division 01 – General Requirements</u></b>	
<b>Section 011100 – Summary Of Work</b>	
Fairchild Specification .....	10
<b>Section 012513 – Product Substitution Procedures</b>	
Fairchild Specification .....	2
<b>Section 013100 – Project Management and Coordination</b>	
Fairchild Specification .....	3
<b>Section 013300 – Submittal Procedures</b>	
Fairchild Specification .....	5
<b>Section 013520 – Safety Requirements</b>	
Fairchild Specification .....	3
<b>Section 013543 – Environmental Procedures</b>	
Fairchild Specification .....	14
<b>Section 014510 – Quality Requirements</b>	
Fairchild Specification .....	6
<b>Section 015000 – Temporary Facilities and Controls</b>	
Fairchild Specification .....	7
<b>Section 016000 – Product Requirements</b>	
Fairchild Specification .....	5
<b>Section 017329 – Cutting and Patching</b>	
Fairchild Specification .....	5
<b>Section 017700 – Closeout Procedures</b>	
Fairchild Specification .....	4
<b>Section 017720 – Equipment-In-Place List</b>	
Fairchild Specification .....	1
Equipment-In-Place List .....	1
<b>Section 017823 – Operation and Maintenance Data</b>	
Fairchild Specification .....	6
<b>Section 017836 – Warranties</b>	
Fairchild Specification .....	3
<b>Section 017839 – Project Record Documents</b>	
Fairchild Specification .....	8
<b><u>Division 02 – Existing Conditions</u></b>	
<b>Section 028200 – Asbestos Remediation</b>	
Fairchild Specification .....	9
<b><u>Division 07 – Thermal and Moisture Protection</u></b>	
<b>Section 074113 – Metal Roof Panels</b>	
Fairchild Specification .....	5
<b><u>Division 08 – Openings</u></b>	
<b>Section 087100 – Door Hardware</b>	
Specification Guideline.....	33
<b><u>Division 09 – Finishes</u></b>	
<b>Section 096800 – Carpet</b>	
Fairchild Specification .....	6
<b><u>Division 10 – Specialties</u></b>	
<b><u>Division 23 – Heating, Ventilating, and Air-Conditioning (HVAC)</u></b>	
<b>Section 230900 – Instrumentation And Control For HVAC</b>	
Specification .....	32
END OF TABLE OF CONTENTS	





## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 011100 – SUMMARY OF WORK

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE:** Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

### SECTION 011100 – SUMMARY OF WORK

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. All referenced specifications, standards and publications form a part of the specification to the extent required by the references thereto. Reference by basic designation automatically includes reference to the current (at bid opening) amendments, addenda and errata to the basic publication.
- C. Construction projects are broken out by Phases and usually are: Phase I – Material Gathering, Submittals and Design, Phase II – Physical Work and Phase III – Close-out. However, on occasion the Phases may be combined. Sections within the BDS provide for the specific requirements to be met by the contractor for each phase. Refer to contract task order award documents, which provide for the schedule duration for each of the Phases and daily rate for the assessment of liquidated damages if the phase schedules are not met on time.

##### 1.02 PROJECT DESCRIPTION

- A. The Project consists of, but is not limited to, **[insert summary of project]**
- B. The Work includes, but is not limited to, **[insert description of work]**
- C. The site of the work for this Project is **[insert location]**. The **[insert Site description]** is an approximately **[insert size of area]** area located **[insert location]**.
- D. All work shall be done in accordance with this specification, project drawings and provisions of this contract.
- E. All work is to be performed while the building remains occupied (unless the building is specified to be vacant). Scheduling, as described within these documents, shall be achieved to accommodate this occupation. For airfield work, special conditions apply; contact 92 CES/CEN for these requirements. See also Section 013520, *Safety Requirements, Para 1.04*.

##### 1.03 BRAND NAME REFERENCES

- A. General Provisions include by reference the “Material and Workmanship” clause. This clause states “references in the specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in

this contract.” This statement shall apply to all references made in these specifications to equipment, material, articles, or process.

#### 1.04 REQUIREMENTS OF REGULATORY AGENCIES

- A. Perform all work in strict accordance with all current Federal, State, and local codes and regulations to include, but not limited to, UFC 1-200-01, *General Building Requirements*.

#### 1.05 CONTRACTOR USE OF PREMISES

- A. General: Limit use of the premises to construction activities in the project site
- B. Protection of Government Property: Contractor shall protect all Government property within the buildings *in which he is working*, except for such property as is required to be demolished. Property which is to be demolished, shall be protected until its scheduled demolition time. Protection shall include, but not be limited to, protection from construction-generated dust, debris, water, and vibration.
- C. Confine operations to areas indicated for construction. Portions of the building and/or airfield beyond these areas are not to be disturbed. Keep all areas clean at all times.
- D. The Contractor shall be aware of other ongoing projects that may affect this work. The Contractor shall coordinate with the Contracting Officer to ensure that their work does not interfere or is affected by the work of others.

#### 1.06 NOTIFICATION

- A. The Contractor shall provide written notification to the Contracting Officer. This notification shall be a minimum of 7 days prior to the commencement of construction. Contractor notification shall include:
  - 1. Street and unit number, building number, and/or location on airfield
  - 2. Demolition and construction designation
  - 3. Construction commencement date
  - 4. Work hours, expected noise and vibration levels
  - 5. Utility interruptions, date and hours of interruptions
  - 6. Construction completion date
  - 7. Contractor's representative's name and phone number to contact for coordination issues
  - 8. Base CE Construction Manager's name and phone number to contact for problems that cannot be resolved with the Contractor

#### 1.07 QUALIFICATIONS OF WORKERS

- A. The Contractor shall hire personnel qualified for the work which they are to perform. Such personnel shall possess the required training and/or license as would normally be required by industry standard. This shall include, but not be limited to, licensed electricians and plumbers.
- B. The Contractor shall not employ any person who is an employee of the United States Government, either military or civilian, unless such person seeks and receives approval in accordance with AFI series 136 for civilians and DODD 5500-5 for military.

#### 1.08 DESIGNATION OF TECHNICAL REPRESENTATIVE

- A. The Base Civil Engineer or his authorized representative is designated as the technical representative of the Contracting Officer for the purpose of technical surveillance of workmanship and inspection of materials for work being performed under this contract. This provision in no way authorizes anyone other than the Contracting Officer to commit the Government to changes in terms of the contract.

## 1.09 REQUIRED PERMITS

### A. Work Clearance Permits

1. The Contractor, in coordination with the Government Contracting Officer or their representative, shall obtain an approved FAFB Form 103, *Base Civil Engineering Work Clearance Request*, prior to beginning construction.
2. The request for a Work Clearance Permit shall be submitted by the Contractor at least two weeks (14 days) prior to beginning physical construction. The Government will require a minimum of ten (10) workdays for processing the FAFB Form 103, therefore, the Contractor shall schedule this submittal accordingly.
3. The submittal shall be made only after the Contractor has clearly marked the limits of all proposed excavations. Marking shall be in accordance with the American Public Works Association Uniform Color Code as adopted by the Washington State Utilities Coordinating Council (see <http://www.washington-ucc.org/index.html>).
4. Upon receipt of the Base Civil Engineering Work Clearance Request, the Government will complete the remainder of the form. The Government will locate and mark underground utilities within the limits of the proposed excavations (all Government locates shall be assumed to be accurate within +/- 24 inches of the actual utility, see <http://www.wucc.org/tolerance.html> for tolerance/hand dig zone). Note that in some instances the locating agency will provide a phone number for the Contractor to call to schedule specific locates.
5. Once the Government marks existing utilities, the Contractor is responsible for maintaining the marks. The Contractor will be charged a fee if existing utilities must be remarked because the Contractor failed to maintain Government markings.

## 1.10 BASE REGULATIONS AND RESTRICTIONS

- A. Conform to all Base Regulations and directives pertaining to security, safety, traffic, fire and personnel clearances insofar as they pertain to the Contractor's activities on Fairchild Air Force Base. The Contractor shall be responsible for providing and placing all barricades, lighting, and safety devices, if required by the Contracting Officer, during any of his activities. Barricades shall be in accordance with Section 015000, *Temporary Facilities and Controls*.
- B. During all operations within the restricted area of the airfield, the Contractor must have an escort. One escort shall be required for every twenty five (25) employees of the Contractor, and each separated work operation shall require an escort. Escorts shall be provided by the Government. If access is required to the airfield Controlled Area, employees will be escorted or be on an entry authority list (EAL) signed by the 92 OSS/CC. If an escort is unavailable for CMA access the contractor and sub-contractors will be trained and licensed by Airfield Management to drive in the CMA.

## 1.11 PHASING

- A. The Contractor (in coordination with the Airfield Manager) shall phase the construction in such a way that limits interruption to airfield operations and shall take into account other planned/ongoing projects. Phasing shall be submitted and approved prior to start of physical work.
- B. The order of phases will depend on the construction status of other projects that may also be under construction.

## 1.12 ACCESS AND HAUL ROUTES AND STAGING AREA

- A. Use only the approved routes to and from storage, work and disposal areas. Approved routes within the airfield shall be discussed/ approved by the Airfield Manager and Security Forces Physical Security POC. Confine all operations and maintenance of tools and equipment, parking of vehicles and storage of items to areas designated on the drawings. Stock piling of materials or placement of work trailers is not allowed on the airfield, unless

pre-coordinated with the Airfield Manager prior to the start of the project. ***[The Designer is to ensure that the proper haul route and storage areas are clearly indicated on the Project Drawings.]***

- B. Contractor shall provide sufficient signage at storage/staging areas indicating the project name along with name and phone number of prime contractor and office performing Quality Assurance.

#### 1.13 ACCIDENT PREVENTION

- A. Comply with all pertinent provisions of the Department of Army, U.S. Army Corps of Engineers EM 385-1-1, *Safety and Health Requirements*.
- B. Furnish, post, maintain and remove guardrails, barricades and construction warning signs in sufficient number and at appropriate locations to protect and safeguard base personnel, property and operations during construction.

#### 1.14 SAFETY

- A. Prior to the start of construction, the Contractor shall coordinate with the Contracting Officer and the Airfield Manager, (509) 247-5481, to delineate the area of work. Work on or around taxiways or taxilanes shall be coordinated before the work begins. Work near taxiways/taxilanes if approved, shall remain 200 feet from the centerline of each. Work near or on taxiways/taxilanes shall be coordinated during construction meetings prior to the start of work. Work on or around the runway shall be coordinated before the work begins. Work near the runway shall remain at least 100 feet from the edge of the runway from Taxiway Charlie to Taxiway Golf/Hotel. Work near the runway between Taxiway Alpha and Charlie shall remain at least 400 feet from the runway to protect the CAT II ILS Critical Area. All equipment used on or near the runway shall be manned and operational at all times. No vehicles or equipment shall be left on or near the runway at any time. Any work inside the aforementioned areas will need CMA access, to include two way radio communication with Tower. Work performed in these areas require written permission to the Contracting Officer five (5) working days in advance. The Contracting Officer will coordinate with the Airfield Manager to obtain approval to extend the area of work.
- B. The Contractor shall be responsible for safety precautions and for providing such safety devices as required for the safety of his personnel. Occupational Safety and Health Act (OSHA) Standards shall be followed. A site specific Safety and Health Plan shall be included in the Contractor's submittals.
- C. Prior to every entrance onto the airfield, Contractor personnel shall inspect their vehicles (specifically the undercarriage and all tires) and equipment for foreign or loose objects and debris, which may fall off of the vehicle causing accidental damage to aircraft or possible injury to flight or ground personnel.
- D. All vehicles, while operating within the airfield area, shall be identified by the Contractor Company name plates or by other means subject to approval of the Contracting Officer. Orange and white checkered flags are required for all vehicles working on the airfield. Approval to leave vehicles/equipment on the Airfield will be approved on a case by case basis. No vehicles/equipment shall be left in the project area without the Airfield Managers approval. Vehicles/equipment left in the project area shall require flashing beacons when left overnight.
- E. Remove all equipment and objectionable matter from the work site upon completion of each day's work and have the work area in a safe, clean and orderly manner to the satisfaction of the Contracting Officer or an authorized representative. During work hours immediately remove any dirt, debris or foreign matter that are deposited on operational pavement, or areas adjacent to active taxiways/runways. No stock piling of materials on the airfield, unless pre-approved by the Airfield Manager.

- F. No smoking, shall be permitted on the airfield. Smoking is only permitted in designated smoking areas. Flame or spark producing equipment will be approved by fire department prior to use.
- G. Immediately remove any dirt, debris and foreign matter that are deposited on pavement and areas adjacent to active taxiways and runways, as a result of the work or when directed by the Project Manager.
- H. Fully cooperate with operations and security personnel.
- I. Give right-of-way to aircraft at all times and maintain a minimum of 100 feet clearance from wing-tip of aircraft and 200 feet clearance from all rotary aircraft.
- J. Fire trucks and emergency equipment will have ingress and egress to all areas at all times with and unobstructed width of not less than 20 feet.

#### 1.15 TRAFFIC CONTROL

- A. Accident Prevention: For the protection of Government personnel and property, the Contractor shall comply with the following minimum safety requirements while performing work under this contract. These requirements are additional to and do not replace the standards promulgated by the Department of Labor under OSHA Standards. The most stringent of these shall apply.
- B. All vehicle/equipment operators, before driving on the airfield, will be given airfield driving instructions by the Airfield Manager or designated representative prior to starting work. Contact Airfield Management 247-9553/5202 to set up an appointment.
- C. Careful attention and strict adherence to these precautions will prevent accidental damage to aircraft and possible injury to both flight and ground personnel.

#### 1.16 INTERRUPTION OF UTILITY SERVICES

- A. The Government shall not be held responsible for interruptions of utility service and shall not be liable for Contractor delays, damages, or increased costs occasioned by any such interruption of service.

#### 1.17 UTILITY OUTAGES

- A. All outages shall be coordinated with the using agency through the Contracting Officer or his representative and the Base Fire Department. Written notice shall be provided by the Contractor to the Contracting Officer not less than two (2) weeks prior to the required outage whenever areas outside the project limits are affected by the outage. One (1) week prior notice is required if only the subject facility within the project limits is affected by the outage. All work shall be coordinated and arranged to insure that the outage shall be of minimal duration. In the event a scheduled outage is canceled by the Government, notification will be given to the Contractor at least 24 hours in advance of the time for the outage to start and the Contractor shall reschedule outage for the soonest possible, mutually agreeable, time. Once an outage is arranged and work begun, work must go on until utilities are restored to the affected line(s) and/or facility.

#### 1.18 RECORD DRAWINGS

- A. Additional record drawings showing existing underground utilities may be made available by the Government. The Contractor shall avail himself of the drawings. Any utility line shown on the contract or record drawings or made known to the Contractor and damaged during construction work shall be repaired immediately by the Contractor at no cost to the Government.

#### 1.19 WORK SCHEDULE

- A. Working hours for the Contractor shall be between the hours of 7:30 am and 4:30 pm excluding Saturdays, Sundays, and Federal holidays. If the Contractor desires to work during periods other than above, additional Government inspection forces may be required. The

Contractor must notify the Contracting Officer three working days in advance of his intention to work during other periods to allow assignment of additional inspection forces when the Contracting Officer determines they are reasonably available. If such force is reasonably available, the Contracting Officer may authorize the Contractor to perform work during periods other than normal hours/days. However, if inspectors are required to perform in excess of their normal hours/days solely for the benefit of the Contractor, the actual cost of inspection at overtime rates will be charged to the Contractor. These adjustments to the contract price may be made periodically as directed by the Contracting Officer. The contracting officer will notify 92 SFS/S3 three working days prior to the work hour/day change to accommodate installation gate access.

- B. Projects requiring work on the airfield may require the Contractor to perform the work at times other than those listed above. Notify the Airfield Manager immediately of any work approved outside the work hours identified in the Pre-Con meeting.

#### 1.20 SMOKING IN AIR FORCE FACILITIES

- A. Contractors are advised that the Commander has placed restrictions on the smoking of tobacco products in Air Force facilities. Contractor employees and visitors are subject to the same restrictions as are government personnel. Smoking is permitted only in designated smoking areas.

#### 1.21 AVAILABILITY OF UTILITY SERVICES

- A. Notwithstanding the provisions of Contract Clause, "Availability and Use of Utility Services," the Government will provide utilities (water, gas, and electricity) for project work areas during the performance period of this contract if available. At project work areas where no utilities are available, the Contractor shall furnish his own utility services. No utilities will be provided by the Government at the Contractor open storage area.

#### 1.22 WATER SUPPLY

- A. When required, the Contractor will be furnished a water supply from a fire hydrant selected by the Contracting Officer with written coordination of the Base Fire Department. Exceptions will be in the case of a significant drop in water pressure on the system degrading the protection of facilities and lives. The Contractor shall install his own approved backflow prevention device (see 331-137, *Backflow Prevention Assemblies Approved for Installation in Washington State* for listing of approved devices) and gate valve on the fire hydrant. Government personnel will turn on the hydrant valve, leaving it on for the Contractor's operation through his gate valve. Only Government personnel will operate the fire hydrant valve. If the Contractor attempts to operate the hydrant valve, he shall be liable for all damages to the fire hydrant casing, valve stem, or lug.

#### 1.23 SEVERE WEATHER WARNING

- A. In the event of a severe weather warning, the Contractor shall take immediate action to tie down, remove, protect, or secure his materials and equipment to the satisfaction of the Air Force Inspector in order to reasonably assure that Government Property will not be damaged. If the Contractor fails or refuses to secure materials and equipment to the satisfaction of the Air Force inspector, the work will be accomplished by Air Force personnel and the cost thereof charged to the Contractor.

#### 1.24 AREA CLEAN-UP

- A. The Contractor shall at all times keep the construction area, including storage areas used by the Contractor, free from accumulation of waste materials and rubbish. Prior to completion of work each day, remove from the construction site all waste materials and rubbish.
- B. All mud, dirt, debris, foreign objects or spills of any kind from the Contractor's operations (including subcontractors and suppliers) on streets, hard surfaces, and parking lots used as access to the work or staging areas shall be cleaned off the same day.

- C. Upon completion of the construction, the Contractor shall leave the work premises in a clean and neat condition satisfactory to the Contracting Officer. This shall be the required condition at the time of acceptance of all work under this contract.

#### 1.25 CONSTRUCTION SITE MAINTENANCE

- A. All supplies and equipment on the project site shall be stored so as to preclude mechanical and climatic damage. The site shall be maintained in a neat and orderly manner. Visual screening shall be required for outside construction sites to maintain a neat appearance. The job site/facility must also be protected to preclude mechanical and climatic damage.

#### 1.26 REMOVAL AND REPLACEMENT RESPONSIBILITY

- A. The Contractor shall be responsible for the replacement or repair of all existing finished surfaces, utilities, equipment, landscape and grounds, and structures or parts thereof that he damaged, removed, cut, or disturbed in the course of completing the work specified. The job site/facility must also be protected to preclude damage.

#### 1.27 CONTRACTOR PARKING

- A. Contractor vehicles and equipment shall be parked in a designated area. The Contractor shall be responsible for maintaining security for Contractor-owned equipment/vehicles as well as for materials stored by the Contractor. The Contractor shall not be permitted to park or run vehicles on grass areas. Any damage done to lawns or shrubs shall be repaired or replaced by the Contractor.

#### 1.28 CONTRACTING OFFICER'S AUTHORITY

- A. No person other than a Contracting Officer will have authority to modify the terms of this agreement. The Contracting Officer is the only person authorized to approve changes in any of the requirements under this agreement and notwithstanding any provisions contained elsewhere in this agreement, the said authority remains solely with the Contracting Officer. In the event the Contractor effects any such change at the direction of any person other than the Contracting Officer, the change will be considered to have been made without authority and no adjustment will be made in the contract price to cover any increase in costs incurred as a result thereof.

#### 1.29 SANITARY FACILITIES

- A. Unless otherwise authorized to use existing facilities, the Contractor shall provide his own chemical sanitary toilets at the work site, separate from his field office. Chemical toilets must be serviced regularly, and will be subject to Government inspection by the Base Medical Officer. All sanitary deficiencies shall be corrected within 24 hours of the inspection.

#### 1.30 COORDINATION WITH GOVERNMENT ACTIVITIES

- A. If it becomes necessary to interrupt work activities in buildings and/or areas for construction purposes, permission to do so must be requested in writing to the Contracting Officer fourteen (14) working days in advance. Written requests for street closings shall be submitted for approval fourteen (14) working days prior to closing of the street. The Contracting Officer shall coordinate with the staff Civil Engineer. Any temporary construction for facilities used by the Contractor for preventing interruption of normal work activity or loss of utilities services shall be subject to approval of the staff Civil Engineer through the Contracting Officer.

#### 1.31 APPROVAL TO USE RADIOACTIVE MATERIALS

At least 30 calendar days prior to bringing radioactive material (including LASERs) on Fairchild AFB (contained in monitoring/testing equipment, for example), submit to Bioenvironmental Engineering, 92 OMRS/SGXB, via the Contracting Officer, the dates and times the equipment will be on base. The 92 OMRS/SGXB can be contacted by telephone at (509) 247-2391. A brief description of the proposed activities; a copy of a current NRC or Agreement State license (EXCEPTION: Contractors using generally licensed materials [e.g.

certain NITON Lead Paint Analyzers] and DOE or DOE prime contractors operating in accordance with 10 CFR 835 do not require an NRC license or NRC Form 241); 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; a copy of the contract clause of the Air Force contract describing work to be performed at the installation and the inclusive dates of the work; and a written authorization in the contract that the installation RSO can conduct periodic assessments to ensure contractor personnel are complying with radiation safety practices to prevent exposures to Air Force personnel and avoid contamination of government property for Bioenvironmental Engineering approval before radioactive material is brought on base.

PART 2 PRODUCTS – NOT APPLICABLE

PART 3 EXECUTION – NOT APPLICABLE

END OF SECTION 011100





## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 012513 – PRODUCT SUBSTITUTION PROCEDURES

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

### SECTION 012513 – PRODUCT SUBSTITUTION PROCEDURES

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

##### 1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
- B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section 013300, *Submittal Procedures*.

##### 1.03 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions." The following are not considered substitutions:
  - 1. Substitutions requested by Bidders during the bidding period, and accepted prior to award of Contract, are considered as included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
  - 2. Revisions to Contract Documents requested by the Government.
  - 3. Specified options of products and construction methods included in Contract Documents.
  - 4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

##### 1.04 SUBMITTALS

- A. Submit each request for substitution in accordance with Submittal procedures.
- B. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
  - 1. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
  - 2. Samples, where applicable or requested.

3. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
  4. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Government and separate Contractors that will become necessary to accommodate the proposed substitution.
  5. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution.
  6. Indicate the effect of the proposed substitution on overall Contract Time.
  7. Cost information, including a proposal of the net change, if any in the Contract Sum.
- C. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

## PART 2 PRODUCTS

### 2.01 SUBSTITUTIONS

- A. Conditions: The Contractor's substitution request will be received and considered by the Government when one or more of the following conditions are satisfied, as determined by the Government; otherwise requests will be returned without action except to record noncompliance with these requirements. Extensive revisions to Contract Documents are not required.
1. Proposed changes are in keeping with the general intent of Contract Documents.
  2. The request is timely, fully documented and properly submitted.
  3. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
  4. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
  5. A substantial advantage is offered the Government, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Government may be required to bear.
  6. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
  7. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
  8. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.
  9. The Contractor's submittal and Government's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

END OF SECTION 012513



## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

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### SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

##### 1.02 SUMMARY

- A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:
  - 1. General project coordination procedures.
  - 2. Conservation.
  - 3. Coordination Drawings.
  - 4. Administrative and supervisory personnel.
  - 5. Cleaning and protection.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Refer to Section 013300, *Submittal Procedures*, for preparing and submitting the Contractor's Construction Schedule.
  - 2. Refer to Section 016000, *Product Requirements*, for coordinating general installation.
  - 3. Refer to Section 017700, *Closeout Procedures*, for coordinating contract closeout.

##### 1.03 COORDINATION

- A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
  - 3. Make provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Government and separate contractors where coordination of their work is required.
- C. Requests for Information (RFIs): The contractor shall submit all RFIs in writing on the form included at the end of this section. RFIs received in any other format or on any other form will be rejected by the Government. A separate form shall be submitted with each RFI.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  1. Preparation of schedules.
  2. Installation and removal of temporary facilities.
  3. Delivery and processing of submittals.
  4. Progress meetings.
  5. Project closeout activities.
- E. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.
  1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

#### 1.04 SUBMITTALS

##### A. Coordination Drawings

1. Coordination Drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended. Submit coordination drawings to the Contracting Officer's for approval
  - a. Coordination drawings are required when limited space availability necessitates maximum utilization of space for efficient installation of different components.
  - b. Preparation of Coordination Drawings may include components previously shown in detail on Shop Drawings or Product Data.
  - c. Submit Coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.
  - d. Show the relationship of components shown on separate Shop Drawings.
  - e. Indicate required installation sequences.

##### B. Staff Names

1. Submit during Phase I submittal process and no later than 15 days prior to commencement of construction operations, a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the Project Site. Identify individuals, their duties, and their telephone numbers.
  - a. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

#### PART 2 PRODUCTS – NOT APPLICABLE

#### PART 3 EXECUTION

##### 3.01 GENERAL COORDINATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.

### 3.02 CLEANING AND PROTECTION

- A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to assure protection from damage or deterioration at Substantial Completion.
- B. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.
- C. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

END OF SECTION 013100



DIVISION 01 – GENERAL REQUIREMENTS  
SECTION 013300 – SUBMITTAL PROCEDURES  
FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

SECTION 013300 – SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including general and supplementary conditions and other Division 01 specification sections, apply to this section.

1.02 DESCRIPTION OF WORK

- A. This section specifies administrative and procedural requirements for submittals required by the specifications.
- B. Administrative Submittals: Refer to other portions of the Contract Documents for requirements for administrative submittals.

1.03 DEFINITIONS

- A. Shop Drawings: specially prepared technical data for this project, including drawings, diagrams, schedules, measurements, and similar information not in standard printed form for general application to a range of similar projects.
- B. Product Data: standard printed information on materials, products and systems.
- C. Samples: physical examples of materials, either for limited visual inspection or (where indicated) for more detailed testing and analysis.
- D. Miscellaneous Submittals: warranties, maintenance agreements, bonds, data and reports, physical work records, quality testing and certifying reports, record drawings, field measurement data, and operating and maintenance materials that are related directly to the work and are not processed as shop drawings, product data, or samples.

1.04 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with the performance time of the contract. Transmit each submittal sufficiently in advance to ensure completion within the stated performance time.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity. Coordinate transmittal of different types of submittals for related elements of the work so processing will not be delayed by the need to review submittals concurrently for coordination. The Government reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
  - 2. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

- a. Allow two (2) weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Government will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
  - b. If an intermediate submittal is necessary, process the same as the initial submittal. Allow two (2) weeks for reprocessing each submittal.
  - c. No extension of contract time will be authorized because of failure to transmit submittals to the Government sufficiently in advance of the work to permit processing.
- B. Contractor Review: Prior to submittal, each respective line item on every transmittal form, AF Form 3000, shall be reviewed, by the Contractor's Quality Control representative. The QC representative shall sign and date the Form 3000 certifying the accompanying submittal complies with the contract requirements. **For Design-build projects, the Designer-of-Record shall also review, sign and date the Form 3000, to certify that the accompanying submittal complies with the contract requirements.**
  1. Provide Contractor Submittal Review and Designer-of-Record labels and stamps for each Form 3000, including Shop Drawings, to record the Contractor's / Designer-of-Record's review and approval markings.
  2. Include the following information on the label/stamp:
    - a. Name of Contractor / Designer-of-Record
    - b. Submittal Number
    - c. Line Item Number
    - d. Action Taken
    - e. Date of Review
    - f. CQC / DQC Representative Signature

#### 1.05 SUBMITTAL REGISTER

- A. Prepare a complete and detailed Submittal Register to be submitted to the Contracting Officer using an AF Form 3000, *Material Approval Submittal*. The information shall be developed from the submittal requirements of the contract documents. Incomplete forms (missing specification section, drawing number, etc.) shall be returned to the Contractor for completion and resubmittal.
  1. List all submittals required by the contract documents. SUBMITTAL NUMBER shall be sequential (e.g., 1, 2, 3, 4, etc.). Resubmittals shall retain the original number and add an alphabetic suffix (e.g., 1A, 1B, 1C, etc.).
  2. Mark the form with the SUBMITTAL TYPE required.
  3. Indicate on the submittal register the Contract Phase (I, II, or III) the submittal item is required
  4. Products and materials the Contractor provides identically as specified will not require the submittal of an AF Form 3000. The item shall be entered with a submittal number, contract reference, and a note in the REMARKS that includes the item name, model number, and other data for identification, and the words "IAW specs". The DATE columns shall be annotated "NA".
  5. All other types of submittals require the completion and submittal of the AF Form 3000 as required by the contract documents. These shall include all items specifically requiring Government approval, including product variances and substitutions, shop drawings, color samples, test results, etc. Contractors shall not submit multiple items on one AF Form 3000. If one item on the form is disapproved, all items will be disapproved.

6. Contractor shall review, update, and resubmit the Submittal Register via an AF Form 3000 as requested by the Contracting Officer.

#### 1.06 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

B. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

1. Manufacturer's printed recommendations.
2. Compliance with recognized trade association standards.
3. Compliance with recognized testing agency standards.
4. Application of testing agency labels and seals.
5. Notation of dimensions verified by field measurement.
6. Notation of coordination requirements.

#### 1.07 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

B. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Include the following:

1. Generic description of the Sample.
2. Sample source.
3. Product name or name of manufacturer.
4. Compliance with recognized standards.
5. Availability and delivery time.

C. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

1. Where variation in color, pattern, texture or other characteristics is inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
2. Refer to other specification sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
3. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the work shall be judged.

#### 1.08 GOVERNMENT ACTION

A. The Government will review each submittal and mark to indicate action taken. Compliance with specified characteristics is the Contractor's responsibility.



- B. Final Unrestricted Release: Where submittals are marked "Approved," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
- C. Final-But-Restricted Release: When submittals are marked "Approved as Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
- D. Returned for Resubmittal: When submittal is marked "Disapproved," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark. Do not permit submittals marked "Disapproved," to be used at the Project site, or elsewhere where Work is in progress.
- E. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "For Information Only" or "FIO".

#### 1.09 APPROVED SUBMITTALS

- A. The approval of submittals by the Contracting Officer shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error that may exist. The Contractor, under the CQC requirements of this contract, is responsible for the dimensions and design of adequate connections, details and satisfactory construction of all work. After the Contracting Officer has approved submittals, no resubmittal for the purpose of substituting materials or equipment will be given consideration unless accompanied by an explanation as to why a substitution is necessary.

#### 1.10 DISAPPROVED SUBMITTALS

- A. The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies as specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, they shall promptly notify the Contracting Officer.

### PART 2 PRODUCTS – NOT APPLICABLE

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. The Contractor is responsible for, and shall submit all items specified in these specifications. Further, the Contracting Officer may request submittals in addition to those listed when deemed necessary to ensure compliance with the requirements of the specification sections.
- B. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including, but not limited to, catalog cuts, diagrams, operating charts or curves; test reports; samples; O&M manuals, including parts list; certifications; warranties and other such required submittals.
- C. All submittals shall be submitted in electronic format to include a completed AF Form 3000 and all supporting documents.

#### 3.02 SUBMITTAL REGISTER

- A. The Contractor shall submit 1 electronic copy of the completed Submittal Register for Government approval within 10 calendar days after Award. In preparing the document, adequate time shall be allowed for review and approval and possible resubmittal as specified

below. The approved Submittal Register is the scheduling document and shall be used to control submittals throughout the life of the contract.

### 3.03 SCHEDULING

- A. Submittals shall be scheduled, made and approved prior to the acquisition of the material or equipment covered thereby. Likewise, all transmittals, specifically shop drawings, shall be scheduled, made, and approved, prior to the start of construction on a respective area. Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. No delays, damages or time extensions will be allowed for time lost in late or unsatisfactory submittals. **Material submittal review will not begin until full design is completed and approved. (\*Exceptions to submittal reviews will be considered on a case-by-case basis)**

### 3.04 MATERIAL APPROVAL SUBMITTAL (AF Form 3000)

- A. The AF Form 3000, *Material Approval Submittal*, shall be used for submitting all submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification section and paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item. Each AF Form 3000 shall be submitted for each item. When multiple items are submitted on an AF Form 3000, and any item is disapproved, all items on a single form will be disapproved.

### 3.05 VARIATIONS AND SUBSTITUTIONS

- A. For submittals that include proposed variations requested by the Contractor, the Contractor shall set forth in writing the justification for any variations and annotate such variations on the submittal in the "Comments" section. Likewise, no submittal of a substitution of an "or equal" material or equipment will be accepted without a justification that demonstrates to the Government's satisfaction that the item is, in fact, equal to the specified item and meets all requirements. This justification shall include specific references to the respective specification section and all requirements therein. The justification shall also include a comparison of the salient characteristics of the specified and submitted items.

END OF SECTION 013300



DIVISION 01 – GENERAL REQUIREMENTS  
SECTION 013520 – SAFETY REQUIREMENTS  
FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

SECTION 013520 – SAFETY REQUIREMENTS

PART 1 GENERAL

1.01 GENERAL

- A. This section shall serve as an amendment to Section 32, paragraph 32.A.09, of the US Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1. All other requirements stipulated in the manual are to remain.

1.02 FIRE PREVENTION

- A. It is the inherent responsibility of the Contractor to practice good fire prevention measures while working on Fairchild Air Force Base. Questions concerning fire prevention can be referred to the Fire Prevention Section at extension 247-5215. The following criteria shall be adhered to at all times during the contract work.
1. Flammable paints, oils, etc., within the area of operation shall be stored IAW NFPA standards in containers within a controlled area.
  2. Temporary wiring shall be in compliance with NFPA 70, *National Electrical Code*®.
  3. All welding/cutting, open flame, or other hot work operations shall only be done under approval by the Base Fire Department. No welding/cutting and open flame operations are allowed in facilities when automatic detection and suppression systems are out of service. No welding/cutting and open flame operations are allowed in facilities when automatic detection and suppression systems are out of service. Welding, cutting or brazing shall only be done under approval of the Base Fire Department.
  4. Contractor shall obtain an approved FAFB Form 103 for all fire detection and suppression system outages. Automatic fire detection and suppression systems shall be returned to service during construction and renovation projects (if possible) when facility is unoccupied.
  5. Contractor posts a fire guard for twenty four (24) hours (or certifies the facility fire safe) after welding/cutting and open flame operations in facilities when:
    - a. Fire detection/sprinkler systems cannot be returned to service.
    - b. Fire detection/sprinkler systems do not exist.
  6. Fire extinguishers required during construction shall be supplied by the Contractor.
  7. The Fire Department shall be notified of and approve any access or street blockage prior to the actual action. Access must be available for Fire Department response at all times.
  8. The Base Fire Department shall approve any water main shut off, or use of water from fire hydrants. The Base Fire Department shall be notified one full workday prior to actual shut-off of any water mains.

- B. New Construction: All new construction and major/minor renovations shall comply with, but not limited to:
  - 1. The Army Corps of Engineering Manual (EM), EM-385-1-1, Safety and Health Requirements Manual.
  - 2. NFPA 241, *Safeguarding Construction, Alteration, and Demolition Operations*.

#### 1.03 WELDING

- A. A welding permit is required prior to performing any welding, cutting, grinding, or any spark producing operations, especially in areas designated as hazardous/ flammable areas.
- B. Welding, cutting, or brazing/soldering operation must be approved by the Fire Department. Site must be inspected and AF Form 592 must be issued by the Fire Inspector or qualified personnel. Contact the Fire Department at 247-5215.
- C. No welding/cutting and open flame operations are allowed in facilities when automatic fire detection systems are out of service.
- D. Automatic fire detection systems are returned to service (if possible) during construction and renovation projects when the facility is unoccupied.
- E. Contractor posts a fire guard for 24 hours (or certifies the facility fire safe) after welding/cutting and open flame operations in facilities when:
  - 1. Fire detection/sprinkler systems cannot be returned to service.
  - 2. Fire detection/sprinkler systems do not exist.
- F. The Fire Department may provide additional site specific requirements with issuance of the welding permit.

#### 1.04 AIRFIELD SAFETY

- A. Project/work areas shall be identified with lighted barricades and FOD fencing when applicable. The Airfield Manager will determine the location of the lighted barricades and FOD fencing. At all corners and ends, dual markers and dual lights are required. A marker and a light are positioned every 50 feet (15 meters) or less between corners, and between a corner and an end. For smaller projects markers and lighted barricades will be placed 10 feet apart to delineate the outline of the project from the active airfield. The markers may be either low- or high-profile barricades as appropriate. Any barricade lighting outages on the barricades will be identified with colored surveyor tape around the light not working. The contractor should repair/replace the light immediately and notify the project manager of the repair/replacement. All barricades will be weighted with water, and shall be checked daily to ensure that they are filled.
- B. Low-profile barricades are 1 foot (0.3 meter) or less in height, and of sufficient mass to retain an established position on pavement. Each barricade has a vertical side projection of 6 square feet (0.54 square meters) or more. Projection is marked with alternating diagonal or vertical orange and white stripes at least 6 inches (150 mm) and not over 12 inches 300 mm) in width.
- C. High-profile barricades are of light construction, from 2 feet (0.6 meter) to 3 feet (1 meter) in height, and anchored in their established position with weighted counterweight. Each barricade has a vertical side projection of 3 square feet (0.27 square meters) or more. Projection is marked with alternating reflectorized diagonal or horizontal orange and white stripes at least 6 inches (150 mm) and not over 8 inches (200 mm) in width.
- D. Each marker is provided with a continuous burning amber-yellow or red light of at least 10 candelas, or a flashing amber-yellow or red light of at least 5 candelas effective intensity. Frequency of flashing light is between 55 and 75 flashes per minute.

#### 1.05 INCREASED HEALTH SAFETY

- A. In the event of a pandemic affecting the local environment, an addendum to the Contractor's Safety Plan will be required. This addendum shall reflect safety and health measures required for the protection of the Contractor's employees, as well as for FAFB personnel. The Plan shall comply with requirements set forth by the Washington State Department of Health, and by Washington State Department of Labor and Industries for construction practices within pandemic zones.
- B. In the event of a health event at a lower health threat level than a pandemic (eg; local flu, mumps, measles, air quality, etc.) an addendum to the Contractor's Safety Plan may be required. This addendum shall reflect safety and health measures required for the protection of the Contractor's employees, as well as for FAFB personnel. The Plan shall comply with requirements set forth by the Washington State Department of Health guidelines.

1.06 SITE ENVIRONMENTAL SAFETY

A. Any radioactive device (such as a nuclear densometer used to test soil compaction) must be approved before it is allowed on Fairchild AFB. Submit for approval to the Base Radiation Protection Officer, 92d Medical Group/SGPB, 247-2391. Coordinate with USAF Construction Manager NLT 30 days prior to start of Phase 2 (Construction).

PART 2 MATERIALS – NOT APPLICABLE

PART 3 EXECUTION – NOT APPLICABLE

END OF SECTION 013520



DIVISION 01 – GENERAL REQUIREMENTS  
SECTION 013543 – ENVIRONMENTAL PROCEDURES  
FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

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SECTION 013543 – ENVIRONMENTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. The action required by this section consists of furnishing all labor, materials and equipment necessary to perform all work required for the control and prevention of environmental pollution during and as the result of construction operations under this contract.
- B. All construction operations shall comply with all applicable Federal, State, local, and Air Force environmental regulations to assure work performance has no detrimental effect upon the environment while supporting the Fairchild Air Force Base (FAFB) mission.
- C. Fairchild Air Force Base has an Environmental Management System and is committed to a policy of excellence in all areas of environmental stewardship including compliance, pollution prevention, protecting natural and cultural resources, and restoration. Our leaders insist upon maximum protection for human health, natural resources, and the environment. It is incumbent upon each member of the Team Fairchild community, including contractors, to fulfill these obligations.
- D. Upon completion of asbestos abatement or before any government employee returns to the facility, clearance monitoring for asbestos must be completed by a certified laboratory IAW Washington Administrative Code (WAC) 296-62-07709 and WAC 296-62-07735, Appendix A. All asbestos abatement and air sampling plans must be approved by both CE Environmental and Bioenvironmental Engineering prior to implementation.
- E. REFERENCES

This section references applicable Federal, State, and local laws and regulations, as well as Air Force regulations and plans which relate to specific environmental issues.

Work will be accomplished within the guidance and limitations established by, but not limited to, the following:

- 1. Air Force Instruction (AFI)
  - a. AFMAN 32-7002, Environmental Compliance and Pollution Prevention

- b. AFMAN 32-1067, Water and Fuel Systems
- 2. Army Corps of Engineers Manual
  - a. EM 385 1 1, Safety and Health Requirements
- 3. Code of Federal Regulations (CFR)
  - a. Executive Order 11593, Protection and Enhancement of the Cultural Environment
  - b. Executive Order 13101, Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition
  - c. 36CFR800, Protection of Historical Properties
  - d. 40CFR260 through 40CFR265, Hazardous Waste Management, Identification, and Standards
  - e. 40CFR82, Protection of Stratospheric Zone
  - f. 40CFR122 through 40CFR124, National Pollutant Discharge Elimination System (NPDES) Requirements
  - g. 40CFR761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
  - h. 40CFR763, Asbestos
  - i. 40CFR112, Oil Pollution Prevention
- 4. New York City Department of Health & Mental Hygiene – Guidelines on Assessment and Remediation of Fungi in Indoor Environments
- 5. Spokane City – City of Spokane Municipal Code 13.03A, Pretreatment
- 6. Spokane County – Spokane Regional Stormwater Manual
- 7. Spokane Regional Clean Air Agency – Regulation I
- 8. Spokane County Regional Health District – Solid Waste Handling Standards
- 9. United States Code (USC)
  - a. Emergency Planning and Community Right-to-Know Act
  - b. Farm Security and Rural Investment Act
  - c. Federal Insecticide, Fungicide and Rodenticide Act
  - d. National Historical Preservation Act
  - e. Resource Conservation and Recovery Act (RCRA)
  - f. Toxic Substances Control Act
  - g. Clean Water Act, National Pollutant Discharge Elimination System General Permit for Discharges from Construction Activities

10. Washington Administrative Code

- a. WAC 173-218, Underground Injection Control Program
- b. WAC 173-303, Dangerous Waste Regulations
- c. WAC 173-304, Minimum Functional Standards for Solid Waste Handling
- d. WAC 173-340, Model Toxics Control Act - Cleanup
- e. WAC 173-350, Solid Waste Handling Standards
- f. WAC 173-360, Underground Storage Tank Regulations
- g. WAC 173-400 through WAC 173-491 - Air Quality Requirements
- h. WAC 197-11, SEPA Rules
- i. WAC 246-290, Public Water Supplies
- j. WAC 365-230, Lead-based Paint
- k. WAC 296-62-07709: Exposure assessment and monitoring.
- l. WAC 296-62-07735: Appendix A—WISHA reference method—Mandatory.

11. Air Force Manual

- a. AFMAN 32-1067, Water and Fuel Systems
- b. AFMAN 32-7002, Environmental Compliance and Pollution Prevention,
- c. AFMAN 32-7003, Environmental Conservation

1.02 SUBMITTALS

A. Prior to Physical Work NTP

- 1. Air Quality Notice of Construction Application – See paragraph 1.05.B. *[When an air emission source is being installed or modified and triggers the requirements of SRCAA Regulation I, Article IV or V.]*
- 2. Dust Control Plan – See paragraph 1.05.D. *[When the total project site, including vehicle parking, staging area, and all work areas (not necessarily contiguous) could exceed one-acre in size.]*
- 3. Protection of Natural Resources Plan – See paragraph 1.06. *[When the project and/or staging area(s) are outside the commercial/industrial area of the base.]*
- 4. Wastewater Discharge/Disposal Plan – See paragraph 1.07.B.
- 5. Storm Water Pollution Prevention Plan - See paragraph 1.07.C.1.a. *[When the total project site will disturb one or more acres of land, or will disturb less than one acre but is part of a common development that will ultimately disturb one or more acres of land (not necessarily contiguous) could exceed one-acre in size.]*



6. Storm Water Notice of Intent Confirmation - See paragraph 1.07.C.1.d. *[When the total project site will disturb one or more acres of land, or will disturb less than one acre but is part of a common development that will ultimately disturb one or more acres of land (not necessarily contiguous).]*
  7. Underground Injection Control (UIC) Well Documentation – See paragraph 1.07.C.4 *[For installation of any type of dry well or other UIC]*
  8. Solid Waste Disposal Plan – See paragraph 1.08.C.
  9. Hazardous Material (HAZMAT) Worksheets and MSDSs – See paragraph 1.11.C.
  10. Abatement Plan – See paragraph 1.14.A.
  11. UST Installation Notification - All underground tank installations shall be coordinated through 92 CES/CEIE, Environmental. 92 CES/CEIE will prepare a Notice of Intent to install a tank at least 30 days but not more than 90 days before the installation may begin. The contractor shall provide UST data for the completion of this notification. (WAC 173-360A-0300)
  12. UST Removal Notice of Intent - All underground tank removals shall be coordinated through 92 CES/CEIE, Environmental. 92 CES/CEIE will prepare a Notice of Intent to permanently close an UST system, or a tank or piping run that is part of an UST system, at least thirty days, but no more than ninety days, before the planned start date. 92 CES/CEIE will also confirm the planned start date at least three business days before starting permanent closure. The contractor shall provide UST removal data for the completion of this notification. (WAC 173-360A-810)
- B. Quarterly, Annual, As-Required, and/or at Project Close-Out
1. Initial Air Emissions Equipment Start-Up Notification – See paragraph 1.05.B.4. *[When an air emission source is being installed or modified and triggers the requirements of SRCAA Regulation I, Article IV or V.]*
  2. Temporary Air Emission Source Approved Notice of Intent – See paragraph 1.05.C. *[When scope of project is likely to result in the use of a temporary air emission source]*
  3. Artifact Notification – See paragraph 1.06.A. *[When project scope includes any excavation]*
  4. Potable Water System Test Results – See paragraph 1.07.A.2. *[If project impacts potable water system]*
  5. Storm Water Notice of Termination – See paragraph 1.07.C.1.h. *[When paragraph 1.08.A.6. is applicable]*
  6. Solid Waste Disposal Tracking Sheet – See paragraph 1.08.D.
  7. Contaminated Soil Disposal Plan – See paragraph 1.09.D. *[When project scope includes any excavation]*
  8. Hazardous Waste Manifest – See paragraph 1.10.C. *[When hazardous waste will be generated during the course of the project]*
  9. Universal Waste Disposal Documentation – See paragraph 1.10.D. *[When universal waste will be generated during the course of the project]*
  10. Hazardous Material (HAZMAT) Worksheets and MSDSs – See paragraph 1.11.C. Submit for new items not identified prior to physical work NTP.

11. Hazardous Material (HAZMAT) Usage Summary – See paragraph 1.11.E.
12. Non-Chemical Pest Control Coordination – See paragraph 1.12.
13. Release Notification – See paragraph 1.13.B.
14. Asbestos Containing Material (ACM) Abatement Post Project Record – See paragraph 1.14.B. *[When ACM abatement will be performed during the course of the project]*
15. Asbestos and Lead Free Certification – See paragraph 1.15.
16. WDOE Underground Injection Control (UIC) Registration Form – See paragraph 1.07.C.4.b. *[When a UIC well is approved by the government for installation.]*
17. *Storm Water Pollution Prevention Plan (SWPPP) Modifications and Updates* – See paragraph C.1.a.
18. Stormwater Notice of Intent (NOI) Modifications and Updates – See paragraph C.1.d.
19. UST Decommissioning Checklist - Decommissioning must be reported to the Washington State Department of Ecology within thirty days using the applicable checklist. The checklist must be completed by the contractor. A copy will be provided to 92 CES/CEIE. (WAC 173-360A-0810)
20. UST Site Assessment - When an UST system, or a tank or piping run that is part of an UST system, undergoes permanent closure, the contractor will conduct a site assessment. The site assessment and closure report will be completed by the contractor and submitted to WDOE. Copies of all documents shall be forwarded to 92 CES/CEIE. (WAC 173-360A-0810)

#### 1.03 NOTIFICATION

- A. If the Contractor is found to be in noncompliance with the aforementioned or any other applicable regulations, the Contracting Officer shall notify the Contractor in writing of the noncompliance and action to be taken. The Contractor shall, upon receipt of such notice, immediately take corrective action.

#### 1.04 SUBCONTRACTORS

- A. Compliance with the provisions of this section by subcontractors will be the responsibility of the Contractor.

#### 1.05 AIR QUALITY

- A. Regulations
  1. Facilities shall be designed and constructed in accordance with Federal, State, and local air quality criteria to include Spokane Regional Clean Air Agency (SRCAA) Regulation I.
- B. Notice of Construction (NOC) Application *[When an air emission source is being installed or modified and triggers the requirements of SRCAA Regulation 1, Article IV or Article V, such as but not limited to: fuel storage tanks, fuel burning equipment, emergency generators, stationary internal combustion engines, bag houses, cyclones, sawdust collectors, paint booths, and abrasive blasters.]*
  1. For the installation and/or modification of equipment requiring a Notice of Construction from the Spokane Regional Clean Air Agency (SRCAA), per SRCAA Regulation 1, Article IV or Article V, the Contractor shall complete a Notice of Construction

application with all required supporting documentation and submit it to 92 CES/CEIE via the Contracting Officer for approval. CEIE will contact SRCAA for the appropriate permits, permit modifications, or written concurrence that air emissions will not be negatively impacted. The contractor is responsible for paying all SRCAA fees associated with filing and reviewing the NOC application.

2. The Contractor shall have a copy of the approved Notice of Construction prior to physical work NTP. It takes a minimum of 60-days to receive an approved NOC from the date the application and all supporting data is submitted.
3. All applicable conditions of the approved Notice of Construction shall be met by the Contractor.
4. Initial Equipment Start-up
  - a. The contractor shall notify 92 CES/CEIE via the Contracting Officer at least 14-days prior to the initial start-up of equipment regulated under SRCAA Regulation 1.
  - b. Aboveground Storage Tanks (AST). For ASTs subject to SRCAA Regulation 1 with an approved NOC:
    - i. The contractor shall notify 92 CES/CEIE at least 14-days prior to the initial filling of the AST.
    - ii. Prior to the initial filling a visual inspection shall be conducted and documented. If holes, tears, or other defects in the seals or floating roof are found, they shall be repaired prior to filling the tank.
    - iii. During the initial filling of the tank, the floating roof of the tank being filled shall be observed for the presence of free liquid product. If liquid product is present, the source of the liquid shall be identified and corrected prior to using the tank.

C. Temporary Air Emission Sources *[When scope of project is likely to result in the use of a temporary air emission source.]*

1. The Contractor shall submit a Notice of Intent (NOI) to SRCAA for any temporary stationary air emission source subject to SRCAA Regulation 1, which the contractor proposes to locate temporarily on the base. Temporary stationary air emissions sources include, but are not limited to: crushers, asphalt plants, and emergency generators. Contractor shall submit a copy of the approved Notice of Intent to 92 CES/CEIE, through the Contracting Officer, prior to moving the temporary stationary air emission source onto the base. It takes a minimum of 30-days to receive an approved NOI from the date the application and all supporting data is submitted to SRCAA. All applicable conditions of the approved Notice of Intent shall be met by the Contractor.

D. Dust Control

1. In accordance with SRCAA Regulation 1, Section 6.05, for any construction site, reasonable precautions shall be taken to prevent particulate matter (PM) from becoming airborne. Construction site shall be maintained and operated to minimize emissions. There will be no tracking of particulate matter on to paved roadways without taking every reasonable precaution. Appropriate load control measures shall be implemented.
2. Dust Control Plan: *[When the total project site, including vehicle parking, staging area, and all work areas (not necessarily contiguous) could exceed one-acre in size.]* The total size of the impacted area of the project has been determined to likely exceed 1 acre in size (impacted area includes the actual project site(s) (not necessarily contiguous) in addition to staging area(s), parking area(s), etc.). The Contractor shall submit a dust control plan for approval by 92 CES/CEIE via the Contracting Officer.

The impacted area includes the actual project site(s) (not necessarily contiguous) in addition to staging area(s), parking area(s), etc.

a. The plan shall include at a minimum:

- i. Truck and material haul routes along with a plan for controlling dirt, debris, and dust on base roadways.
- ii. The contractor/subcontractor and equipment designated for cleaning along the haul route and measures to reduce dirt, dust, and debris from roadways.
- iii. Identification of all fugitive dust sources.
- iv. A description of the dust control method(s) to be used for each source.
- v. A schedule, rate of application, calculations, or some other means of identifying how often, how much, or when the control method is to be used.
- vi. Provisions for monitoring and record-keeping.
- vii. A back-up plan in case the first control plan does not work or is insufficient.
- viii. The name and phone number of the person responsible for making sure the plan is implement and who can be contacted in the event of a dust complaint.

#### 1.06 PROTECTION OF NATURAL AND CULTURAL RESOURCES

A. Archaeological and Historical Sites *[When project scope includes any excavation]*

1. If any artifacts or human bones are encountered, the Base Cultural Resource Program Manager (92 CES/CEIE) shall be notified immediately via the Contracting Officer and work shall be stopped.

B. Potential Impact to Habitats *[When project and/or staging area is outside the industrial/commercial area of the base.]*

1. For construction in areas outside the industrial/commercial areas on base, the Contractor shall submit a plan to 92 CES/CEIE via the Contracting Officer detailing how impact to native habitat will be minimized and include a map showing proposed staging area, etc.

C. Wetlands *[When project scope includes any excavation]*

1. The Contractor shall not dredge, fill, or dump in wetland areas. Contractor shall perform all work in a manner and using methods that have minimal impact to wetland areas.

#### 1.07 WATER, WASTEWATER AND STORMWATER SYSTEMS

A. Potable Water System

1. All potable water system installation and modifications shall be constructed, tested, and certified in accordance with WAC 246-290, Public Water Supplies

2. Any potable water sample analysis results required by WAC 246-290 shall be performed by the contractor and provided to the Base Bioenvironmental Engineering Office (92 AMDS/SGPB) through the Contracting Officer. Review and approval by 92 AMDS/SGPB is required for project acceptance.
  3. Contractor shall provide and use a Washington State approved backflow assembly on any connection to the base water supply system, including but not limited to fire hydrants. The assembly used must be commensurate to the degree of hazard as determined by a Washington State certified Cross-Connection Control Specialist. The assembly must be tested by a Washington State certified Backflow Assembly Tester at the time of installation.
- B. *Wastewater [All sanitary sewer system expansion, improvements or modifications shall be accomplished with adherence to the Fairchild General Sewer Plan and the requirements outlined in the Washington State "Criteria for Sewage Works". This shall include main extensions and manhole installation. Any larger system improvement such as pretreatment equipment, lift stations, flow and sampling stations, etc. shall be designed by a licensed engineer and be reviewed/approved by the Washington Department of Health.]*
1. Unless approved in writing by 92 CES/CEIE, Environmental, non-domestic sewage discharges, including but not limited to wastewater from concrete saw cutting operations, paint removal, wastewater from mechanical floor sweep equipment, groundwater from excavation dewatering, and chlorinated water used for potable water system disinfection, are not authorized. Wastewater discharge requests must include a "Wastewater Discharge/Disposal Plan". As a minimum, the plan must include a detailed description of: each activity or process generating wastewater; methods to be used to characterize or determine that the wastewater meets City of Spokane wastewater effluent limitations (sampling and analysis); methods to be used to ensure representative sampling; wastewater storage management and discharge procedures including pumping rate and quantities; decanting procedures and solids management. The plan must also address disposal alternatives should sampling and analysis result in non-dischargeable wastewater (i.e. exceeds City of Spokane discharge limits or characterizes as a hazardous waste).
- C. **Storm Water Management During Construction:** Unless approved in writing by 92 CES/CEIE, Environmental, non-stormwater discharges are not authorized to any stormwater collection or distribution system. Best management practices to minimize impacts to storm water systems from construction activities, including but not limited to the tracking of debris, sediment, or erosion, shall be utilized on all project sites. As a federal installation in the state of Washington, all Fairchild Air Force Base (FAFB) storm water activities (construction and industrial) are regulated by the Environmental Protection Agency (EPA), not the Washington Department of Ecology (WDOE).
1. For any project where the total project site will disturb 1 or more acres of land:
    - a. A site-specific Storm Water Pollution Prevention Plan (SWPPP) must be developed and coordinated through 92 CES/CEIE (Environmental Element) via the Contracting Officer for government review prior to submission of the EPA Notice of Intent (NOI) and physical work. An electronic version (PDF) of the draft SWPPP will be submitted for coordination purposes. Prior to physical work NTP, a hard copy of the completed final SWPPP will be submitted to 92 CES/CEIE, Environmental through the Contracting Officer. The contractor will submit any SWPPP modifications or updates to 92 CES/CEIE, Environmental through the Contracting Officer. Guidance for permit requirements, SWPPP development, and Best Management Practices (BMP) can be located on the EPA NPDES website.
    - b. A current copy of the SWPPP shall be available at the project site or at an easily accessible location so that it can be made available at the time of an onsite inspection or upon request by a regulating authority or FAFB representative.

- c. The waiting period requirements of the EPA Notice of Intent (NOI) must be met prior to commencing earth-disturbing activities. The project is considered covered under the CGP after EPA has acknowledged receipt of the NOI and the waiting period expires. Copies of the NOI submittal and confirmation notice will be submitted to 92 CES/CEIE (Environmental Element) via the Contracting Officer prior to physical work NTP. The contractor will submit any NOI modifications or updates to 92 CES/CEIE, Environmental through the Contracting Officer.
  - d. On projects that require a NOI and SWPPP, the general contractor shall ensure personnel conducting site inspections in accordance with their SWPPP have training as a Certified Erosion and Sediment Control Lead (CESCL). Copies of CESCL certifications will be submitted as part of the general contractors SWPPP.
  - e. Routine site inspections will be conducted as required by the CGP. Copies of these inspections must be kept with the project SWPPP.
  - f. An EPA Notice of Termination (NOT) will be submitted once all earth-disturbing activities are completed and the requirements as outlined in the CGP have been met. Compliance with all conditions of the CGP and SWPPP is required, including adherence with BMP requirements, erosion and sediment control system maintenance, and site inspections, until site stabilization has been established and the permit terminated. Copies of the NOT will be submitted to 92 CES/CEIE (Environmental Element) via the Contracting Officer.
2. Low Erosivity Waiver (LEW)
- a. Under limited conditions (non-vegetative site stabilization), contractors may request a waiver from the NPDES construction site storm water permitting requirements (SWPPP, NOI, NOT, etc.). Information on small construction waivers and instructions can be found in the EPA CGP. If a contractor believes that the project qualifies, documentation supporting the LEW request must be coordinated through 92 CES/CEIE, Environmental via the Contracting Officer for government review prior to submission to EPA and physical work.
  - b. Erosion prevention measures will be implemented and maintained for the duration of the project. For the purposes of R-factor determination, the project must be completed within the established period of performance. If the project is not completed within the period of performance, R-factors must be recalculated and submitted to the 92 CES/CEIE, Environmental to ensure the LEW conditions remain applicable. Failure to meet the established R-factor will result in the contractor being responsible for the development and submittal of a storm water pollution prevention plan (SWPPP) and EPA Notice of Intent (NOI) (see 1.07.C). This requirement may force the project into job stoppage until EPA approval and applicable NOI waiting period. The contractor will be responsible for all costs associated with suspending the project, developing a SWPPP, and obtaining coverage EPA's NPDES General Permit for Construction Activities, including the mandatory 2-week waiting period from the date the Notice of Intent (NOI) is submitted.
3. Discharge into Storm Water System: Regardless of project size, construction sites will manage storm water on-site using effective erosion and sediment control. The Contractor shall not discharge to any storm water collection system without specific approval from 92 CES/CEIE (Environmental Element) via the Contracting Officer. Only storm water can be discharged into storm water receiving conveyances such as collection lines and ditches and it shall be shown that best management practices are in place to limit any discharge of pollutants such as sediment and debris. The Contractor shall provide a Work Plan for Storm Water.

**1.08** Per- and Polyfluoroalkyl Substances (PFAS): Two major PFAS compounds include perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). PFOS/PFOA are components of an aqueous film forming foam (AFFF) widely used at Fairchild AFB that has created the high potential for PFOS/PFOA impacted soil and groundwater. All groundwater encountered at Fairchild AFB must be sampled for PFOS/PFOA, a hazardous waste determination made, and disposed of appropriately. All sample information including date, location, quantity encountered, and analytical results shall be provided to the Restoration (AFCEC/CZOM) within five (5) business days of receipt of analytical results. For further information, contact 92 AFCEC/CZOM at 509-247-2450.

## **1.09 SOLID WASTE**

### **A. Definitions**

1. Solid waste or wastes: Solid waste means all putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.
2. Inert wastes: Noncombustible solid wastes that are not hazardous wastes and that are likely to retain their physical and chemical structure under expected conditions of disposal, including resistance to biological attack and chemical attack from acidic rainwater.
3. Demolition waste: Solid waste, largely inert waste, resulting from the demolition or razing of facilities, roads, and other manmade structures. Demolition waste consists of, but is not limited to, concrete, brick, bituminous concrete, wood, masonry, composition roofing and roofing paper, steel, and minor amounts of metal like copper. Plaster (i.e. sheet rock or plaster board) or any other material, other than wood that is likely to produce gases or a leachate during the decomposition process shall be considered demolition waste. Asbestos wastes and items with lead based paint (LBP) that exceed federal limits of allowable lead shall not be considered to be demolition waste for the purposes of this specification.

### **B. Salvaging, Recycling, and Disposal of Waste**

1. The Contractor shall make every reasonable effort to reduce the amount of solid waste generated by salvaging and recycling materials to the greatest extent possible.
2. Materials capable of being recycled, especially metal, asphalt, concrete, base course and fill material shall be recycled at facilities licensed and permitted by the county or state for such recycling.
3. The Base Recycling Center may be available to accept corrugated cardboard (flattened) for recycling.
4. The Contractor shall be responsible for the proper handling and disposal of all solid waste accumulated or generated on FAFB in performance of the contract.
5. All inert waste and demolition waste shall only be disposed of and/or recycled at facilities licensed and permitted by the county or state for such disposal or recycling.
6. No debris from street/airfield sweepers shall be dumped anywhere on the base.
7. There are no disposal areas on the base.

C. Solid Waste Disposal Plan

1. A plan for solid waste disposal shall be submitted to the Contracting Officer for approval prior to physical work NTP. Such a plan shall provide a project name; project number; contract number; a brief description of the project; summarize the activities that will generate waste; itemize all waste (including waste or material to be salvaged and/or recycled) expected to be encountered during the construction or demolition process; how the materials will be managed on base; and include proposed disposal/recycle locations and corresponding applicable Solid Waste Permit(s) showing the disposal/recycle facility is licensed and permitted. A Solid Waste Disposal Plan Template can be found at the end of this section.
2. If, during the course of the project, the specifics of the Solid Waste Disposal Plan change (e.g., materials disposed/recycled, disposal/recycling facilities used, etc.), then an updated plan must be submitted to the Contracting Officer for approval prior to implementing the changes.
3. The contractor shall ensure that all subcontractors, vendors, suppliers follow the approved Solid Waste Disposal Plan. It is the contractor's responsibility to coordinate with subcontractors to ensure awareness and participation.
4. Approval of the Contractor's Solid Waste Disposal Plan will not relieve the Contractor of responsibility for compliance with applicable environmental local, state and federal regulations.

D. Solid Waste Disposal Tracking

1. All solid waste including salvaged and recycled materials shall be tracked by the type, quantity, weight, (including totals for each column), and disposition. This information shall be submitted on the Solid Waste Disposal Tracking Sheet (found at the end of this section) to the Contracting Officer within 7 days of the end of each calendar quarter (i.e. submit in January, April, July, and October) and at project completion.
2. Provide dump weight receipts to the Contracting Officer for all disposed solid waste.

1.10 CONTAMINATED SOIL

- A. If petroleum-contaminated soil, discolored soil, or suspect contamination is encountered at any time during construction, the Contractor shall cease all operations in the area and immediately notify the Contracting Officer.
- B. All contaminated soil encountered during excavation shall be removed and isolated from the work area. The contaminated soils shall be placed on a plastic liner with a minimum 6-mil thickness. The liner shall have sufficient strength to resist rips and tears. The soil shall be covered to prevent possible contamination of the surrounding area during or after a precipitation event. The liner and cover shall be sufficiently larger than the area of stored soil to cover the stored soil plus two (2) feet (600 mm) of excess on all sides.
- C. Contractor is responsible for sampling and analysis to determine the degree of contamination. A representative sample of the soil shall be taken prior to soil removal. For suspected petroleum contaminated soil, the sample shall be analyzed by a laboratory approved for WTPH-HCID and BTEX analysis. Any hydrocarbons detected by this analysis shall be qualified and quantified. The action levels for treating and disposing of contaminated soil are identified in the Model Toxics Control Act:
- D. Soil with sample concentrations exceeding the action level shall be disposed of at a landfill licensed for such disposal. A plan for disposal of the material shall be submitted to 92 CES/CEIE via the Contracting Officer prior to the commencement of construction and



disposal disposition documents shall be submitted within 7 days of the end of each calendar quarter (i.e. submit in January, April, July, and October) and project completion to 92 CES/CEIE via the Contracting Officer.

#### 1.11 HAZARDOUS WASTE/UNIVERSAL WASTE/PCB WASTE

##### A. Definitions

1. Hazardous Waste: A material is a hazardous waste if it has not been excluded from regulation and possesses at least one of the four characteristics of hazardous waste (ignitable, corrosive, reactive, or toxic); is a listed waste; or is a mixture of a listed hazardous waste and solid waste.
2. Universal Waste: A waste the state of Washington has deemed to be dangerous but requires a lesser degree of training and management than a hazardous waste does.

- B. The Contractor shall be responsible for the proper storage and management of any hazardous waste or universal waste accumulated or generated at the job site. No hazardous waste or universal waste shall remain at a jobsite after project completion. If final disposal/shipping arrangements are still pending, contractor shall contact 92 CES/CEIE via the Contracting Officer for assistance.
- C. The Contractor shall be responsible for the proper disposal of any hazardous waste or PCB-waste accumulated or generated at the job site. Disposal actions shall be accomplished in compliance with the "Hazardous Waste Manifest System" for shipping and ultimate disposal. The Contractor shall insure that such transporting and disposal are in strict compliance with the established criteria. Proper disposal shall include the preparation of a hazardous waste manifest LDR as required for disposal of the waste at a RCRA approved facility using the EPA Identification # for Fairchild AFB. All manifests will be signed by an authorized person in 92 CES/CEIE prior to hazardous waste being removed from a project site. Manifests shall be coordinated through 92 CES/CEIE via the Contracting Officer at least 3-days prior to scheduled shipment to provide the government, at their discretion, an opportunity to inspect the packaging and labeling in addition to ensuring an authorized government representative will be available to sign the manifest on day of shipment.
- D. Universal Waste: The Contractor shall be responsible for the proper disposal of any universal waste generated at the job site. The base highly encourages disposal of fluorescent lamps through a permitted recycling facility. If lamps are disposed of through a permitted recycling facility, contractor shall provide documentation of this method of disposal prior to project close-out. Lamps not recycled are classified as hazardous waste and shall comply with the disposal/manifest requirements detailed in paragraph 1.11.C.
- E. Railroad Ties: Railroad ties are an exempt dangerous waste when handled in accordance with WAC 173-303-071(g). Therefore, ties that are in good condition will be salvaged and recycled. Ties that have no salvage value will be disposed of as treated wood and wood products and disposed of in a permitted landfill within 180-days of removal in accordance with WAC 173-303-071(g). For railroad ties that are salvaged and recycled, the contractor shall provide a statement indicating where and how the ties will be recycled. For railroad ties that are disposed of in a permitted landfill, a record of disposal shall be provided. Contractor shall develop and execute a soil sampling plan to sample/analyze soils surrounding the area from where the railroad ties were removed for Polynuclear Aromatic Compounds (PAHs) EPA Method 8270 and TCLP for Metals EPA Method 6010C.
- F. Paint Debris: Fairchild AFB is a large quantity generator of hazardous waste and thus solvent-based paint debris including but not limited to rags, brushes, rollers, or partial containers that is contaminated with solvent-based thinners, cleaners, paints, or other solvent-based or heavy metal-containing hazard material must be handled, stored, and characterized for disposal without leaving the base. In addition, all paint scraped, blasted, sanded, or otherwise removed shall be captured, containerized, and characterized for

proper disposal. Paint debris that characterizes as a hazardous waste shall be managed and disposed of in accordance with all requirements of paragraph 1.11.

#### 1.12 HAZARDOUS MATERIAL

##### A. Definition

1. Hazardous Material: In accordance with AFMAN 32-7002, a hazardous material includes all items covered under EPCRA tracking requirements, the OSHA HAZCOM standard, and all Class I and II ODSs.

##### B. The Contractor shall be responsible for the proper storage, management, and disposal of any hazardous material brought on Base.

1. For any single hazardous material stored on-site in a quantity equal to or exceeding 55-gallons at any time, the contractor shall provide secondary containment for the entire quantity of that hazardous material.
2. Hazardous material shall be stored within a fenced, locked secure area not accessible to the base populace after hours.
3. All containers of hazardous material shall be clearly and properly labeled; closed when not in use; and stored in an upright, secure position.
4. No hazardous material shall be left on-site at the end of a project. Touch-up/repair material shall not be provided to the user unless pre-approved by the 92 CES/CEIE Hazardous Material Management Process (HMMP) Team prior to the end of the project.

##### C. The Contractor shall submit to 92 CES/CEIE for approval via the Contracting Officer prior to physical work NTP, a Contractor Hazardous Material Worksheet (found at the end of this section) and corresponding manufacturer's Global Harmonized System compliant Safety Data Sheet (SDS) for each hazardous material to be brought onto the base during the performance of the contract. This work sheet and SDS shall be completed for each and every hazardous material to be used by the General Contractor and all subcontractors. If in doubt whether an item is a hazardous material, include the item/material on the *Contractor Hazardous Material Worksheet* with the SDS.

##### D. If during the course of the contract, items not previously identified are to be brought on the base, the Contractor shall submit a *Contractor Hazardous Material Worksheet* and SDS for approval prior to bringing the hazardous material onto the base.

##### E. Contractor shall report quantity of each hazardous material used on the base by submitting a *Contractor Hazardous Material Worksheet* to 92 CES/CEIE via the Contracting Officer. Submit one report for each calendar year of project performance no later than 1 December of that calendar year, or 30 days prior to project closeout, whichever occurs earlier. If applicable, Contractor may estimate usage for the month of December.

#### 1.13 PESTICIDES

- ##### A. Any pesticide proposed for use on the base including soil sterilants and insecticides shall comply with the process outlined in paragraph 1.12, Hazardous Materials. Pesticide usage is closely monitored by the Air Force and only pre-approved pesticides may be applied on the Base. Any other non-chemical pest control activity proposed for implementation on a project site shall be coordinated through the base Pest Management Shop via the Contracting Officer.

#### 1.14 SPILL/RELEASE

- A. Contractor shall have sufficient resources and training to prevent and respond to spills/releases on their project site. Contractors shall take proactive, aggressive measures to ensure no spill or release reaches the environment (soil, grass, storm water, etc.). Contractors shall use appropriately maintained drip pans under any equipment suspected of small drips/leaks. No equipment with significant leaking of fluids shall be used or stored on a project site. If such leaking is discovered, the equipment shall be immediately removed from the base by the contractor. Contractors shall have adequate spill absorbent material readily available on the project site to clean-up a minimum of 5-gallons and greater as deemed necessary based upon the quantity of materials being stored. For spills beyond the immediate resources of a contractor, the area shall be evacuated and the base fire department (call 911) notified immediately. Contractor shall reimburse the government for governmental resources expended in response to a spill or release at the project site.
- B. A release to the environment (soil, storm water, etc.) shall be immediately reported to the base fire department (who will notify 92 CES/CEIE) and the Contracting Officer. 92 CES/CEIE (Environmental Element) will accomplish appropriate notifications to regulatory agencies.

#### 1.15 ABATEMENT

- A. Hazardous Materials Survey: For task orders that do not include a required hazardous material survey, the contractor shall provide applicable surveys in accordance with applicable regulations and regulatory guidance. For asbestos, the survey shall be performed by a certified AHERA building inspector in compliance with the AHERA Act, 40 CFR 763, Asbestos, and SRCAA Regulation I, Article IX. All other hazardous material surveys shall be performed by an industrial hygienist with a minimum of three years of relevant experience. The contractor shall develop and submit Hazardous Materials surveys to include drawings, summary report of findings and personnel qualifications. A copy of each required survey shall be forwarded as a submittal to the Contracting Officer for approval prior to performing any work.
- B. Abatement Plan: For each task order requiring abatement of PCBs and/or other hazardous materials, an organized abatement plan with table of contents shall be submitted for government review that includes a clear list of all materials to be abated in accordance with hazardous material surveys; containment details; waste characterization; waste disposal information; landfill authorization; worker certification information; regulatory notifications; and work plan for each material being abated. The work plan shall describe all techniques, methods, and special equipment to be used on the project, including schematic drawings of the work area layout(s) showing entries/exits, HEPA exhausts, decontamination units, waste load-outs, air monitoring plan, etc. The Abatement Plan shall clearly state the contractor performing the abatement has reviewed the entire scope of the project and the entire hazardous material survey and addressed the abatement of all hazardous materials identified within the survey that will be impacted. In addition, the contractor performing the abatement must be licensed in the state of Washington to perform abatement work. Prior to submission to the government, any abatement plan shall be reviewed and approved by an independent Environmental Consultant hired by the Contractor to oversee the abatement with an AHERA Supervisor or AHERA Project Designer certification. This review and approval shall be documented and included in the submittal to the government. The contractor shall submit the plan to 92 CES/CEIE through the Contracting Officer.
- C. Post Abatement Project Reports: Contractors performing abatement shall submit an abatement post project report to 92 CES/CEIE via the Contracting Officer prior to project close-out. Reports cannot be combined and must be a stand-alone submittal. All post project reports shall contain the following as a minimum: copies of all regulatory notifications (if applicable), disposal documentation, daily abatement and site visit logs, air monitoring results (if applicable), results of all sampling and testing performed, copies of training certificates proving the training currency of employees conducting abatement work, and certifications by the above referenced

independent environmental consultant hired by the contractor to oversee abatement that they have reviewed the post project report and it accurately reflects the work performed and meets regulatory requirements and the requirements specified within this paragraph. This review and approval shall be documented and included in the submittal to the government. The contractor shall submit the post project report to 92 CES/CEIE through the Contracting Officer.

- D. All construction operations shall comply with all applicable Federal, State, local, and Air Force ACM regulations. Additionally, all work impacting ACM components shall be performed in accordance with the applicable ACM abatement specification.
- E. During the course of the project, if previously unidentified ACM building components are encountered, the contractor shall stop work and notify the Contracting Officer.
- F. No asbestos containing building material shall be used or installed during any project performed on FAFB.

#### 1.16 ASBESTOS CONTAINING MATERIALS AND LEAD-BASED PAINT PRODUCTS

- A. The contractor shall perform asbestos and lead testing of new materials as they are brought onto the job site. Materials to be tested shall include, but not be limited to, protective coatings; gypsum wall board; drywall compounds; floor coverings; mastics; sealants; composite sidings; asphaltic roof material; and coated metal roofing material. Contractor shall have the materials sampled by an independent industrial hygienist and analyzed by an accredited laboratory for asbestos and lead. These materials shall be non-detect for asbestos. For lead, these materials shall be <0.01% by weight or <100 ppm when tested by Flame Atomic Absorption (FAA). The following lead coatings are not required to meet this threshold, but are still required to be tested as they are brought onto the jobsite: agricultural and industrial equipment refinish coatings; Industrial (and commercial) building and equipment maintenance coatings, including traffic and safety marking coatings; graphic art coatings (i.e., products marketed solely for application on billboards, road signs, and similar uses and for identification marking in industrial buildings); touchup coatings for agricultural equipment, lawn and garden equipment, and appliances; mirrors which are part of furniture articles to the extent that they bear lead-containing backing paint; artists' paints and related materials; metal furniture articles (not including metal children's furniture) bearing factory-applied (lead) coatings.
- B. The contractor shall submit a signed, stamped affidavit from a Licensed Architect and an AHERA certified building inspector or Professional Engineer stating that, after a careful review of the material submittals and subsequent testing of in-place materials used on the project, to the best of his/her knowledge, no Asbestos Containing Building Material or Lead-based Paint exceeding 100 ppm by weight (unless exempt as stated in section 1.15.A) were used on the project. The signed, stamped affidavit shall include copies of applicable material submittal and associated test reports and be submitted on an AF Form 3000, Material Approval Submittal.

#### 1.17 STORAGE TANKS (non-drinking water)

- A. All UST installations or removals shall be coordinated through 92 CES/CEIE and shall meet the requirements outlined in WAC 173-360, Underground Storage Tank Regulations. Copies of all documents including notification, sampling and closure shall be forwarded to 92 CES/CEIE.
- B. Any discovery of a previously unknown UST will immediately be reported to 92 CES/CEIE, Environmental. The contractor will cease all operations adjacent to the UST until provided further guidance by the government.

- C. All AST installations or removals shall be coordinated through 92 CES/CEIE and shall meet all regulatory requirements as detailed in 40CFR112, Oil Pollution Prevention. Copies of all documents including tank and monitoring equipment specifications shall be forwarded to 92 CES/CEIE.

1.17 MOLD

- A. Projects shall be designed and executed in such a manner to prevent the growth or spread of mold. If mold is encountered during a project, guidance in EPA Publication EPA 402-K-01-001, Mold Remediation in Schools and Commercial Buildings, shall be followed.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

## 92d Civil Engineering Squadron

## Fairchild AFB

This form must be submitted by the end of the first week after the last month of each calendar quarter (i.e. submit first week in Jan, Apr, Jul, and Oct) and at project completion. Form must be submitted to 92 CES/CEIE through the Contracting Officer. Ensure total numbers are included for each column.

[illegible]

TOTAL WEIGHT (LBS)					

REVISED: 17 Dec 13

## SOLID WASTE DISPOSAL PLAN TEMPLATE

**(NOTE: At a minimum, red section of this template must be customized to be project specific.)**

**PROJECT NAME:**

**PROJECT NUMBER:**

**CONTRACT NUMBER:**

The SWDP will have the following sections: Section 1 will describe the purpose of this plan, provide a project description and summarize activities that will generate waste. Section 2 will identify all potential non-hazardous solid waste streams and list these individual waste stream with their proposed management and associated disposal/recycling facilities. Section 3 will describe the reporting requirements of solid waste disposal/recycling.

### 1. INTRODUCTION

#### 1.1. Purpose

The purpose of this Solid Waste Disposal Plan (SWDP) is to describe potential solid waste streams, management of solid waste streams, and proposed disposal/recycling facilities for all solid waste streams to be generated during the course of the project, in accordance with the Fairchild AFB Base Design Standards.

**1.2. Project Description:** *Provide a brief description of the project and summarize the activities that will generate waste.*

### 2. POTENTIAL WASTE STREAMS AND DISPOSAL PLAN FOR EACH WASTE STREAM

The following is a list of potential solid waste streams created during the course of the project: *(NOTE: Itemize all waste by type of material, including waste or material to be salvaged or recycled such as concrete, asphalt, metal, demo debris, wood waste, etc.) expected to be encountered during the construction/demolition process; how the materials will be managed on base; and include proposed disposal/recycle locations and corresponding applicable Solid Waste Handling Permit(s) (as applicable) for the disposal/recycling facilities.)*

### **2.1. Waste Item #1 (e.g., Metal)**

*Metal waste generated by demolition of interior offices, exterior stairs and restrooms will be mostly steel. Metal waste will be segregated if feasible and placed in containers at the site for temporary storage. Metal waste will be transported to the following facilities for recycling:*

- *Metal Recycler ABC (include address)*
- *Metal Recycler XYZ (include address)*

### **2.2. Waste Item #2 (e.g., Soil)**

*Soils removed in support of trenching, footing excavation and grading will be transported to the following facilities for reuse/recycling (or disposal):*

- *Facility ABC (include address)*
- *Facility XYZ (include address)*

### **2.3. Waste Item #2, (e.g., Asphalt)**

*Asphalt removed in support of removing/replacing existing failing asphalt on paved area on the side of the building will be transported to the following facility for recycling:*

- *Facility ABC (include address)*

### **2.4. General Construction Debris/waste**

*General construction debris will be generated during the project and may include interior building construction materials such as plastic, small electrical parts, gypsum wall board and acoustical ceiling tile. General construction debris/waste will be placed in dumpsters or other metal/plastic containers at the site for temporary storage. General construction debris/waste will be transported to the following facility for disposal:*

- *Landfill ABC (include address)*

### **2.5. Regular Commercial Trash**

Regular commercial trash and certain non-hazardous construction debris will be generated during various *demolition/construction* activities. This trash/debris will be placed into dumpsters. The filled dumpsters will be transported to *Facility ABC* for disposal.

## **2. WASTE DISPOSAL REPORTING REQUIREMENTS**

### **3.1. Solid Waste Disposal Tracking**

All solid waste including salvage and recycled materials will be tracked by the type, quantity and disposition. We will document this information in a task order specific Solid Waste Disposal Tracking Sheet as provided in the Fairchild Base Design Standard and will submit this tracking sheet on a quarterly basis, within seven days of the end of each quarter, until this project is completed.

**OTHER INFORMATION:** Provide any other relevant information. For example, if there is an Asbestos Containing Material (ACM) Management Plan or Lead-based Paint (LBP) Management Plan for the project, they should be referenced.

## CONTRACTOR HAZARDOUS MATERIAL AUTHORIZATION AND USE<sup>1</sup>

1. PRIME CONTRACTOR/ORGANIZATION:		2. E-MAIL		3. PHONE		4. FAX		5. DATE		
		6. PRIME COTR/POC		7. PHONE		8. FAX		9. CONTRACT NUMBER		
10. CONTRACTOR/ORGANIZATION POC		11. WORKPLACE/BLDG		12. SUB-CONTRACTOR				13. DELIVERY ORDER		
14. CONTRACTING OFFICER/FAFB OPR		15. CONTRACTING OFFICER SIGNATURE			16. PHONE		17. FAX		18. DATE	
19. OFFICE REQUESTING CONTRACT/OPR		20. SIGNATURE			21. PHONE		22. FAX		23. DATE	
24. EXPECTED START DATE		25. EXPECTED END DATE			26. PROJECT/TASK DESCRIPTION					

27. Will Air Force or Civil Service Personnel be exposed to these chemicals?

Product Name/Part Number	Material Manufacturer <sup>2</sup>	Solid, Liquid or Gas	Amount & Unit of Issue <sup>4</sup>	Container Type	Max Amount Onsite at any Time <sup>5</sup>	Est. Amount Used for Project	Actual Amount Used <sup>6</sup>	Process Type <sup>7</sup>	Remarks/Notes <sup>8</sup>

### FOOTNOTES:

1. This form is used for initial approval of hazardous materials and to report subsequent usage. Include all materials, which contain an EHS, TRI, CERCLA hazardous substance, toxic chemical, generates a hazardous waste after use, and/or requires a Material Safety Data Sheet.
2. Attach copy of MSDS for each line item.
3. Identify National Stock Number if known. If unknown, leave blank, and HMMP will complete.

4. Identify amount in container & the units item is measured in, i.e. gallon, ounces, lbs, etc.
5. Identify maximum amount present (stored and used) at any one time on Fairchild AFB.
6. Report actual quantities used at the end of the project, by January if project extends beyond Calendar Year, and/or when directed on reporting schedule on reverse (Block 27)
7. See Table 1—Process Types for appropriate codes.
8. Use the Remarks/Notes section to indicate specific process/product information, e.g. weight of each component in a kit, mix rations, disposal info, etc.) Government will also use this section to indicate authorization status.



[illegible]

END OF SECTION 013543



## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 014510 – QUALITY CONTROL

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

### SECTION 014510 – QUALITY CONTROL

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

##### 1.02 DESCRIPTION OF WORK

- A. All labor, materials, equipment and services necessary to accomplish the work of this section as indicated or specified herein.
- B. Quality Control (QC) shall be provided for all Phases of the projects. The Contractor is responsible for accomplishing QC. Specific QC requirements are listed herein. The QC system shall consist of plans and procedures necessary to produce an end product which complies with the contract requirements. The system shall cover design efforts and all construction operations, both on and off-site, and shall be keyed to the proposed construction sequence.
  - 1. The design QC shall be responsible for verifying that the design is accurately completed to meet contract requirements.
  - 2. The construction QC shall be responsible for reviewing all contract documents ensuring that they meet requirements of design and contract documents.
- C. The contractor shall hire International Accreditation Service (IAS) certified testing laboratories and shall also bear the costs for all inspections and testing of materials and equipment. This requirement supersedes and takes precedence over any other document that states or implies that the Government is responsible for these costs.

##### 1.03 INSPECTION SERVICES

- A. Accomplish work in an orderly progression of steps to satisfy performance requirements of this Specification.
- B. Items of work to be concealed shall be Government inspected prior to concealment.
- C. Notify Contracting Officer at least ten working days prior to proposed date of final inspection. Final inspection shall be preceded by a pre-final inspection (multiple inspections if necessary) at which time a list of deficiencies will be furnished by the Contractor. The Contractor QC shall provide a current QC punchlist at all Pre-Final and Final Inspections, for completed and uncompleted items. Discrepancies noted in the pre-final inspection(s) shall be corrected by the Contractor and re-inspected by the Government prior to final inspection of the work.

##### 1.04 QUALITY CONTROL (QC)

- A. Manufacturer: Obtain materials of each type required from a single manufacturer, to greatest extent possible. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Installer: Firm(s)/Installer shall have at least 3 years of successful experience in installation of specific materials and other components used for this project. Where required for warrantee, the Installer shall be certified by the manufacturer of the materials.
- C. As specified herein, provide the Government evidence needed to establish confidence that QC is being performed adequately.
- D. Except as modified and supplemented herein, follow the published requirements and written recommendations of the materials manufacturers. Concerning methods of installation, industry practices apply only when this Contract does not address the matter.
- E. The specified QC requirements are minimums. Also, do what is needed to fulfill the intent and requirements of the Inspection of Construction clause.
- F. The QC is subject to audit by a Government representative. Give the representative all information necessary for this audit. Government agents, including representatives, engineers, and quality assurance evaluators, are not authorized to change the Contract without the written authorization of the Contracting Officer; this lack of authority extends to all situations in which the actions of these agents could be construed as constituting a change.
- G. Provide Quality Control defined as follows:
  - 1. QC is the regulatory process by which the Contractor measures actual quality performance, compares it with standards, and acts on the difference. The quality function is the entire collection of activities through which fitness for use is achieved.
  - 2. Contractor inspection is a careful and critical investigation of all work to ensure that it conforms to the Contract, and to detect variances and act to correct them in time to prevent reworking and delay. This includes detailed, skillful examination and testing with immediate comparison to the requirements of the Contract. On discovery of variance, the Contractor will immediately institute corrective action to eliminate the variance and to ensure that all future work conforms to the requirements of the Contract.
  - 3. Basic QC Requirements appear in Paragraph 1.05, BASIC QUALITY CONTROL REQUIREMENTS of this section. As a minimum, the QC shall perform each of the actions listed on a daily basis.

#### 1.05 BASIC QUALITY CONTROL REQUIREMENTS

- A. Introduction:
  - 1. The Contractor shall ensure that the Government obtains products and services as required by the contract to ensure quality control is maintained in the design and construction phases of the project.
  - 2. To accomplish this, the Contractor shall assign QC personnel to the design and construction phases of the contract.
- B. **Design QC:** During the design phase the design QC shall be responsible for ensuring the design is complete and accurate to meet the requirements of the contract. Ensure all submittals are reviewed and AF3000 Material Approval Submittal form is signed by the designer of record for compliance with design and contract documents. The design QC shall be a Registered Architect or Licensed Engineer for at least 5 years in the State of Washington.
- C. **Construction QC:** The construction QC shall be responsible for reviewing and signing the AF3000 Material Approval Submittal form for all product submittals prior to submitting to contracting officer to ensure they meet the design and contract requirements. Construction QC shall continuously observe work in progress, including testing and measuring, and report

findings on a daily record form. The Government is assured of "getting exactly what is required" when the record form does not contain any variances from the contract. During construction the construction QC shall perform below activities:

1. **Preparatory Phase:** Before actual work begins, the Contractor shall:
  - i. Read and review the specifications and the drawings.
  - ii. Visit the construction site and become familiar with its layout.
  - iii. Attend the preconstruction conference.
  - iv. A check to assure that provisions have been made to provide required control inspection and testing.
  - v. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
  - vi. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawing or submitted data, and are properly stored.
  - vii. A review of the appropriate activity hazard analysis to assure safety requirements is met.
  - viii. Discussion of procedures for constructing the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that phase of work.
  - ix. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
  - x. The Government shall be notified at least 48 hours in advance of beginning any of the required actions of the preparatory phase. This phase shall include a meeting conducted by the superintendent, other Contractor personnel (as applicable), and the foreman responsible for the definable feature. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements. As a minimum, each section of the specifications shall be considered as a definable feature. However, there may be more than one definable feature under a section of the specifications, i.e., mechanical, electrical, etc. Invite the Government's representative to each meeting. The results of the preparatory phase actions shall be documented by separate minutes prepared by the Contractor and attached to the daily QC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.
2. **Initial Phase:** This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:
  - i. A check of preliminary work to ensure that it is in compliance with contract requirements. Review minutes of the preparatory meeting.
  - ii. Verification of full contract compliance. Verify required control inspection and testing.
  - iii. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards.
  - iv. Resolve all differences.
  - v. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

- vi. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the Contractor and attached to the daily QC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
- vii. The initial phase shall be repeated for each new crew to work on-site, or any time acceptable specified quality standards are not being met.

- 3. **Follow-up Phase:** Daily checks shall be performed to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work. The checks shall be made a matter of record in the QC documentation and shall document specific results of inspections for all features of work for the day or shift. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon or conceal non-conforming work.
  - a. **Additional Preparatory and Initial Phases:** Additional preparatory and initial phases may be conducted on the same definable features of work as determined by the Government if the quality of on-going work is unacceptable; or if there are changes in the applicable Contractor staff or in the on-site production supervision or work crew.
  - b. **QC Record:** Complete, daily as follows:
    - i. **Items of Work:**
      - 1. Insert date and record number.
      - 2. Insert weather description and temperature.
      - 3. Indicate crew start and stop times.
      - 4. Indicate your start and stop times.
      - 5. Indicate exact location of work performed.
      - 6. Indicate exact location of work previously completed.
    - ii. **Products.**
      - 1. Examine each material.
      - 2. Assure that all materials comply with the contract. To determine compliance, compare the material with the project specifications and drawings, and also with the approved manufacturer's literature submitted.
    - iii. **Variances:**
      - 1. All variances require an explanation of the variance. The explanation shall be limited to a description of the variance only; reasons for variance are not necessary.
      - 2. Indicate action taken to resolve each variance to result in complying work. If a variance is not resolved on the same day it occurs, the record must be entered for all succeeding days, until the variance is resolved.

#### 1.06 CONFLICTING REQUIREMENTS

- A. **General:** If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the Contracting Officer for a decision before proceeding.
- B. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.

To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the Contracting Officer for a decision before proceeding.

PART 2 PRODUCTS – NOT APPLICABLE

PART 3 EXECUTION

3.01 CONTENT OF THE QC PLAN

- A. The QC plan shall be in compliance with current Unified Facilities Guide Specifications (UFGS) 01 45 00.00 10/20 (current revision) and the (MATOC/MACC specification section 01700 Contractors Quality Control.)

3.02 QUALITY CONTROL ORGANIZATION

- A. The Contractor shall identify an individual within his organization who shall be responsible for overall management of QC and have the authority to act on all QC matters for the Contractor.
  - 1. A design QC shall be identified to ensure that the design of the project is complete and in compliance with contract documents.
  - 2. A construction QC shall be identified. This individual shall be on site at all times during construction and will be employed by the Contractor, except as noted in the following. An alternate person will be identified in the plan to serve in the event of the primary QC's absence. The requirements for the alternate shall be the same as for the designated QC.
- B. The Contracting Officer may authorize one individual to act as both Superintendent and QC for a project on a case by case basis. Individual will be required to have the same required QC background and experience. The Contractor will provide the résumé and QC certification of the individual assigned as a submittal under Phase I.

3.03 COMPLETION INSPECTION

- A. At the completion of all work or any increment thereof established by a completion time stated in the Special Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the Contractor shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved plans and specifications. The "punch list" shall include defective work as well as any incomplete work, including administrative requirements (e.g., O&M manuals, as-built drawings, hazmat reporting requirements, green procurement reporting requirements, etc.). Such a list of deficiencies shall be included in QC documentation, as required by paragraph DOCUMENTATION below, and shall include the estimated date by which the deficiencies will be corrected. The Contractor shall make a second inspection to ascertain that all deficiencies have been corrected and so notify the Government. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time stated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

3.04 DOCUMENTATION

- A. The Contractor shall maintain current records of QC operations, activities, and tests performed, including the work of subcontractors and suppliers. These records shall be on an acceptable form and shall be a complete description of inspections, the results of inspections, daily activities, tests, and other items, including but not limited to the following:
  - 1. Contractor/subcontractor and their area of responsibility.
  - 2. Operating plant/equipment with hours worked, idle, or down for repair.
  - 3. Work performed today, giving locations, description, and by whom.

4. Test and/or control activities performed with results and references to specifications/plan requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
  5. Material received with statement as to its acceptability and storage.
  6. Material submittals reviewed, with contract reference by whom, and action taken.
  7. Off-site surveillance activities, including actions taken.
  8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
  9. List instructions given/received and conflicts in plans and/or specifications.
  10. Contractor's verification statement.
- B. These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 24 hours after the date(s) covered by the report, including reports that shall be submitted for days on which no work is performed. All calendar days shall be accounted for throughout the life of the contract. Reports shall be signed and dated by the Primary QC. The report from the QC shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.
- 3.05 SAMPLE FORMS
- A. Sample Contractor QC Report forms are included at the end of this section.

**CONTRACTOR TEST REPORT**

STRUCTURE OR BUILDING \_\_\_\_\_

CONTRACT NO. \_\_\_\_\_

DESCRIPTION OF TEST, SYSTEM OR PART OF SYSTEM TESTED: \_\_\_\_\_

DESCRIPTION OF TEST: \_\_\_\_\_

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR THE CONTRACTOR:

NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF A SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR: \_\_\_\_\_

QUALITY CONTROLLER (QC): \_\_\_\_\_

DATE: \_\_\_\_\_

REMARKS: \_\_\_\_\_



## DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACT NUMBER/PROJECT NUMBER	DATE	REPORT NUMBER
DESCRIPTION AND LOCATION OF WORK		
WEATHER COMMENTS:		
CONTRACTORS/SUBCONTRACTORS AND AREA OF RESPONSIBILITY FOR WORK PERFORMED TODAY: (Indicate start/stop times for each)		
A. _____		
B. _____		
C. _____		
D. _____		
E. _____		
1. WORK PERFORMED TODAY: (Indicate location and description of work performed. Refer to work performed by prime and/or subcontractor by letter in table above)		
2. TYPE AND RESULTS OF INSPECTION: (Indicate whether P-Preparatory, I-Initial, or F-Follow-up and include satisfactory work completed or deficiencies with action to be taken)		
3. TESTS REQUIRED BY PLANS AND/OR SPECIFICATIONS PERFORMED AND RESULTS OF TESTS: (Comment on test(s) & attach test reports)		
4. MATERIALS RECEIVED/INSTALLED: (Acceptability of incoming materials; list all materials installed; location of stored materials.)		
5. VERBAL INSTRUCTIONS RECEIVED: (List any instructions given by Gov't personnel on construction deficiencies, retesting required, etc. with action to be taken)		

FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION

6. REMARKS: (Cover any conflicts in plans, specifications or instructions; offsite surveillance activities; progress of work, delays, causes and extent thereof; environmental considerations; comments on change orders, etc.)
7. SAFETY: (Include any infractions of approved safety plan, safety manual, or instruction from Gov't personnel. Specify corrective action taken)
CONTRACTOR'S CERTIFICATION: I certify that the above report is complete and correct and that all material and equipment used, work performed and tests conducted during this reporting period were in strict compliance with the contract plans and specifications except as noted above.
CONTRACTOR'S AUTHORIZED REPRESENTATIVE
GOV'T QA Review & Comments (see below) Gov't Site Visit ?        YES        NO        Time of visit: _____ to _____ hours

Additional Comments:


QA Comments & Review Only:
Signed: _____ Date: _____

END OF SECTION 014000



## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

#### FAIRCHILD SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

### SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

Drawings and general provisions of the contract, including general and supplementary conditions and other Division 01 specification sections, apply to this section.

##### 1.02 SUMMARY

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection. A visually acceptable site at Fairchild AFB is an important construction standard. A clean, well-kept site will help ensure compliance with the safety and environmental requirements of the contract. The contractor shall maintain the trailers/storage buildings in good, and clean, condition or must remove them. The contractor is responsible for the security of his property and general housekeeping of the area(s).
- B. Temporary construction and support facilities include but are not limited to:
  - 1. Field offices and storage sheds.
  - 2. Temporary roads and paving.
  - 3. Temporary project identification signs and bulletin boards.
  - 4. Temporary enclosures and fences.
  - 5. Sanitary facilities.
  - 6. Waste disposal services.
  - 7. Construction aids and miscellaneous services and facilities.
- C. Security and facility protection required include but are not limited to:
  - 1. Temporary fire protection.
  - 2. Barricades, warning signs, and lights.
  - 3. Sidewalk bridge or enclosure fence for the site.
  - 4. Environmental protection.

##### 1.03 QUALITY CONTROL

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:
  - 1. Building Code requirements.
  - 2. Health and safety regulations.

3. Utility company regulations.
4. Police and Fire Department rules.
- B. Standards: Comply with NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations* and ANSI/ASSE-A10 Series, *Safety Requirements for Construction and Demolition Operations*.
  1. Refer to "Guidelines for Bid Conditions" for industry recommendations.
- C. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70, *National Electrical Code®*.
- D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

#### 1.04 PROJECT CONDITIONS

- A. Conditions of Use:
  1. Temporary services, facilities, storage areas, and all other job site areas shall be kept clean and neat in appearance at all times. Materials shall be neatly stacked until ready for use. All materials, supplies, equipment, etc. that are no longer needed shall be promptly removed from the site.
  2. Job site, storage/staging, and office areas shall be kept free of weeds and uncontrolled vegetation growth at all times. Cut dry land grass within the construction and storage sites to a 4-inch (100 mm) height at least once per week during the growing season. Improved grounds/lawn areas shall be mowed at least once per week during the growing season to keep growth to less than (2) inches (50 mm). Maintain height of grass for airfield projects at 7 to 14 inches. Trim the grass inside and at least 24 inches outside project fences at time of grass cutting. Grass or weeds on stockpiled earth shall be maintained as described above. Stockpiling on the airfield will be approved by the Airfield Manager prior to the start of the project. If the approved location needs to be relocated, the new location requires 92d OSS Airfield Manager approval prior to the move.
  3. Areas of improved grounds within the project limits that are scheduled to remain after construction shall be maintained during construction by the Contractor. Maintenance shall include watering, mowing, and trimming. Irrigation shall be provided as necessary to maintain grass in a healthy growing condition.
  4. All loose debris and material subject to being moved by prevailing winds in the area shall be picked up or secured at all times.
  5. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.
- B. Maintain in good condition throughout the job all temporary and existing utilities required for construction.
- C. Terminate use and remove temporary utilities at earliest reasonable time when no longer needed or when permanent utilities have, with authorized use, replaced the need.

#### 1.05 TEMPORARY ELECTRICITY AND LIGHTING

- A. Coordinate with the 92 CES Electric Shop to provide connections to existing facilities, size to provide service required for power and lighting; Government will pay the costs of power used when the Contractor connects to Government owned electrical lines.
- B. Install circuit and branch wiring with area distribution boxes located so that power and lighting is available throughout the construction site by the use of construction-type power cords.

- C. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work and for areas accessible to the public.
- D. Permanent electrical service installed under this contract may be used during construction period.
- E. Airfield lights and signs will be turn off, covered or removed from the project area. Coordination with 92d OSS Airfield Management and 92d CE Electric Shop is required.

#### 1.06 TEMPORARY HEAT AND VENTILATION

- A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage due to the temperature or humidity.
- B. Provide adequate forced ventilation of enclosed areas for accumulation of dust, fumes, vapors, or gases.
- C. Portable heaters shall be standard approved units complete with controls, of a type which will not smoke or otherwise damage building finishes. Pay all costs of installation, maintenance, operation, and removal. All heaters shall be monitored while being operated.
- D. Provide connections to existing facilities; extend and supplement with temporary units as required to comply with requirements. Pay all costs of installation, maintenance, operation and removal. Government will pay costs of fuel used from the existing system.

#### 1.07 TEMPORARY WATER

- A. Coordinate with the Water Shop to make connections to existing facilities to provide water for construction purposes. Government will supply reasonable amounts of water at no cost to the Contractor. Contractor shall pay all costs of installation (including materials), maintenance, operation, and removal of the connections. Contractors may connect to base fire hydrant(s) for a project's water needs, but must connect using a third party certified backflow prevention device (BPD). The base Water Shop will be present for certification of the BPD before any hydrant is used. Coordinate with USAF Construction Manager.

#### 1.08 TEMPORARY ENVIRONMENTAL CONTROLS

- A. See Section 013543, *Environmental Procedures*, for temporary environmental control requirements.

#### 1.09 TEMPORARY CONSTRUCTION WAIVER AND SECURITY FREE ZONE WAIVER Airfield Projects

- A. 92 CES/CEN will process a Temporary Construction Waiver for work on or near the airfield. 92 CES/CEN will also process a Security Free Zone package for work in a restricted area. Allow a minimum of 60 days (concurrent) to process each. The contractor will not be allowed to start the on-site work until each waiver/package has been approved. If work must commence prior to free zone approval, escorts as coordinated by 92 CES will be required. The waiver/package will be initiated based on the contractor's submitted Progress schedule.
- B. Escorts/Surveillance: Work in Security Free Zones may require continual escort/surveillance by government personnel. The contractor shall submit by the 15th of each month the following month's work schedule in Security Free Zones so adequate escorts/surveillance can be arranged.
- C. Provide Foreign Object Debris (FOD) barrier in accordance with the Contract Documents. FOD Barrier shall be constructed of 4' high, orange, safety or barrier fence with the widest opening being no larger than 2" nominal. Inspect the FOD fence at the end of each day to collect and dispose of any accumulated FOD and repair any damage that may have occurred to the FOD barrier. After storms, the FOD fence shall be checked by the contractor. Any repairs or replacements shall be done immediately to protect the work site. This includes after work hours, weekends, and holidays. Any flashing red or amber lights

found unlit on the fence or barriers will be identified by survey tape tied around the light (s). These will be repaired/replaced upon the contractors return to the project site.

- D. **Security Free Zone Perimeter:** The contractor shall provide and mark the free zone boundary with elevated ropes, barriers, fencing, or other suitable materials, to clearly delineate it from the restricted area along the perimeter (generally the work limits). The FOD barrier will suffice as the boundary barrier if a FOD barrier is required. The FOD fence will be secured along the bottom edge to maintain a barrier to trap debris. Otherwise, the contractor shall provide weighted, stanchions every 25' to include yellow flashers and restricted area signs will be installed every 100ft or controlled area signs every 100yds. A red rope shall be strung between the stanchions. If the free-zone must be contained entirely within a restricted area (all sides of the free-zone are within the restricted area), a free-zone corridor from some point on the restricted area boundary to the work project must be established and marked with elevated barriers. However, elevated barriers will not be used on/across active taxiways. In this situation, the wing commander must approve the painting of temporary red lines across the active taxiway in accordance with AFI 31-101, *Integrated Defense*.

#### 1.10 SUBMITTALS

- A. **Site Plan:** Prior to starting the work, submit site plan(s) to the 92d Contracting Officer for approval showing the layout and details of all temporary facilities used for this contract. The plan shall include the location of the safety and construction fences, location of all site trailers, equipment and material storage areas, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas. Site photographs prior to the start of work may be included with the plan. At completion of work, the Contractor shall remove the facilities and restore the site(s) to original condition. Storage areas are not permitted at the entrances to housing areas. If the project does not lend itself to 'just-in-time' delivery to storage 'down time' by the contractor, an on-or-near base storage area, to be determined by the Government, may be authorized; approval must be obtained in writing by 92 CES/CEN. The Site Plan should also show: 1) Haul / access routes on project drawings no later than the 35% design submittal. Access route selection should avoid high visibility areas, consider security restrictions, and take into account the nature of the work (hauling demolition materials, concrete delivery, etc.); and 2) Project limits on project drawings no later than the 35% submittal. Project limit lines must encompass utility corridors, as well as general construction areas. Strive to limit project limits / contractor lay-down area(s) to those essential for completion of the work. For any temporary facilities and vehicles located on the airfield they will be identified by an orange and white checkered flag (approximately 3 x 3 feet).

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. **General:** Provide new materials. Undamaged, previously used materials in serviceable condition may be used if acceptable to the Government (refer to Section 016000, *Product Requirements*). Provide materials suitable for the use intended.
- B. **Construction and Safety Fence:** Provide galvanized chain link fencing 2m (6 foot) high, with brown, UV light resistant, plastic fabric mesh netting (similar to tennis court screening), and galvanized steel posts and gates. The safety fence shall be in accordance with OSHA standards, consisting of a high-density polyethylene grid or approved equal, a minimum of 1.1 m (42 inches) high, supported and tightly secured to steel posts located on minimum 3 m (10 foot) centers.
- C. **Airfield Projects:** Coordinate with 92 CES/CENM and Fairchild Airfield Manager for Foreign Object Debris (FOD) barrier requirements to include whether they are necessary, where to install, and their specific construction.

1. In general, FOD barriers shall be constructed of 4' high, orange, safety or barrier fence with the widest opening being no larger than 2" nominal. The FOD fence shall be secured along the bottom edge to maintain a barrier to trap debris. Use of weighted buckets, ecology blocks/jersey barriers are encouraged to keep the FOD fence in place during windy conditions. Sandbags are not approved for airfield use. FOD fencing shall be new orange construction fence. Old construction fencing "tied" together is not approved for airfield use. No chain link fence or fence with fabric is approved for airfield use. FOD fences and barriers will be lighted with flashing red or amber lights. Depending on the size of the area additional flashing red or amber lights will be required.
2. Contractor shall be required to inspect the FOD fence at the end of each day to collect and dispose of any accumulated FOD and repair any damage that may have occurred to the FOD barrier.

## 2.02 EQUIPMENT

- A. General: Provide new equipment. Undamaged, previously used equipment in serviceable condition may be used if acceptable to the Government (refer to Section 016000). Provide equipment suitable for use intended.
- B. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
- C. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- D. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- E. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.
- F. Administrative Field Office(s) and Material Storage Trailers: Contractor's administrative field office(s) and material storage trailers shall be in neat, clean, and functional condition. Locate the office(s) and trailers behind the construction fence unless otherwise indicated on the drawings. Storage of materials/debris under field offices or trailers is prohibited. Contractor field office(s) and storage trailers need not comply with base standard colors.
- G. Dumpsters: Equip dumpsters with a secure cover. The cover shall be closed at all times, except when being loaded with trash and debris. Locate dumpsters behind the construction fence/Contractor lay-down area. Empty site dumpsters at least once a week, or as needed to keep the site free of debris and trash. If necessary, provide 208 liter (55 gallon) trash containers to collect debris in the construction site area. Locate the trash containers behind the construction fence or out of the public view. Empty trash containers at least once a day. Large demolition normally requires a large dumpster without lids—these are acceptable but shall be located within the construction fence and shall not have debris higher than the sides before emptying.
- H. Temporary Telephones: Provide temporary telephone service for all supervisory personnel engaged in construction activities (i.e., superintendent and QC), throughout the construction period.
- I. Temporary Sanitation Facilities: All temporary sewer and sanitation facilities shall be self contained units with both urinals and stool capabilities. Ventilate the units to control odors and fumes and empty and clean them at least once a week or more often if required by the



contracting officer. The doors shall be self-closing. Locate the facilities behind the construction fence/Contractor lay-down area.

- J. First Aid Supplies: Comply with governing regulations.
- K. Fire Extinguishers: Fire Extinguisher must be serviceable with current inspection tag. Provide hand-carried, portable UL-rated, class "ABC" dry chemical fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

## PART 3 EXECUTION

### 3.01 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Comply with applicable requirements if specified in Division 22, *Plumbing*; Division 23, *Heating, Ventilating, and Air Conditioning (HVAC)*; and in Division 26, *Electrical*. Maintain and operate systems to assure continuous service. Modify and extend systems as work progress requires.
- B. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access, confined to the area(s) designated on the project drawings. Enclose the project work area/Contractor lay-down area with 2m (6 foot) high chain link fence with brown or black, UV light resistant, plastic fabric mesh netting and gates. Orange construction fencing is not permitted. Contractor's lay-down area is intended to be for materials needed within one week. Remove the fence upon completion and acceptance of the work. The intent is to block the construction from public view. Security of all materials and equipment will be the sole responsibility of the Contractor.
- C. Safety fences: The Contractor shall provide temporary safety fences at the construction activities within the fenced construction site and also outside of the fenced area that involve safety hazards affecting both construction workers and the general public. The safety fence shall be in accordance with OSHA standards, consisting of a high-density polyethylene grid or approved equal, a minimum of 1.1 m (42 inches) high, supported and tightly secured to steel posts located on minimum 3 m (10 foot) centers. The Contractor shall remove the fence from the work site upon completion of the contract.
- D. The contractor shall post a sign at each storage area detailing project name, prime contractor name and phone number, and the office doing the quality assurance. Sign letter height shall be 1.5 inches. Colors shall match the Project Construction Sign. The contractor must furnish the sign(s), maintain the sign(s) during construction, and remove the sign(s) from the jobsite upon closure of the storage area(s).
- E. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion may be permitted to use permanent facilities, under conditions acceptable to the Government.
- F. Temporary Enclosures: Provide temporary enclosures for protection of construction from exposure to foul weather, other construction operations, and similar activities.
  - 1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
  - 2. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
  - 3. Where temporary wood or plywood enclosure exceeds 100 sq. ft. (9.2 sq. m) in area, use UL-labeled, fire-retardant-treated material for framing and main sheathing.
- G. Collection and Disposal of Waste: Collect waste generated from construction daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris.

Enforce requirements strictly. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

### 3.02 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Termination and Removal: Unless the Government requires that it be maintained longer, remove each temporary facility when the need has ended, but no later than Substantial Completion. Restore existing facilities used for temporary services as specified, or to original condition. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
  - 1. Replace air filters and clean inside of ductwork and housings.
  - 2. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
  - 3. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.
  - 4. Clean and repair damage caused by temporary installations or use of temporary facilities; replace construction that cannot be satisfactorily repaired.

END OF SECTION 015000



## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 016000 – PRODUCT REQUIREMENTS

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

### SECTION 016000 – PRODUCT REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

##### 1.02 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. Multiple Prime Contracts: Provisions of this Section apply to the construction activities of each prime contractor.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Section 013300, *Submittal Procedures*, specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.

##### 1.03 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
- B. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- C. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature that is current as of the date of the Contract Documents.
- D. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products. Reference Buy American Act.
- E. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
- F. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

#### 1.04 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
- B. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Government to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.
- C. Compatibility of Options: When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
- D. Each prime contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other prime or separate contractors.
- E. If a dispute arises between prime contractors over concurrently selectable, but incompatible products, the Government will determine which products shall be retained and which are incompatible and must be replaced.
- F. Foreign Product Limitations: Except under one or more of the following conditions, provide domestic products, not foreign products, for inclusion in the Work:
  - G. No available domestic product complies with the Contract Documents.
  - H. Domestic products that comply with the Contract Documents are available only at prices or terms substantially higher than foreign products that comply with the Contract Documents.
- I. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.
- J. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
- K. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
  - 1. Name of product and manufacturer.
  - 2. Model and serial number.
  - 3. Capacity.
  - 4. Speed.
  - 5. Ratings.

#### 1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
- B. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
- C. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

- D. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- E. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- F. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
- G. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
- H. Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

## PART 2 PRODUCTS

### 2.01 PRODUCT SELECTION

- A. General Product Requirements
- B. Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
- C. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
- D. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- E. Product Selection Procedures

The Contract Documents and governing regulations govern product selection.  
Procedures governing product selection include the following:

- F. Proprietary Specification Requirements  
Where Specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.
- G. Semi-proprietary Specification Requirements
  - 1. Where Specifications name 2 or more products or manufacturers, provide 1 of the products indicated. No substitutions will be permitted.
  - 2. Where Specifications specify products or manufacturers by name, accompanied by the term "or equal" or "or approved equal," comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
- H. Nonproprietary Specifications  
When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
- I. Descriptive Specification Requirements  
Where Specifications describe a product or assemblies, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.

J. Performance Specification Requirements

1. Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated.
2. Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.
3. Compliance with Standards, Codes, and Regulations.
4. Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.

K. Visual Matching

1. Where Specifications require matching an established Sample, the Government's decision will be final on whether a proposed product matches satisfactorily.
2. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category.

L. Visual Selection

Where specified product requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Government will select the color, pattern, and texture from the product line selected. A color board shall be prepared by the Contractor, showing a minimum of two color concepts, with both being "neutral" in concept. All finish samples must be submitted before any color selections will be made by the Government.

M. Sustainable Procurement Program

1. Fairchild Air Force Base has adopted a Sustainable Procurement Program (SPP) regarding the purchase of environmentally preferable products in accordance with Federally-mandated 'sustainable' procurement preference programs. The specifications may include products that must meet the requirements of the various elements of the SPP including Recovered Materials (recycled content), Energy and Water Efficient Products, Alternative Fuels and Alternative Fuel Vehicles, Bio-based Products, Non-Ozone Depleting Substances, Alternatives to Hazardous or Toxic Chemicals, and Environmentally Preferable Products and Services. Such products and materials will be evaluated, and approved or disapproved by the Government, on a similar basis as a product substitution. In the opinion of the Government, if the material does not meet the intent of the specifications, it shall be the basis for disapproval.
2. Contractor shall report types and value of EPA-designated recycled content items used on the project by submitting a *Contractor's Recovered Materials Certification* (included at the end of this section) to 92 CES/CEIE via the Contracting Officer. Submit one report for each calendar year of project performance no later than 30 January of the following year, or at project closeout, whichever occurs earlier.

PART 3 EXECUTION

3.01 HAZARDOUS MATERIAL

See Section 013543, *Environmental Procedures, paragraph 1.12*, for hazardous material definition and requirements.

3.02 RECORD PRODUCT DATA

- A. Maintain one copy of each Product Data submittal. Note related Change Orders and markup of record drawings and Specifications.
- B. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
- C. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
- D. Upon completion of markup, submit complete set of record Product Data to the Government for the Government's records.

### 3.03 RECORD SAMPLE SUBMITTED

Immediately prior to Substantial Completion, the Contractor shall meet with the Contracting Officer and the Government's personnel at the Project Site to determine which Samples are to be transmitted to the Government for record purposes. Comply with the Government's instructions regarding delivery to the Government's Sample storage area.

### 3.04 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
- B. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

### 3.05 SAMPLE FORMS

- A. Sample Contractor's Recovered Materials Certification form included at the end of this section.

## **CONTRACTOR'S RECOVERED MATERIALS CERTIFICATION USER'S GUIDE**

### **A. PURPOSE OF FORM**

1. This form is to be completed by the Contractor when EPA-designated items included in the AF Sustainable Procurement Program for Recovered Materials are being procured. For questions on whether the product counts as "EPA designated" or what the required recycled content is, refer to product descriptions on EPA's website at <https://www.epa.gov>. Several items may fall under each product classification listed on the form and it is the contractor's responsibility to refer to the EPA's website for the complete list. EPA continuously designates new products.

2. The completed Certification shall be submitted to the Contracting Officer and shall become part of the contract file.

### **B. APPLICABILITY**

1. Contractor's Recovered Materials Certification Form is used for projects exceeding \$150,000 in value and where FAR 52.223-9 is included, and is completed by the contractor upon contract completion.



## CONTRACTOR'S RECOVERED MATERIALS CERTIFICATION

Project No. /Contract  
No. \_\_\_\_\_

Project Description: \_\_\_\_\_

The Contractor shall list which item(s) apply to the procurement request, the required recycled content, and sign and date.

The Contractor shall complete the following matrix of EPA designated recycled content items by placing the information in the boxes beside each applicable item.

<b>Comprehensive Procurement Guidelines (CPG)</b>					
<b>Categories and Designated Items</b>					
Fill in <b>all</b> appropriate boxes	Specification Section No.	Percent Recycled Content		Manufacturer's Name & Address	Approx. Value of Item for this Contract
		Required	Actual		
<b>CONSTRUCTION PRODUCTS</b>					
Building insulation products					
Carpet (polyester)					
Carpet cushion					
Cement and concrete containing coal fly ash, ground granulated blast furnace slag, cenospheres, and silica fumes					
Consolidated and reprocessed latex paint					
Floor tiles					
Flowable fill					
Laminated paperboard					
Modular threshold ramps					
Non-pressure pipe					
Patio blocks					
Railroad grade crossings/surfaces					
Roofing materials					
Shower and restroom dividers/partitions					
Structural fiberboard					

FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION

<b>LANDSCAPING PRODUCTS</b>					
Compost and fertilizer made from recovered organic materials					
Garden and soaker hoses					
Hydraulic mulch					
Lawn and garden edging					
Plastic lumber, landscaping timbers and posts					
<b>NON-PAPER OFFICE PRODUCTS</b>					
Binders, clipboards, file folders, clip portfolios, and presentation folders					
Office furniture					
Office recycling containers & waste receptacles					
Plastic desktop accessories					
Plastic envelopes					
Plastic trash bags					
Printer ribbons					
Toner cartridges					
<b>PAPER AND PAPER PRODUCTS</b>					
Printing and writing papers					
Newsprint					
Commercial/industrial sanitary tissue products					
Paperboard and packaging products					
Miscellaneous papers					
<b>PARK and RECREATION PRODUCTS</b>					
Park benches and picnic tables					
Plastic fencing					
Playground equipment					
Playground surfaces					
Running tracks					

FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION

<b>TRANSPORTATION PRODUCTS</b>					
Channelizers, delineators, and flexible delineators					
Parking stops					
Traffic barricades					
Traffic cones					
<b>VEHICULAR PRODUCTS</b>					
Engine coolants					
Rebuilt vehicular parts					
Re-refined lubricating oils					
Retread tires					
<b>MISCELLANEOUS PRODUCTS</b>					
Awards and plaques					
Bike racks					
Blasting grit					
Industrial drums					
Manual-grade strapping					
Mats					
Pallets					
Signage					
Sorbents					
<b>OTHER ITEMS</b>					

I hereby certify the Contract Specifications for the requisition of all materials listed on this form complies with EPA standards for recycled/recovered materials content.

Contractor's Signature \_\_\_\_\_

Contractor's Title and Company Name \_\_\_\_\_

Date \_\_\_\_\_

END OF SECTION 016000

FAIRCHILD AIR FORCE BASE GUIDE SPECIFICATION



## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 017329 – CUTTING AND PATCHING

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

### SECTION 017329 – CUTTING AND PATCHING

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.
- B. Existing Irrigation systems: Construction Contractors shall repair damage caused by them to existing irrigation systems in all cases where we identify an area as having an existing system, and in situations where it is obvious that there is an existing system, even though the exact location of the lines have not been marked.

##### 1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for cutting and patching.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
- C. Section 013100, *Project Management and Coordination*, for procedures for coordinating cutting and patching with other construction activities.
- D. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
- E. Requirements of this Section apply to mechanical and electrical installations. Refer to Division 23 and 26 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.
- F. When doors with locksets are to be removed, the lock cores may not leave the FAFB premises at any time. Cores shall be returned to the FAFB Lock Shop.

##### 1.03 SUBMITTALS

- A. Cutting and Patching Proposal
- B. Submit a proposal describing procedures and request approval to proceed. Include the following information, as applicable, in the proposal:
- C. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.
- D. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
- E. List products to be used and firms or entities that will perform Work.
- F. Indicate dates when cutting and patching will be performed.

- G. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
- H. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
- I. Approval by the Government to proceed with cutting and patching does not waive the Government's right to later require complete removal and replacement of unsatisfactory work.

#### 1.04 QUALITY ASSURANCE

- A. Requirements for Structural Work
- B. Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
- C. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
  - 1. Foundation construction.
  - 2. Bearing and retaining walls.
  - 3. Structural concrete.
  - 4. Structural steel.
  - 5. Lintels.
  - 6. Timber and primary wood framing.
  - 7. Structural decking.
  - 8. Stair systems.
  - 9. Miscellaneous structural metals.
  - 10. Exterior curtain-wall construction.
  - 11. Equipment supports.
  - 12. Piping, ductwork, vessels, and equipment.
  - 13. Structural systems of special construction in Division 13 Sections.
  - 14. Operational Limitations.
- D. Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.
- E. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
  - 1. Primary operational systems and equipment.
  - 2. Air or smoke barriers.
  - 3. Water, moisture, or vapor barriers.
  - 4. Membranes and flashings.
  - 5. Fire protection systems.
  - 6. Noise and vibration control elements and systems.
  - 7. Control systems.

- 8. Communication systems.
- 9. Conveying systems.
- 10. Electrical wiring systems.
- 11. Operating systems of special construction in Division 13 Sections.
- 12. Visual Requirements
- F. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Government's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.
- G. If possible retain the original Installer or fabricator to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer or fabricator, engage another recognized experienced and specialized firm.
- H. Processed concrete finishes.
- I. Stonework and stone masonry.
- J. Ornamental metal.
- K. Matched-veneer woodwork.
- L. Preformed metal panels.
- M. Fire stopping.
- N. Window wall system.
- O. Stucco and ornamental plaster.
- P. Acoustical ceilings.
- Q. Terrazzo.
- R. Finished wood flooring.
- S. Fluid-applied flooring.
- T. Carpeting.
- U. Aggregate wall coating.
- V. Wall covering.
- W. Swimming pool finishes.
- X. HVAC enclosures, cabinets, or covers.

#### 1.05 EXISTING WARRANTIES

Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used. Use materials whose installed performance will equal or surpass that of existing materials.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
- B. Before proceeding, meet at the Project Site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

### 3.02 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

### 3.03 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
- B. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- C. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.
- D. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
- E. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
- F. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
- G. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- H. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
- I. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
- J. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
- K. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and



- appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
- L. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.
  - M. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
- 3.04 CLEANING
- Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 017329



## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 017700 – CLOSEOUT PROCEDURES

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

##### 1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
  - 1. Inspection procedures.
  - 2. Final cleaning.
- B. Refer to the following specification sections for related closeout requirements:
  - 1. Section 013543, Environmental Procedures.
  - 2. Section 016000, Product Requirements.
  - 3. Section 017720, Equipment-in-Place.
  - 4. Section 017823, Operation and Maintenance Data.
  - 5. Section 017836, Warranties.
  - 6. Section 017839, Project Record Documents.
- C. Closeout requirements for specific construction activities are included in the appropriate specification sections.
- D. The Contractor shall include a line item on the AF Form 3064, *Contract Progress Schedule*, The Contracting Officer may retain up to 7% of the contract value from the contractor pending receipt and approval of all required documentation or an amount required to protect the interests of the Government.

##### 1.03 SUBSTANTIAL COMPLETION

###### A. General

Contractor shall provide notification to Government when all work begins and ends in each facility. Government inspections shall occur throughout the entire period of work with one date for Substantial Completion for the entire project.

###### B. Preliminary Procedures

- 1. Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

- a. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
- b. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
- c. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
- d. Advise the Government of pending insurance changeover requirements.
- e. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
- f. Obtain and submit releases enabling the Government unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
- g. Submit record drawings, maintenance manuals, Contractor's Recovered Materials certificate, solid waste disposal tracking sheet, hazardous materials worksheets, final project photographs, damage or settlement surveys, property surveys, and similar final record information as required by other contract sections.
- h. Deliver tools, spare parts, extra stock, and similar items.
- i. Make final changeover of permanent locks and transmit keys to the Government. Advise the Government's personnel of changeover in security provisions.
- j. Complete startup testing of systems and provide comprehensive instructional training of systems for the Government's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, temporary fences, temporary utility connections, and similar elements.
- k. Complete final cleanup requirements, including restoration of storage areas and touchup painting.
- l. Touch up and otherwise repair and restore marred, exposed finishes.

## 2. Inspection Procedures

- a. On receipt of a request for inspection, the Government will either proceed with inspection or advise the Contractor of unfilled requirements.
- b. The Government will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
- c. The Government will repeat inspection when requested and assured that the Work is substantially complete.
- d. Results of the completed inspection will form the basis of requirements for final acceptance.
- e. Inspection procedures vary for phased projects; designers must select the appropriate inspection procedures for the specific type of contract.

## 1.04 FINAL ACCEPTANCE

### A. Preliminary Procedures

1. Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

2. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
  3. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
  4. Submit a certified copy of the Government's final inspection list of items to be completed or corrected, endorsed and dated by the Government. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Government.
  5. Submit consent of surety to final payment.
  6. Submit a final liquidated damages settlement statement.
  7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Re-inspection Procedure
1. The Government will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Government.
  2. Upon completion of re-inspection, the Government will prepare a certificate of final acceptance. If the Work is incomplete, the Government will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
  3. If necessary, re-inspection will be repeated.

1.05 Real Property Records

Draft, Interim, and Final DD 1354 Form, Transfer and Acceptance of Military Real Property will be required for each project. Draft DD1354 shall be submitted by the end of Phase I submittals. Interim DD1354 shall be submitted and approved prior to the end of Phase II construction, the government will not accept BOD if Interim DD1354 is not submitted/approved. Final DD1354 shall be submitted by the end of Phase III closeout. Contact the Contracting Officer for any project specific information necessary to complete the DD Form 1354. For information purposes, a blank DD Form 1354 (fill-able) in ADOBE (PDF) may be obtained at the following web site:  
<http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1354.pdf>

PART 2 PRODUCTS – NOT APPLICABLE

PART 3 EXECUTION

3.01 FINAL CLEANING

A. General

1. The General Conditions require general cleaning during construction. Regular site cleaning is included in DIVISION 01 Section "Construction Facilities and Temporary Controls."

B. Cleaning

1. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

2. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
  3. Remove labels that are not permanent labels.
  4. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
  5. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
  6. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
  7. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
  8. Grounds that have been compacted by construction activities shall be scarified, reggraded, and restored to match surrounding areas.
- C. Pest Control
- Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.
- D. Removal of Protection
- Remove temporary protection and facilities installed for protection of the Work during construction.
- E. Compliance
1. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Government's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.
  2. Where extra materials of value remain after completion of associated Work, they become the Government's property. Dispose of these materials as directed by the Government.

END OF SECTION 017700



## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 017720 – EQUIPMENT-IN-PLACE LIST

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE:** Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

### SECTION 017720 – EQUIPMENT-IN-PLACE LIST

#### PART 1 GENERAL

##### 1.01 SUBMITTAL

Data listed in PART 3 of this section shall be submitted in accordance with Section 013300, *Submittal Procedures*. Due dates shall be as indicated in applicable paragraphs and all submittals shall be completed before final payment will be made.

#### PART 2 PRODUCTS – NOT APPLICABLE

#### PART 3 EXECUTION

##### 3.01 SUBMITTAL

The final Equipment-in-Place List shall be completed and returned to the Contracting Officer within 30 calendar days of the final inspection. The Contracting Officer Representative will review all final Equipment-in-Place Lists for accuracy and conformance to the requirements contained in Division 01, General Requirements. The lists shall be returned to the Contractor if corrections are necessary. The Contractor shall make all corrections and shall return the lists to the Contracting Officer within seven calendar days of receipt.

##### 3.02 EQUIPMENT-IN-PLACE LIST

- A. Contractor shall submit for approval, at the completion of construction, a list of equipment-in-place. This list shall be updated and kept current throughout construction, and shall be jointly inspected for accuracy and completeness by the Contracting Officer's representative and a responsible representative of the Contractor prior to submission of each monthly pay estimate. A sample form showing minimum data required is provided at the end of this section.
- B. The Equipment-in-Place List shall be comprised of all equipment falling under one or more of the following classifications:
  - 1. Each piece of equipment listed on the mechanical equipment schedules.
  - 2. Each electrical panel, switchboard, and MCC panel.
  - 3. Each transformer.
  - 4. Each piece of equipment or furniture designed to be movable.
  - 5. Each piece of equipment that contains a manufacturer's serial number on the name plate.

##### 3.03 PAYMENT

All costs incurred by the Contractor in the preparation and furnish Equipment-In-Place Lists shall be included in the contract price and no separate payment will be made for this work. Approval and acceptance of the final Equipment-in-Place Lists shall be accomplished before final payment is made to the Contractor.

## EQUIPMENT-IN-PLACE LIST

CONTRACT NO.: \_\_\_\_\_

Specification Section: \_\_\_\_\_ Paragraph No.: \_\_\_\_\_

ITEM DESCRIPTION: \_\_\_\_\_

Item Name: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Model Number: \_\_\_\_\_

Capacity: \_\_\_\_\_ Replacement Cost \_\_\_\_\_

ITEM LOCATION:

Building Number: \_\_\_\_\_ Room Number: \_\_\_\_\_

or Column Location: \_\_\_\_\_

MANUFACTURER INFORMATION:

Manufacturer's Address: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Trade Name (if different from item name): \_\_\_\_\_

Manufacturer's Address: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Telephone Number: \_\_\_\_\_

WARRANTY PERIOD: \_\_\_\_\_

Checked by: \_\_\_\_\_

END OF SECTION 017720



## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 017823 – OPERATION AND MAINTENANCE DATA

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

### SECTION 017823 – OPERATION AND MAINTENANCE DATA

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

##### 1.02 SUMMARY

This Section specifies the requirements for development and delivery of Operations and Maintenance Manuals.

#### PART 2 PRODUCTS

2.01 Preliminary O&M: The Contractor shall submit one (1) complete set of preliminary O&M manuals for each set of O&M data. Preliminary O&M Manuals shall be submitted and approved by the Substantial Completion date. If they are submitted after this date, the contractor shall remain responsible for all maintenance and service on the facility until they are approved.

- A. The contractor may submit the preliminary manuals without binder(s). If so, they shall include two typewritten pages representing the proposed binder marking format. One page(s) will represent the front cover(s) and the other page(s) will represent the spine(s).
- B. For equipment or systems requiring personnel training and/or acceptance testing, the final O&M data will be approved by the Contracting Officer prior to the scheduling of training and/or testing.

2.02 Final O&M: The final O&M manual shall contain original manufacturer's data and product literature. All data furnished must be of such quality to reproduce clear, legible copies. Holes used to bind data shall not be punched through text, and all text shall be readable when bound.

- A. Provide one (1) complete set of hard bound copies.
- B. For each facility, provide one (1) CD/DVD or transmitted electronically to the government with the applicable O&M data in Adobe.pdf format.

2.03 Tools: The Contractor shall provide one of each nonstandard tool, test instrument, and/or gauge necessary for performing maintenance and repair work. A nonstandard tool, test instrument, and/or gauge is defined as an item normally supplied by the manufacturer for the equipment operation or maintenance. The Contractor shall prepare a master list of such items for all equipment and systems, and shall key maintenance and repair procedures to this list. The above referenced items for performing maintenance and repair work shall be provided for each individual facility of multi-facility projects.



- 2.04 Spare Parts: The Contractor shall provide those spare parts and supplies that are specified in the TECHNICAL SPECIFICATIONS and those which are normally provided with the equipment or system. A separate master list shall be provided for these items upon turnover to the Government of the parts and supplies.

### PART 3 EXECUTION

#### 3.01 GENERAL

The Contractor shall provide Operation and Maintenance (O&M) manuals which include all equipment, systems and materials that were furnished and/or installed by the contractor. Additional O&M requirements are specified in individual sections of the technical specifications.

#### 3.02 FORMAT

- A. O&M data shall be separated into distinct systems and organized in UFGS format. If the quantity of material is such that it will not fit within one binder then it shall be divided into volumes, as required.
- B. O&M manuals shall be prepared for each individual facility of multi-facility projects. For those projects where the work performed is identical in each building, separate O&M manuals are required for each building.

#### 3.03 BINDER

- A. Construction: Manuals shall be 3 ring black binder with spine, but only one type shall be used for all manuals. The manuals shall be hardback covered, cleanable, and not over three (3) inches thick and designed for 8- 1/2 x 11 inch paper.
- B. Marking: Each binder shall have the following information on the cover: Type of O&M Manual, Project Title, Project Number, Facility Number, Volume Number, and Prime Contractor, (see Figure 1. O&M Manual Cover). Each binder shall also have the following information inscribed on the spine in the same manner as above: Type of O&M Manual, Project Title, Project Number, Facility Number, Volume Number and Year Constructed (see Figure 2. O&M Manual Spine).
- C. Color: Color of binder shall be black with exterior clear insert sleeves and printing shall be gold on black paper.

#### 3.04 Contents

- A. Manuals shall be structured to address each of the following topics in the order listed.
  1. Warning Page: A warning page shall be provided listing potential dangers (if they exist), such as high voltage, toxic chemicals, flammable liquids, explosive materials, carcinogens, or high pressures. The warning page shall be placed inside the front cover, in front of the title page.
  2. Title Page: A title page shall be provided to include prime contractor name, telephone number, and address. Title page shall also include project title, project number, contract

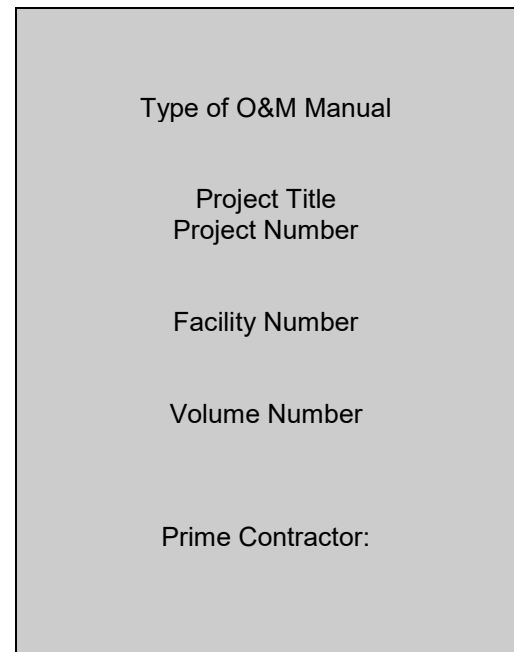


Figure 1. O&M Manual Cover

number, warranty inclusive dates and list of all subcontractors with addresses and phone numbers.

3. Index: Each manual shall have a master index at the front identifying all manuals, volumes and subject matter for each volume. Following the master index, each manual shall have a table of contents listing each section by CSI format and product/equipment name. Rigid tabbed flyleaf sheets shall be provided for each separate product, equipment or system within the manual. For example, if a project has Air Handling Units 1 through 4, there shall be tab sheets:

15500	15500	15500	15500
AHU-1	AHU-2	AHU-3	AHU-4

4. Description: Narrative and technical description of the system. This narrative should be short and concise. If applicable, include a description of the interrelations with other systems. This section shall clearly indicate the limit of repair work that may be performed by Government personnel during the warranty period without voiding warranty provisions.

5. Warranty:

- a. Table of all warranties. Table shall have the following columns: Item warranted, Warrantor's info, and expiration date.
  - (1) Item warranted should be very brief explanation of what the warranty covers. Examples include General parts and workmanship, boiler, door closure, roof, etc.
  - (2) Warrantor's info must include the name, address, and telephone number of the company responsible for executing warranty repairs. If applicable, include email addresses, websites, or any other specific info that will be helpful for initiating a warranty request.
  - (3) Expiration date shall be the last day that the warranty is valid.
- b. Signed, general warranty required by the contract. General warranty shall state inclusive dates and POC information.
- c. One copy of each manufacturer and extended warranty. If any warranty requires activation, the contractor must include verification of the activation along with the associated warranty. This section only applies to warranties with an expiration after the general warranty expires.

6. Installed Equipment Lists: All O&M manuals shall contain a copy of the completed Equipment-in-Place List required in Section 017720, *Equipment-in-Place List*.

7. Equipment Startups, testing, training sign-ins, etc.

8. Tools List (if applicable): Refer to Part 2 for details.

9. Spare Parts List (if applicable): Refer to Part 2 for details.

10. Systems and Components: Tabbed sections for each installed system, equipment, etc. See more detailed guidance below.

- B. For each system, equipment, or material, provide a section which addresses each of the following topics (where applicable).

1. General

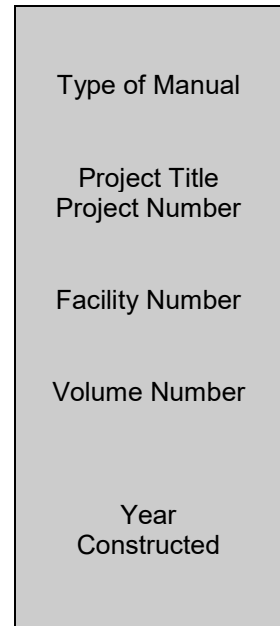


Figure 2. O&M Manual Spine

- a. Data Identification: Catalog data shall be marked to clearly identify pertinent data by highlighting the data with pointers.
- b. Parts and Supplies: A complete list of parts and supplies, to include shop manuals and illustrated parts catalogs, shall be provided with the maintenance instructions. The list shall include all parts and components of individual pieces of equipment or system and shall identify such items as description of part, model number, circuit or component identification, etc. Parts lists, shop manual, and illustrated parts catalogs shall be included within each volume of maintenance instructions. Further, a master list of spare parts and supplies recommended from each manufacturer for 1 year of operation, including source of supply, shall be sub listed with each instruction.
  - (1) Availability: The Contractor shall list the sources of supply for all parts and supplies, including name of supplier/manufacturer, address, and telephone number.
  - (2) If parts and supplies are not normally stocked locally, (within 3 hour drive) necessary procurement time shall also be a part of the listing.
- c. Maintenance Schedule: A schedule of all required periodic maintenance shall be included. This schedule shall list, by frequency of occurrence, all lubricants and special adjustments required. The types and amounts of lubrication must be specified. The Contractor shall verify that the furnished maintenance schedule agrees with the published manufacturer's data.
- d. Safety precautions and instructions that should be followed during operations and maintenance procedures shall be incorporated into the maintenance procedure and flagged for the attention of maintenance personnel. The procedures shall include necessary operating instructions for taking equipment off line, lock-out/tag-out, putting equipment on line, or putting equipment on standby.
- e. Operator Data: The instructions shall include equipment and/or system layouts showing all piping, wiring, breakers, valves, dampers, controls, etc., complete with diagrams, schematics, isometrics, and data to explain the detailed operation and control of each individual piece of equipment and/or system, including system components. Layouts shall show the location within the facility of controls, valves, switches, dampers, etc., by reference to site location, wing designation, floor, room number or other clear and concise directions for locating the item. Operator data may be identical to posted data and framed instructions but shall be prepared as part of the O&M manuals. All control systems operations data shall include the following:
  - (1) A fully labeled control schematic which details all set points, throttling ranges, actions, spans, proportional bands, and any other adjustment.
  - (2) A fully labeled elementary diagram (ladder diagram).
  - (3) A sequence of control on the diagrams cross- referenced to the control schematic and elementary diagram.
  - (4) A generic, functional description of each control component shown on the drawings.
  - (5) Catalog data of all control devices.
- f. The instructions shall include all necessary material, equipment, and system data to perform maintenance work and shall include, but not be limited to, manufacturers/bulletins, catalogs, and descriptive data; certified performance curves, copies of approved test plans, including logs and records of performance acceptance test results, and actual adjustments made during final acceptance and inspection; system layouts, including block diagrams, wiring, control, and isometric diagrams: schematic items within the facility; and interrelationships with other items of system.

- g. Drawings: All drawings bound in the manuals shall be of such size that will require only one fold made right to left. All larger size drawings shall be inserted into a separate pocket in the required location in the manual. All drawings must be clearly legible.

## 2. Architectural

- a. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products. Data shall include, but not be limited to, information on carpet, floor tile, vinyl wall finishes, builder's hardware, etc. If required for reordering, attach product samples inside the manual.
- b. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- c. Moisture-protection and Weather-exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspection, maintenance, and repair.

## 3. Mechanical

- a. Check List Prior to Start Up: Precaution and pre-check prior to startup of equipment and/or system, including safety devices, monitoring devices and control sequence shall be provided.
- b. Start Up and Operation: Step-by-step sequential procedures for startup and normal operation checks for satisfactory operation shall be provided. Safety precautions and instructions that should be followed during these procedures shall be incorporated into the operating instructions and flagged for the attention of the operator. Procedures shall include test, manual/normal, and automatic modes.
- c. Shutdown: Procedures for normal and emergency shutdown of equipment and/or systems shall be provided. The instructions shall include any procedures necessary for placing the equipment and or system on standby or preparing the equipment and/or system for startup at a later time. Procedures shall include test, manual/normal, and automatic modes.
- d. Troubleshooting and Maintenance Procedures: Troubleshooting guidance shall cover both preventive maintenance and repair.
  - (1) Maintenance Procedures shall indicate preventive maintenance, lubrication, and good housekeeping practices which should be performed by operating personnel as well as more complex maintenance procedures which would normally be performed by trained maintenance personnel only. The procedures shall be presented with a schedule indicating time frames or operating hours for specific maintenance to be accomplished.
  - (2) Emergency adjustments shall be included and flagged for operator's attention. These instructions shall include procedures for emergency repairs that may be performed by operating personnel.
  - (3) Repair procedures shall be presented with a step-by-step procedure for locating and correcting the trouble. A "shop manual" and illustrated parts catalog shall be used for this purpose. These procedures shall clearly indicate major repair activities which should only be performed in a shop or factory versus normal repair work that may be performed on-site or with equipment on-line.
  - (4) Refer to specification 230900 paragraph 8 for additional requirements.

### 3.05 POSTED DATA/INSTRUCTION

- A. General: The contractor, in addition to the O&M Manuals, shall provide Posted Data and Framed Instruction for installed equipment or systems.
- B. Posted Data: The Contractor shall provide posted data for equipment or systems, in addition to O&M manuals, and as required by the Technical Specification sections. The data shall consist of as-built schematics of all wiring, controls, piping, etc., as necessary for the operation of the equipment or system, and a condensed typewritten description of the equipment or system. The data may be presented in one or several frames, under glass or sheet acrylic glazing, for clarity and convenience of location. The framed data presentation and outline shall be acceptable to and posted at locations designated by the Contracting Officer or his authorized representative. The data shall be posted before personnel training and performance acceptance testing for the equipment or system.
- C. Framed Instructions: Typewritten instructions, framed under glass or sheet acrylic glazing, explaining equipment or system pre-start checkout, startup, operating, shutdown procedures, safety precautions, and normal operation checks for satisfactory performance of the equipment of systems shall be posted in conjunction with the posted data. The framed instructions may be presented in one or several frames for clarity and convenience of location. The instruction presentation and outline shall be acceptable to and posted at locations designated by the Contracting Officer or his authorized representative. The data shall be posted before personnel training and performance acceptance testing for the equipment or system.

### 3.06 CHECKLIST

Contractor shall complete and initial a copy of the O&M Manual Check List which is provided at the end of this section, and forward it as part of the O&M Manual submittal to the Contracting Officer for approval.

## O&M MANUAL – REVIEW CHECKLIST

- \_\_\_ Does the manual cover all equipment furnished under the contract? (Review against equipment schedules on the drawings and/or equipment submittals.)
- \_\_\_ Does the manual clearly highlight all relevant portions or cross out all irrelevant portions of catalog data?
- \_\_\_ Does the manual contain operations data for the equipment? (Step-by-step operating instructions, startup procedures, sequences of operation, precautions.)
- \_\_\_ Does the manual contain operations data for the equipment? (Lubrication, dismantling, assembly, adjustment, troubleshooting, etc.)
- \_\_\_ Does the manual contain parts lists or parts catalogs for the equipment? Parts catalog or list shall contain identification, part numbers, and recommended parts to be stocked, and local source of parts.
- \_\_\_ Does the manual contain electrical connection diagrams?
- \_\_\_ Does the manual contain control and interlock system diagrams where applicable?
- \_\_\_ Is every page in the manual numbered and an index provided for ready reference to the data?
- \_\_\_ Is the cover hard with the facility name, identification number, location, and system on both the spine and cover? Is the Contractor's name and address, and the contract title and contract number on the inside of the manual cover?
- \_\_\_ Is any of the data in the manual under the binding where it cannot be seen?
- \_\_\_ Do the final manuals contain all original data sheets and are others clearly legible?

- \_\_\_ Are system layout drawings provided? (Simplified diagrams for the system as installed.)
- \_\_\_ Are all drawings in the manual of such a size that requires one fold right to left, or if a larger size drawing, then inserted into a pocket in the manual?
- \_\_\_ Add 11" x 17" as-built drawings to the O&M Manual.

Note: The above are common requirements to all contracts. Check the specific contract for additional information.

END OF SECTION 017823



## DIVISION 01 – GENERAL REQUIREMENTS

### SECTION 017836 – WARRANTIES

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

### SECTION 017836 – WARRANTIES

#### PART 1 GENERAL

##### 1.01 RELATED DOCUMENTS

Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this section.

##### 1.02 SUMMARY

- A. This section includes administrative and procedural requirements for warranties required by the contract documents, including manufacturer standard warranties on products and special warranties.
- B. Refer to the General Conditions for terms of the contractor's period for correction of the work.
- C. Related Sections: The following sections contain requirements that relate to this section:
  - 1. Section 013300, *Submittal Procedures*, specifies procedures for submitting warranties.
  - 2. Section 017700, *Closeout Procedures*, specifies contract closeout procedures.
  - 3. See the individual specification sections for specific requirements for warranties on products and installations specified to be warranted.
- D. Certifications and other commitments and agreements for continuing services to government are specified elsewhere in the contract documents.
- E. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the contractor of the warranty on the work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the contractor.
- F. Separate Prime Contracts: Each prime contractor is responsible for warranties related to its own contract.

##### 1.03 DEFINITIONS

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Government.
- B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Government.

#### 1.04 WARRANTY REQUIREMENTS

- A. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- B. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of the contract documents. The contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the government has benefited from use of the work through a portion of its anticipated useful service life.
- C. Government's Recourse: Expressed warranties made to the government are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the government can enforce such other duties, obligations, rights, or remedies.
- D. Rejection of Warranties: The government reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the contract documents.
- E. Where the contract documents require a special warranty, or similar commitment on the work or part of the work, the government reserves the right to refuse to accept the work, until the contractor presents evidence that entities required to countersign such commitments are willing to do so.

#### 1.05 SUBMITTALS

- A. Submit written warranties to the Government prior to the date certified for Substantial Completion. If the Government's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Government.
- B. When a designated portion of the Work is completed and occupied or used by the Government, by separate agreement with the contractor during the construction period, submit properly executed warranties to the Government within fifteen (15) days of completion of that designated portion of the Work.
- C. When the contract documents require the contractor, or the contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the government, through the contracting officer, for approval prior to final execution.
- D. Form of Submittal: At final completion compile 2 copies of each required warranty properly executed by the contractor, or by the contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the project manual.
- E. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, as indicated in General Requirements Section 017823, Operations and Maintenance Data.
- F. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.

#### PART 2 PRODUCTS – NOT APPLICABLE



## PART 3 EXECUTION

### 3.01 LIST OF WARRANTIES

Provide warranties on products and their installations, for such items as, but not limited to: carpet, doors, windows, roofing, hardware, equipment, etc.

### 3.02 WARRANTY RESPONSE

- A. The contractor shall honor all warranty requirements by responding and initiating corrective action on all warranty work within the following timeframes:
  - 1. Routine Calls: The Contractor shall respond within seven (7) calendar days after notification by the Contracting Officer's representative, and not later than three (3) calendar days on second and subsequent attempts to correct a deficient item. The work must be completed within 20 days of receiving materials.
  - 2. Urgent Calls: The contractor shall respond within 24 hours of notification and complete corrective action within 7 days of receiving materials.
  - 3. Emergency calls: The contractor shall respond within 2 hours of notification and complete corrective action within 24 hours of receiving materials.
- B. The Contracting Officer's representative will determine the category of the call (routine, urgent, or routine). The corrective action shall include making temporary repairs, if necessary, until more permanent repairs can be made or replacement parts ordered. The Contractor shall complete all warranty work to the complete satisfaction of the Contracting Officer in accordance with the applicable specifications. If the Contractor fails to honor warranty requirements (to include making temporary repairs), the government may correct the deficiency and bill the Contractor for the repairs.

END OF SECTION 017836



DIVISION 01 – GENERAL REQUIREMENTS  
SECTION 017839 – PROJECT RECORD DOCUMENTS  
FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

SECTION 017839 – PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 GENERAL

- A. Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Government's reference during normal working hours.
- B. Maintain a complete set of Contract Documents (Drawings and Project Manual) in good condition at the job site. Annotate the Job Set as work progresses to reflect installations which vary from the work originally shown (include change order numbers where applicable). Make the Job Set available for review at the Contracting Officer's request.
- C. Data listed in Part 3 of this section shall be submitted in accordance with Section 013300, Submittal Procedures. Due dates shall be as indicated in applicable paragraphs and all submittals shall be completed before final payment will be made.

1.02 SUBMITTALS

A. Shop Drawings

Submit newly prepared information, drawn to accurate scale to the Contracting Officer. Highlight, encircle, or otherwise indicate deviations from the contract documents. Do not reproduce contract documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the project is not considered Shop Drawings.

B. As-Built Field Data

The As-Built Field Data shall be submitted to the Contracting Officer for review and approval a minimum of 20 calendar days prior to the date of final inspection. If review of the preliminary as-built drawings reveals errors and/or omissions, the drawings will be returned to the Contractor for correction. The Contractor shall make all corrections and return the drawings to the Contracting Officer within 10 calendar days of receipt. Final As-Built Field Data shall be received and approved by the Contracting Officer by the Contract Closeout Completion Date.

C. Certified CADD Technicians List

Drafting work shall be performed by certified CADD technicians with architectural drafting experience and/or individuals with a minimum of five years architectural CADD experience. The names and qualifications of these individuals shall be submitted in writing to the Contracting Officer if requested.

D. As-Built Record Drawings

The final as-built record drawings on computer disc, or digital delivery through the Air Force "DOD SAFE" system, and on 24" X 36" high quality bond paper shall be completed and returned together with the approved preliminary as-built field data to the Contracting Officer within 21 calendar days of the Contract Closeout Completion Date. The Contracting Officer will submit the electronic as-built record drawings to CE and GeoBase for review of all final as-built record drawings for accuracy, conformance to the drafting standards and other requirements contained in this section. The drawings shall be returned to the Contractor if corrections are necessary. The Contractor shall make all corrections and shall return the drawings to the Contracting Officer within seven calendar days of receipt.

PART 2 PRODUCTS – NOT APPLICABLE

PART 3 EXECUTION

3.01 SHOP DRAWINGS

- A. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
  - 1. Dimensions.
  - 2. Identification of products and materials included.
  - 3. Compliance with specified standards.
  - 4. Notation of coordination requirements.
  - 5. Notation of dimensions established by field measurement.
  - 6. Product and system shop drawings shall be included in as-built drawings.
- B. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 36" x 48".

3.02 AS-BUILT FIELD DATA

- A. The Contractor shall keep at the construction site a clean, undamaged, complete set of full size blue or black line white-prints of contract drawings, reproduced at the contractor's expense. In addition, the contractor shall maintain full size marked-up drawings, shop drawings, survey notes, sketches, nameplate data, pricing information, description, and serial numbers of all installed equipment. This information shall be maintained in a current condition at all times until the completion of the work.
- B. The resulting field-marked prints and data shall be referred to and marked as "As-Built Field Data", and shall be used for no other purpose. They shall be made available for inspection by the Contracting Officer's representative whenever requested during construction and shall be jointly inspected for accuracy and completeness by the Contracting Officer's representative and a responsible representative of the Contractor prior to submission of each monthly pay estimate. Failure to keep the As-Built Field Data (including Equipment-in Place lists) current shall be sufficient justification to withhold a retained percentage from the monthly pay estimate.
- C. During construction, these prints shall be marked to show all deviations in actual construction from the contract drawings. The color red shall be used to indicate all additions and green to indicate all deletions. Deviations shall be shown in the same general detail utilized in the contract drawings. Markings of the prints shall be pursued continuously during construction to keep them up to date.
- D. Mark the set to show the actual installation wherever the installation varies from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Mark new information that is important to the Government but was not shown on Contract Drawings or Shop Drawings. Note related change-order numbers where applicable.

- E. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
- F. Correct grade or alignment of roads, structures, and utilities if any changes were made from the contract plans. Correct elevations if changes were made in site grading from the contract plans.
- G. Mark the topography and grades of all drainage installed or affected as part of the project construction.
- H. The Contractor shall prepare, process, and deliver all site, design and construction, and location-related work as geospatial or geographically-references data in an electronic format to the Government according the following criteria and guidance. For projects involving A-E design requirements, the A-E Contractor shall draft a new master specification section that addresses the requirements for construction Contractors and/or Sub-Contractors to collect geospatial or geographically-referenced data during and at the completion of construction phase(s).
  - 1. Geospatial data deliverable requirements shall apply for all surveyed, mapped, collected, extracted, derived, designed, or proposed natural and built features supporting project requirements herein.
  - 2. Final site utility layout, and computer aided-design (CAD) data deliverables shall be converted to a GIS format (as required) or delivered as a geographically-referenced and survey grade CAD data. As-Builts and other A-E data shall be delivered electronically in formats IAW Paragraph O.
  - 3. All data deliverables shall be submitted to the Government on a CD/DVD-ROM, or digital delivery through the Air Force "DOD SAFE" system, in addition to any paper submissions.

**I. Geospatial Data Deliverable Format Requirements.**

- 1. Required Format: The Contractor shall submit geospatial or geographically-referenced data in ESRI ArcGIS file geodatabase (FGDB) format. FGDBs shall be ArcGIS Desktop version 10.3 or later version, and contain all geospatial (vector), attribute (tabular), and metadata (XML) data. Surveyed data shall be delivered in either an .xls, .csv, or .dbf file including Latitude, Longitude, Elevation, along with feature code/description. No additional files, tables, diagrams or documents should be required to complete required geospatial data deliverables.
  - 2. Other Formats: Geospatial data may also be delivered in other formats (such as an export form Oracle or SQL, or a direct ArcSDE (load) provided the Contractor has obtained written approval from the Contracting Officer (CO). The Contractor can contact the Installation GIO, at (509) 247-9399 for additional details and guidance.
  - 3. File-Based Formats: Individual (non-database or "flat") geospatial or geographically-referenced data files, if required, shall be accompanied with the appropriate external spatial reference files that specify the parameters of the projection, coordinate system, units of measure, and datum. EXAMPLES: ArcGIS Shapefiles Projection Files (\*.prj), and auxiliary files (\*.aux).
- J. **Data Model:** Geodatabase deliverables shall be formatted according to the latest official data model version, the Air Force Adaptation (AFA) of the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE). SDFSIE is the single Department of Defense (DoD) spatial data standard that supports common implementation and maximized interoperability for Installation, Environment and Civil Works Missions. SDFSIE is registered in the DoD IT Standards Registry and is recognized as the enterprise standard for geospatial data across the entire DoD business mission area. SDFSIE standards are determined and managed by the Defense Installation Spatial Data Infrastructure Group (DISDI) Group, a

formal governance body that reports to the Department of Defense's Installation & Environment Investment Review Board. Refer to the SDSFIE website for additional information : <https://www.sdsfieonline.org>.

1. Data layers that cannot be accommodated by the SDSFIE data model shall be delivered in separate core SDS feature classes created by the Contractor. Core SDSFIE feature classes are defined as having the current AF Adaptation of SDSFIE (FeatureName, FeatureDescription, etc.) and SDSFIE Foundational (siteID, installation ID, RPUID etc.) attribute fields. Feature class and additional required attribute field naming shall follow the SDSFIE naming convention (camel case).
- a. **Spatial Reference:** All geospatial or geographically-referenced data submissions shall be correspond to NAD 83, Washington State Plane, N (US Foot) or Contractor shall disclose what coordinate system, projection and datum were used for their project work so data can integrate easily with GeoBase.

Requests for geospatial or geographically-referenced data deliverables to be referenced to other spatial stands such as State Plane

#### K. Geospatial Data Deliverable Geometry Requirements

1. Geometry – The Contractor shall create planimetric and topographic data using methods that support the feature geometry required. Acceptable geometry includes Point, Line, and Polygon features. To ensure compliance with current spatial database parameters, no "polygonZ", "polylineZ", or "pointZ" geometry shall be used, as well as no data with "M" values.
  - a. **Point Features:** Shall be created as point and placed in the geometric center of the physical feature they represent. Symbol fonts will not be used to create point features (i.e., no graticules, symbols, or icons).
  - b. **Line Features:** Shall be used to represent linear features, including topographic contours.
    - i. No lines with only one vertex or lines without positive length values.
    - ii. Lines will have no erroneous overshoots, undershoots, dangles, or intersections.
    - iii. Lines will be continuous within their own feature class to ensure spatial query compatibility
    - iv. Line features shall not be broken into small segments (e.g., use a dashed line symbology on a continuous line instead of dashed lines created with small line segments) or broken for text.
    - v. Linear features may be broken at intersections with other line features or nodes IAW AF linear segmentation policy and guidance to ensure proper topological connectivity.
    - vi. Features must snap together where appropriate, such as two vector segments making up one line.
  - c. **Polygon Features:** Shall be used to represent area features.
    - i. No Polygons with two or less vertices or without positive area values.
    - ii. Polygons must completely close and have a single, unique centroid, e.g. no "C" shaped areas.
    - iii. No Polygons with invalid properties such as inverted polygons, or invalid polygon vertices caused by software conversion methods.

- iv. Polygons representing building must depict the building outline (footprint), not the digitized roofline as seen from above, unless specifically supporting roof studies, designs, or construction. Roof features shall reside in a separate core SDSFIE data layer created by the Contractor IAW Paragraph J.
- 2. **Topology:** Topology is the arrangement of how features share geometry. Planimetric and topographic data shall be created using a topology environment where snapping at double precision is enabled to ensure polygons are closed and polylines are properly connected.
  - a. **Point Features:** Point vertices shall be created as points, not graticules, symbols, or icons. Points shall snap to line point coordinates of the associated feature where required, e.g.,
  - b. **Line Features:** Linear features shall snap together where appropriate, such as two vector segments making up one line. Line endpoints must be snapped to the endpoint coordinates of the associated linear feature, e.g., fence lines, utility infrastructure, etc.,
  - c. **Polygon Features:** Polygon features shall not overlap or have gaps between them. Polygon vertices shall snap to the coordinates of associated or adjacent polygon features, e.g., taxiways to runways, roads to sidewalk, etc., Polygon features shall snap to one another where appropriate, such as two polygon edges sharing the same subsequent vertices. These digital representation of common boundaries shall be coincident for all vector features, regardless of geographic data layer.
- L. **Attribution:** Attribute data is the tabular (non-vector), non-geometric) data about a geospatial feature. The Contractor shall create and provide the minimum attribution for geospatial data IAW the AF Data Layer Specification applicable for each geographic layer delivered. The AF Adaptation of the SDSFIE data model requires minimal mandatory attribution for every geographic data feature. Any other required attribution for a given feature class shall be delivered in an external (ancillary) table linked back to the data layer through the use of the Primary Key attribute field.
  - 1. **Minimum Attribution:** Due to the completeness and/or availability of some government furnished information (GFI), there may be some exceptions to this rule:
    - a. Real Property Unique Identifier (RPUID) There may be some features where the RPUID numeric values, designated by the official Air Force Real Property system (ACES RP/TRIRIGA) are not available or do not apply. Missing RPUID numbers for all applicable features shall be verified as acceptable for those features with the Government before providing final deliverables.
    - b. InstallationID, SiteID, and Real Property Site Identifier (RPSUID): There may be some features that are located outside the boundaries of DoD property holdings, therefore no applicable values for these fields may exist. Missing InstallationID, SiteID, and RPSUID numbers for all applicable features shall be verified as acceptable for those features with the Government before providing final deliverables.
    - c. Feature Name shall be populated with the common name of the feature (e.g., "Base Exchange," "Water Main"), and FeatureDescription shall be populated with a detailed description of the feature or conditions affecting the quality of the data (e.g., "location derived from as-built and has not yet been field verified").
    - d. The Primary Key Identifier (IDPK) field shall be populated sequentially according to following the schema: Installation ID\_SiteIDxxxxxxx. This is the ACES-RP/TRIRIGA assigned 4 letter installation identified, underscore, the ACES-RP assigned 4 letter and 4 digit site identifier, then a 7 digit sequential (1 to x) number. Example for Cusick: GJKZ\_GJNB00010000001

- e. Date Edited, and Editor Shall be filled out for every feature updated, or added
  - f. Data Collection (Method of collection) Shall be added for every feature edited, and Data Source field shall include the equipment or system utilized to update that data i.e “Trimble R12 Rover survey performed on January 7, 2022. Or georeferenced with imagery collected on Jan 7, 2022”
- M. **CAD Data Deliverables** – The Contractor shall submit all CAD data in the \*.dwg, \*.dgn, \*.dxf format IAW the Current AF Adaptation of US Army Corps of Engineers Architecture, Engineering, and Construction standards version or the Current AF Adaptation of SDSFIE (as required) using AutoDesk Map3D 2019 or later version. The Contractor shall create CAD data layers IAW the Current AF Adaptation of US Army Corps of Engineers, Architecture, Engineering, and Construction standards or the Current AF Adaptation of the SDSFIE data model as required. CAD data layers shall be created in the NAD83 reference system projected to the appropriate zone of the State Plane system and 1:1 with the drawing unit of measure in US-Feet when data is required to be geospatially referenced.
- 1. **Geometry:** CAD data layers consist of point, polyline, or polygon vectors that represent the actual shape of physical features.
    - a. **Polyline Features:** The Contractor shall create polylines to represent facility interior and exterior walls, columns, doors, windows, and stairwells. Line features are continuous and not broken into small segments. Each polyline feature shall be continuous within its own data layer to ensure spatial query compatibility.
      - i. Must complete closed polygons that represent wall segments to ensure proper topological connectivity.
      - ii. Lines will not overlap or have erroneous overshoots, undershoots, dangles or intersections.
      - iii. Lines will be continuous within their own data layer.
      - iv. Features must snap together where appropriate, such as window or door to the corresponding wall line.
      - v. When required by the project, load CAD data to the File GeoDatabase, using the AF Adaptation to the SDSFIE data layer of “CADFloorPlan”.
    - b. **Polygon Features:** The Contractor shall create polygons to represent facility interior areas (e.g. building floor, rooms, and offices).
      - i. No Polygons with two or less vertices or without positive area values.
      - ii. No Polygons with invalid properties such as inverted polygons, or invalid polygon vertices caused by software conversion methods.
      - iii. Polygons representing building floors must depict the building outline (footprint), not the digitized roofline.
        - 1. Polygons must completely close and have a single, unique centroid, e.g., no “C” shaped areas.
  - 2. **Topology:** Topology is the arrangement of how features share geometry. The Contractor shall create CAD planimetric and topographic data using methods that support the required feature topology. There are three types of topologies in CAD – Node, Network, and Polygon.
  - 3. **Node (point features):** Node topologies shall be used in association with a network or polygon topology to hold information about junctions and intersections between elements of the topology. Point objects, blocks, or text (nodes) are snapped to line point coordinates of associated features, e.g., fire hydrants to water lines, exterior lights to electrical lines, etc.,

4. **Network (line feature):** Network topology shall define the interconnection of links and nodes at link junctions. Network segments may have a specified direction. Links are lines, open polylines, or arcs.
  - a. Line endpoints shall snap to the endpoint coordinates of the associated linear feature, e.g., fence lines, utility infrastructure, etc.
  - b. Features shall snap together where appropriate, such as two vector segments making up one line.
  - c. Information from different layers can be used to define a network topology.
5. **Attribution:** Attribute data is the tabular (non-vector, non-geometric) data about a drawing object or feature. The Contractor shall create and provide the minimum attribution for each CAD layer IAW current AF Adaptation of A/E/C Standards or geospatial SDSFIE requirements.

*For additional information, details, and guidance on requirements and the use of current A/E/C standards, refer to the current AF Adaptation of US Army Corps of Engineers Architecture, Engineering, and Constructions standards.*

- N. **Survey Deliverables** – The Contractor shall submit a survey report that includes the project details i.e horizontal and vertical coordinate system including ellipsoid, projection type, and geoid model. The report shall also include equipment used, and collection information for each point including antenna height, latitude, longitude, elevation, start and end time, to include total duration for length point was taken.
1. Survey Points shall be delivered in one of the following file types: “.csv”, “.xlsx”, or “.dbf”. These points will include the following attribution:
    - a. Potable Water:
      - i. Label, Coordinates (Northing, Easting, and Elevation), Nominal Diameter(in), Length (ft), Pipe Material, Depth (ft-in), Valve/Hydrant Number, Valve Size, and Valve Type.
    - b. Sanitary Sewer:
      - i. Label, Coordinates (Northing, Easting, and Elevation), Diameter (in), Length (ft), Pipe Material, Invert Elevation, Manhole Number, and Manhole Construction.
    - c. Storm Sewer:
      - i. Label, Coordinates (Northing, Easting, and Elevation), Diameter (in), Length (ft), Pipe Material, Invert Elevation, Manhole Number, and Manhole Construction
    - d. Electrical
      - i. Label, Coordinates (Northing, Easting, and Elevation), Conduit Size, Cable Size, Transformer Size, Transformer Type, and Hand Hole Type
    - e. Natural Gas
      - i. Label, Coordinates (Northing, Easting, and Elevation), Diameter (in), Length (ft), Pipe Material, Depth (ft-in), Valve/Meter Type, and Regulator Pressures
    - f. Liquid Fuels
      - i. Label, Coordinates (Northing, Easting, and Elevation), Diameter (in), Length (ft), Pipe Material, Depth (ft-in), and Valve/Meter Type
    - g. Cathodic Protection
      - i. Label, Coordinates (Northing, Easting, and Elevation), Anodes Size



- h. Navigation Aids
  - i. Label, Coordinates (Northing, Easting, and Elevation)
  - i. Communication
    - i. Label, Coordinates (Northing, Easting, and Elevation), Conduit Size, Cable Count.
  - j. Traffic (Foot and Automotive)
    - i. Label, Coordinates (Northing, Easting, and Elevation) Material, Pavement Thickness, and Pavement Type
- 2. Survey Photos shall be taken of the survey equipment on the primary control, and along the surveyed feature and delivered in .jpg, .tiff, or .png format. There shall be photos of the survey equipment on the utility or feature being surveyed, this can be done with either a normal camera, or integrated with the survey controller/equipment, however the name/ID of the photo shall be the same as the survey point.
- O. Contractor shall mark the location and dimension of any changes within the building or structure, and the accurate location and dimension of underground utilities and facilities. Mark the locations and description of any utility lines and other installations of any kind or description known to exist within the construction area. This includes all marked and unmarked utilities discovered during excavation. These locations include dimensions to permanent features such as corners of buildings, permanent survey markers, fire hydrants, etc. The government will provide an ArcMap MXD file titled "Existing Site Conditions, Project xx-xxxx, Project Title" and the associated geodatabase electronic file. Within 30 days after substantial completion, the contractor shall submit a map showing the as-built condition of the project site(s). The map shall consist of an updated electronic file of the ArcMap MXD file initially provided by the government with a new title that says "As-built Site Conditions, Project xx-xxx, Project Title". The MXD file shall include the date the map was "as-built". The contractor shall also submit the associated updated geodatabase electronic file and an 11" x 17" paper copy of the map. All map data shall use a Coordinate System of NAD 83, Washington State Plane North US Feet; all GPS coordinates shall be first order accuracy (1:25,000). Any and all features demolished under the task order shall be deleted from the map and associated geodatabase electronic file. Any and all errors, changes, or modifications to existing site features shall be reflected on the map and associated geodatabase.
  - 1. All existing or abandoned utilities identified during construction, and all those installed shall be surveyed, collecting latitude, longitude, elevation, material type, utility type and size of utility. In the case for new utilities installed during construction; they shall be surveyed at every change in direction, intersection, connection point, or major change in elevation.
- P. Mark changes in details of design, or additional information obtained from working drawings prepared and/or furnished by the Contractor including, but not limited to, fabrication, erection, installation, and planning details, pipe sized, insulation material dimensions of equipment, foundations, etc.
- Q. Mark all changes or modifications from the original design and the final inspection.
- R. Wherever contract drawings or specifications allow options, only the option actually used in the construction shall be shown on the as-built drawings. The option(s) not used shall be deleted.
- S. The contractor shall supplement the as-built field data with the as-built shop drawings for all HVAC, irrigation, structural steel, etc.
- T. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.

### 3.03 AS-BUILT RECORD DRAWINGS

- A. Approved preliminary as-built drawings will be returned to the Contractor along with one set of the original record drawings on CD-ROM, or delivered via the DOD SAFE online data transfer. The Contractor shall draft all as-built data using the same AutoCAD version and format as the original record drawings. The drafting work shall be performed by certified CADD technicians with architectural drafting experience and/or individuals with a minimum of five years architectural CADD experience.
- B. Drafting shall be done in a quality equal to that of the original record drawings. Drafting shall be consistent with the original record drawings in regard to text style, text size, symbols, layers, line type etc. If the creation of additional drawings is required, the drawings will have the same type title block and borders as the original drawings. The Contractor shall be provided with a prototype drawing of the title block and borders by the Government. When final revisions have been completed, each drawing shall have the words "AS-BUILT" in block letters at least 3/8" high placed in the lower right corner of the drawing area if space permits, otherwise, place below the title block between the border and the trim line. The date of completion and the words "REVISED AS-BUILTS" shall be placed in the revision block above the latest revision notation. The Contractor shall provide the government with a complete set of the final as-built project drawings on 24" X 36" high quality bond paper. Contractors shall also supply a pdf of all drawings included in the As-Builts. All costs of drafting, drawing preparation, and materials shall be at the Contractor's expense.
- C. Payment: All costs incurred by the Contractor in the preparation and furnishing of as-built drawings shall be included in the contract price and no separate payment will be made for this work.

END OF SECTION 017839



## DIVISION 02 – EXISTING CONDITIONS

### SECTION 028200 – ASBESTOS REMEDIATION

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

#### PART 1 GENERAL

##### 1.01 SUMMARY

THIS SPECIFICATION IS FOR (*enter building number here*) LOCATED AT FAIRCHILD AIR FORCE BASE, WASHINGTON

- A. Contractor shall provide a cost to abate asbestos containing materials as specified herein. The cost shall include all supervision, labor, materials, equipment, permits, personnel monitoring, environmental monitoring, etc. required to remove, handle, and dispose of ACM as described in this section. ASBESTOS REMEDIATION work may be completed during multiple phases. The Abatement Contractor shall coordinate work with the General Contractor and shall include all mobilization or remobilization fees in their bid. See notes throughout the drawings and other specification sections related to project schedule.
- B. Refer to the (*insert name of HAZMAT survey, date survey was performed, and name of company whom performed HAZMAT survey*), for additional information, regarding materials identified as asbestos containing. The Asbestos Inspection Report is intended to provide supplemental information regarding inspection process, associated analytical data, is specifically not intended to be used as a basis of bid preparation, and will not be a valid basis for a change request.
- C. Dimensions, quantities, and locations are approximate, included solely to provide general information to the Abatement Contractor. The Abatement Contractor shall be responsible for abatement of all ACM specified below without regard to accuracy of quantity or location recorded. The Abatement Contractor shall be responsible for ACM in hidden locations, such as, but not limited to, ACM flooring located under partition walls or beneath cabinets/fixtures. For the purposes of additive or deductive change-order requests, actual quantities must vary by more than twenty (20) percent of the total quantity estimates provided before a change-order request will be considered. The Abatement Contractors shall visit the site and familiarize themselves with the work and conditions under which the work is to be performed.
- D. Work covered by this section includes the handling of friable and non-friable ACM and incidental procedures and equipment required to protect workers from airborne asbestos fibers during the work described. For all ACM removal, Abatement Contractor shall arrange and provide for burial at an appropriate permitted landfill.
- E. Work practices specified shall be allowed if airborne fiber concentrations remain below levels specified in the "Contractor Monitoring Schedule and Airborne Fiber Concentration" table. Should analytical results exceed specified airborne fiber concentrations, the steps outlined in the "Work Practices as a Function of Airborne Fiber Concentration" shall be followed.

##### 1.02 ASBESTOS SPECIFIC SUBMITTALS

- A. Pre-work Submittals: The following items shall be submitted and approved in writing by the Government's Representative at least ten (10) working days prior to commencing work involving asbestos materials.
1. Certifications: Submit documentation of a valid Asbestos Contractor License, and supervisor and worker certifications for the State of Washington.
  2. Insurance: A Certificate of Insurance shall be provided naming Fairchild Air Force Base as primary and noncontributory additional insured on the Abatement Contractor's insurance policy. In addition to insurance requirements specified in the General Conditions, the Abatement Contractor shall submit and maintain coverage types and amounts in companies acceptable to the Government of not less than \$1,000,000 per occurrence Asbestos Specific Liability Insurance.
  3. Permits and Notifications: Obtain and submit copies of all permits and notifications that are required in conjunction with asbestos removal and encapsulation, hauling, and disposition. Provide timely notification of such actions as may be required by federal, state, regional, and local authorities.
  4. Asbestos Plan: Submit a detailed organized site-specific plan with a table of contents of the work schedule and procedures to be used in the removal of materials containing asbestos. The Government's Representative, prior to the start of any asbestos work, shall review and accept the asbestos plan. Such plan shall include the following:
    - a. Site-specific health and safety summary
    - b. A clear list of all materials to be abated in accordance with hazardous material survey(s)
    - c. Containment details.
    - d. Waste characterization.
    - e. Waste disposal information.
    - f. Landfill authorization.
    - g. Worker and supervisor certification information.
    - h. Regulatory notifications.
    - i. Work plan for each material being abated.
    - j. Describe all techniques, methods, and special equipment to be used on the project, including schematic drawings of the work area layout(s) showing entries/exits, HEPA exhausts, decontamination units, waste load-outs, air monitoring plan, etc.
    - k. Documentation of a valid Asbestos Contractor License, and supervisor and worker certifications for the State of Washington.
    - l. Abatement Plan shall clearly state the Contractor performing the abatement has reviewed the entire scope of the project and the entire asbestos survey(s) and addressed the abatement of all asbestos identified within the survey that will be impacted during the course of the project.
    - m. Location and layout of asbestos removal areas, decontamination enclosures, and negative air filtration units.
    - n. Disposal plan that includes the name and address of asbestos landfill; estimated waste quantity to be removed from work site; and procedures for hauling and disposal that comply with 40 CFR 61 Subpart M (NESHAP), 49 CFR Subchapter C (HMTA), and state, regional and local standards.
    - o. Documentation that a respirator program has been established as required by ANSI Z88.2, 29 CFR 1910.134, WAC 296-842.

- p. Description of procedures to be used should asbestos become spilled during storage or transport.
  - q. Prior to submission to the Government, any abatement plan shall be reviewed and approved by an individual knowledgeable and experienced in ASBESTOS REMEDIATION with a AHERA Supervisor and AHERA building inspector certification who is directly responsible for the General Contractor's Quality Control or by an independent Environmental Consultant hired by the General Contractor to oversee the abatement. This review and approval shall be documented and included in the submittal to the Government.
  - r. Employee Safety: It is the Contractor's responsibility to test suspect materials for asbestos-containing material (ACM), to ensure employee safety.
- B. Work-In-Progress Submittals: The Abatement Contractor shall have the following documentation on-site and available for review by Government's Representative during the project. Work-in progress submittals shall also be included with post-work submittals.
- 1. Daily Logs: For each shift the Abatement Contractor is on-site, a daily work log shall be completed. Each log shall document at least the following information:
    - a. Workers' name, certification number and expiration date.
    - b. Worker/visitor entry/exit log to isolated work zones.
    - c. Labor hours and details of job tasks for each worker.
    - d. Respiratory protection used by each worker.
    - e. Number and type of air samples collected.
    - f. Number of bags or quantity of ACM removed from each work area.
    - g. Amount of surfactant or encapsulant used.
    - h. Negative air machine readings.
    - i. Containment area barrier smoke-test results if applicable.
    - j. Problems or delays.
    - k. Project progress.
  - 2. Air Monitoring Records: All regulatory compliance personal and area air monitoring shall be available for the Government's Representatives review daily. Analytical results of samples collected by the Abatement Contractor are required to be submitted to the Government's Representative for review within 48 hours of sampling period completion.
  - 3. Disposal Documentation: Disposal receipts (waste shipment records) shall be kept onsite for Government's Representative review and submitted with project closeout documentation at the conclusion of each mobilization. As stated above, waste generation quantities shall be recorded in the Abatement Contractor's daily logs and correlate with disposal receipts.
  - 4. Notification Revisions: Notification of change in work dates, hours, practices, and quantities removed shall be submitted to the appropriate agencies and the Government's Representative.
- C. Abatement Post Project Report: Contractor shall submit an Abatement Post Project Report with a table of contents to Government's Representative within ten (10) days of substantial completion of each mobilization of ASBESTOS REMEDIATION. Post-work submittals must be received, reviewed, and accepted as completed by Government's Representative prior to project payment. Abatement Post Project Report shall include at least the following:
- 1. Cover Page.

2. Table of Contents.
3. Copies of all regulatory notifications submitted to regulators.
4. Daily Project Logs detailing the ACM activities performed each day.
5. Training Records: Copies of training certificates proving the training currency of employees conducting the ACM work.
6. Sampling Records: Results of all sampling and testing performed.
7. All worker certification documentation.
8. Documentation of all hazardous waste characterization, transportation, and disposal records (signed by final disposal facility).
9. Air Monitoring Records including analytical results.
10. Certification by the individual responsible for QC for the General Contractor that they have reviewed the Abatement Post Project Report and it accurately reflects the work performed and meets the requirements specified by local, state, and federal regulations.

#### 1.03 JOB CONDITIONS

- A. The Abatement Contractor and Government's Representative and/or General Contractor shall work closely together to integrate and schedule ASBESTOS REMEDIATION activities with other site activities. The Abatement Contractor shall complete abatement work, inclusive of time allowance for clearance sampling and analytical receipt in accordance with the notice to proceed. The Abatement Contractor shall anticipate that multiple work phases of work may be required in order to meet construction deadlines.
- B. The Abatement Contractor shall coordinate access to power and water with the General Contractor during the work.
- C. Government's Representative shall be notified in writing ten (10) working days prior to Abatement Contractor's mobilization or remobilization to the site.
- D. Substantial completion for the ASBESTOS REMEDIATION portion of this project is defined as the time when a work area passes visual inspection; and final clearance results are received from the laboratory for each work area; and results of these samples are in complete compliance with the contract documents, and federal, state, or local regulation, whichever is most stringent, for clearance air samples.
- E. Final ASBESTOS REMEDIATION Completion: Final completion for the ACM abatement portion of this project is defined as the time when all post-work submittals, including waste shipment records signed by the disposal facility, are reviewed, and accepted by the Government's Representative as complete.

#### 1.04 QUALITY CONTROL

- A. General Air Monitoring: Abatement Contractor is responsible for performing all monitoring of airborne concentrations of asbestos fibers, both personal and environmental, as required by 29 CFR 1910, 1926, WAC 296-62 and as specified herein. The Government's Representative may provide asbestos visual clearance and air sample collection as a portion of the post-abatement clearance inspection and testing as specified in section 1.05.F.
  1. An accredited laboratory shall analyze all samples taken by the Abatement Contractor. Analytical results shall be made available to the Government's Representative within 48 hours of sample collection.
  2. Abatement Contractor bears sole and full responsibility for employee compliance air monitoring as required in 29 CFR 1926.1101 and WAC 296-62-07709.
- B. Prior to the start of work, the Abatement Contractor shall collect one PCM air sample per 2,000 SF with a minimum of two (2) air samples per work area. The Abatement Contractor

shall also collect an appropriate number of background air samples immediately adjacent to the work area. Minimum sample volume shall be 1,200 liters. The Abatement Contractor shall make available baseline (background) PCM air monitoring results to the Government's Representative at least two (2) day prior to the onset of ASBESTOS REMEDIATION work.

C. Monitoring During Asbestos Work

1. Abatement Contractor shall collect area, personal, environmental air samples during abatement. Air samples shall be collected at a frequency consistent with the Abatement Contractor Monitoring Schedule and shall be within control limits. Additional engineering controls and personal protective measures shall be required if control limits are exceeded.
2. Abatement Contractor shall collect PCM samples at the perimeter of the controlled work area during removal activities completed without a negative pressure enclosure. Perimeter PCM analytical results shall remain at or below the pre-abatement levels. If perimeter thresholds are exceeded the Abatement Contractor shall stop work and initiate corrective action. The Abatement Contractor shall not be permitted to resume work until perimeter air monitoring documents fiber concentration at or below pre-abatement levels.

D. Work Practices as a Function of Airborne Fiber Concentrations

1. At any time, should air samples reach or exceed airborne fiber concentrations specified below, abatement work must stop, change respirators (if necessary), and initiate cleaning. Construction of NPE and three-stage decontamination facility shall occur following cleaning as approved by the Government's Representative. Removal or repair procedures shall not be resumed until the fiber count is reduced below the airborne fiber concentration specified below, and the Government's Representative authorizes resumption of the abatement work.

E. Following is the Abatement Contractor's required sample collection frequency for each work area and associated fiber concentration control limits.

**Table 1: Contractor Monitoring Schedule and Airborne Fiber Concentrations**

Area/Person to be Sampled	Samples per 8-hour shift	Minimum Sample Volume	Control Limit Concentration fibers/cubic centimeter (f/cc)
"Most Contaminated Worker" Peak	1	30 liter	0.5 x Respirator Protection Factor (RPF)
"Most Contaminated Worker"	2	240 liter	0.5 x RPF
Inside Work Area	1	960 liter	0.5 x RPF
Outside Work Area, Adjacent Control Area	1	1200 liter	0.01 or Pre-abatement, whichever is higher
Non-aggressive Intact Worker or Outdoor Removal Worker	1	560 liter	0.015 or 0.005 above Pre-abatement, whichever is higher
HEPA Exhaust	1	1200 liter	0.01 or Pre-abatement, whichever is higher

F. PCM Monitoring after Final Cleanup: Contractor shall collect a minimum of four (4) air samples per interior work area will be taken following initial and final cleanup. Analytical results from final air tests must be less than 0.01 fibers/cc or the pre-abatement level, whichever is greater, as determined by NIOSH Method 7400, Phase Contrast Microscopy. If for any reason fiber concentrations of final air tests are indeterminate, including failed visual

clearance, excessive particulate loading, analytical results shall be rejected and shall be considered the same as if fiber concentrations exceeded the clearance standard.

#### 1.05 APPLICABLE CODES, REGULATIONS, AND PUBLICATIONS

- A. All applicable codes, regulations, and standards have the same force and effect, and are made a part of the contract documents as if copied directly into the contract documents, or as if published copies are bound herewith. The Abatement Contractor is responsible and liable for full compliance with all applicable federal, state, and local regulations.
- B. Safety Compliance: In addition to detailed requirements of this specification, comply with all safety related laws, ordinances, rules, and regulations, including those pertaining to storing, transporting, and disposing of asbestos waste materials. The Abatement Contractor shall comply with 40 CFR Part 61. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification and referenced documents vary, the most stringent shall apply.

#### 1.06 EQUIPMENT

The Contractor shall use equipment that is clean and in good working order and meets applicable agency approval. Equipment deviations shall be submitted to the Government's Representative for approval. All such submittals must be accompanied by U.S. Department of Labor approval. Contractor shall allow Government's Representative to inspect any materials and equipment used during the project for suitability and/or condition.

### PART 2 PRODUCTS

Not Used

### PART 3 EXECUTION

#### 3.01 INSPECTION

- A. Site Inspection: While performing asbestos related work, the Abatement Contractor shall be subject to onsite inspection by the Government's Representative who may be assisted by safety or health personnel. If work is found to be in violation of this specification, as determined by the Government's Representative, a stop work order shall be in effect immediately and remain in effect until the violation is resolved. Standby time, and any additional monitoring and laboratory analyses required to resolve and document violation resolution, shall be at the Abatement Contractor's expense.
- B. Negative Pressure Enclosure Inspections: All NPE (including mini-NPE) shall be inspected and smoke tested daily by the Abatement Contractor. Visual inspections by Government's Representative will be at the Government's Representatives sole discretion. The Abatement Contractor is required to notify the Government's Representative a minimum of 24 hours prior to an initial NPE visual inspection. Removal work in a NPE shall not commence until Government's Representative inspects and accepts initial NPE construction or accepts documentation of Abatement Contractor's inspection.
- C. NPE Construction: Satisfactory completion of the following standard procedures and checks shall constitute acceptable NPE construction and inspection documentation.
  - 1. Negative Air Machines are sized and placed strategically to ensure airflow is strong and consistent throughout the enclosure, as evidenced by work area schematic drawings and subsequent smoke testing.
  - 2. A minimum of four (4) air exchanges per hour will be maintained in the NPE, as calculated by the Abatement Contractor, reviewed, and accepted by the Government's Representative. Negative air machines cubic feet per minute (cfm) capacity shall be conservatively calculated based on 75% of rated capacity. Such that a Negative Air



Machine rated at 2,000 CFM shall be calculated to have a 1,500 cfm capacity (25% less capacity).

3. Visual inspection and smoke tests shall indicate that critical barriers, openings, and surfaces are sealed properly and that no enclosure breaches have occurred.
  4. A minimum of -0.02 column inches of water pressure differential shall be maintained within the NPE as evidenced by manometric measurement (a continuous strip chart readout for each NPE or mini-NPE must be available for inspection and submitted as part of post-work documentation).
  5. Smoke testing all corners and pockets of the enclosure document strong and consistent airflow towards HEPA filtration or collection device.
  6. Record the person's name and Negative Air Machine hours each time a pre-filter or HEPA filter is replaced.
- D. Transmission Electron Microscopy for Contract Disputes: If TEM is used to determine fiber types in order to resolve a dispute or receive final clearance, and then the cost of such analysis will be borne by the party requesting use of TEM analysis.

### 3.02 PREPARATION OF WORK AREAS

#### A. Work Area Preparation

1. Establish regulated areas in accordance with WAC 296-62-07711. At a minimum, seal off all critical barriers and openings with two (2) layers of 6-mil thickness polyethylene sheeting before commencing abatement work.
2. Build airlocks at entrances to and exits from any NPE work areas.
3. Maintain emergency and fire exits from the work areas, or establish alternative exits.
4. Respirator protection shall be in accordance with WAC 62-07715.
5. Wipe clean with cloths and amended water or HEPA filtered vacuum all objects to be removed from the work area. Government's Representative will designate storage areas.
6. The Abatement Contractor is responsible for transportation of objects from the work area to designated storage areas.
7. Institute engineering control work practices in accordance with WAC 296-62-07712.

### 3.03 ASBESTOS CONTAINING MATERIAL REMOVAL

- A. Removal Work: Perform all removal work in accordance with WAC 296-62-077. All ACM shall be containerized and secured at the end of each workday. For purposes of this specification, WAC 296-62-07751, Appendix I - *Work Practices and Engineering Controls for Class I Asbestos Operations* shall be mandatory for all Class I work. No debris, unsecured equipment, tools, etc. shall remain onsite past the end of each workday.
- B. Fiber Concentrations: Fiber concentrations, as described in the "Contractor Monitoring Schedule and Airborne Fiber Concentration" table, shall not be exceeded during the work. If airborne fiber concentrations are exceeded, Abatement Contractor must stop work and commence area cleaning.
- C. Class II Work: For Class II abatement, at a minimum, critical barriers shall be placed over all openings to the regulated area, and the Abatement Contractor shall conduct perimeter area monitoring around the restricted work area during abatement activities. All employees shall be trained in accordance with Washington Labor and Industries requirements pertinent to Class II work and a "competent person" shall be onsite during all Class II operations. If abatement is going to be conducted by mechanical means, then the work shall be conducted within an NPE.

### 3.04 WASTE REMOVAL FROM THE WORK AREA

Gross Removal Debris: Gross asbestos debris shall be bagged by the end of each workday. ACM removed from work areas shall be sealed in clean impermeable disposal bags of 6-mil thickness immediately upon removal. External surfaces of bags shall be thoroughly cleaned in designated work area by wet sponging. Move bags into wash area, wet clean each bag thoroughly, place, and seal in a second clean impermeable 6-mil bag, place bags in labeled containers for transport. Move containers to holding area pending removal to uncontaminated areas and transportation to landfill. Ensure that containers are removed from the holding area by workers dressed in clean coveralls who have entered from the equipment/waste load-out decontamination station or adjacent clean area. Ensure that workers do not enter from contaminated areas into the clean room during any phase of project performance. All personnel handling ACM shall wear protective clothing and respiratory protection.

### 3.05 CLEANUP OF WORK AREAS

Clean Up: After completion of gross removal work, remove visible accumulations of asbestos material and debris. Surfaces from which asbestos has been removed shall be wire brushed, and/or wet sponged, or cleaned by an equivalent method to remove all visible material. During this work, the surfaces being cleaned shall be kept wet. During cleaning operations, critical barriers, such as windows, doors, and HVAC vents and protective barriers shall remain sealed, and any HEPA filtration negative air pressure systems, air filtration and decontamination enclosure systems shall remain in service. ACM specified to remain in the work area shall be encapsulated with bridging encapsulant approved by the Government's Representative. Manufacturer's encapsulation instructions shall be strictly observed. Government's Representative shall approve deviation from Manufacturer's instructions.

1. Clean all other surfaces in the work area and any other contaminated areas with water and/or with HEPA vacuum equipment. After cleaning the work area, allow surfaces to dry completely (6 hours minimum). After a drying period, again wet clean or clean with HEPA vacuum equipment all surfaces in the work area. After completion of the second cleaning operation, the Government's Representative or his assigned designee may perform a visual inspection of the work area to ensure that the work area is free of remaining ACM, suspect ACM debris, and dust.
2. If the area passes visual inspection, the Government's Representative or his assigned designee may collect discretionary air samples to verify that the work area is substantially free of airborne fiber. Sealed containers and all equipment used in the work area shall be included in the cleanup and shall be removed from work areas, via the decontamination enclosure system, at an appropriate time in the cleaning sequence.
3. When the inspection and discretionary sampling indicates that the removal and cleanup performance is satisfactory and complete all exposed surfaces shall be sealed with an approved penetrating encapsulant. Manufacturer's encapsulation instructions shall be strictly observed. The Government's Representative must approve deviation from Manufacturer's instructions.
4. Following a period sufficient to allow the encapsulant to dry completely (8 hours minimum), remove plastic sheeting covering walls, floors, and dispose of as contaminated materials. Critical barriers including plastic sheets covering doors, vents, windows, air plenum grills, and the decontamination system barriers will be left in place during final (aggressive) air testing. Surfaces exposed by the removal of plastic sheeting on walls and floors will be thoroughly cleaned.
5. The Government's representative may conduct final inspections on each work area. When final inspection and air testing determines that the area is free of visible accumulations of dust and ambient air is within control limits for "clean air," the decontamination enclosure systems shall be removed; the area thoroughly wet cleaned; and materials from the equipment and shower rooms disposed of as contaminated waste. A final check shall be carried out to ensure that no dust or debris remains on surfaces

because of dismantling operations. Objects that were removed prior to abatement shall be relocated to the clean work area.

### 3.06 WASTE DISPOSAL

- A. Asbestos Containing Materials and Asbestos Contaminated Waste: Transport sealed and labeled containers in a vehicle compartment completely enclosed with two (2) layers of 6-mil polyethylene sheeting. Transport waste for disposal to the authorized site regularly, so that available onsite storage capacity is not exceeded. Frequency of transportation shall be at a minimum once a week. Procedures for transport and disposal shall comply with 40 CFR 61 Subpart M (NESHAP) 49 CFR Subchapter C (HMTA) and state, regional, and local standards and regulations.
- B. Landfill Criteria: Dispose of undamaged and sealed containers only at the approved disposal site. If containers become broken or damaged during transportation, the damaged containers must be placed in a sealed drum and the entire contaminated drum must be buried. All ACM waste shall be disposed at a facility permitted under 40 CFR Subchapter I to accept asbestos waste.
- C. Disposal Documentation: Submit Waste Shipment Record (WSR) documentation including name and address of landfill, name of landfill employee authorized to accept asbestos waste, quantity of waste removed from work site, and quantity of waste disposed of at the landfill. The WSR shall be signed by the receiving facility.
- D. Hazardous Waste: If hazardous waste is generated, all documentation of waste characterization, transport, and disposal shall be submitted to the Government's Representative.

END OF SECTION 028200



## DIVISION 07 – THERMAL AND MOISTURE PROTECTION

### SECTION 074113 – METAL ROOF PANELS

#### FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

### SECTION 074113 – METAL ROOF PANELS

#### PART 1 GENERAL

##### 1.00 GREEN PROCUREMENT PROGRAM

Fairchild Air Force Base has adopted the Green Procurement Program Plan regarding recycling and conserving resources. The Plan requires that some construction materials be composed of a minimum percentage of recycled products. See Section 016000, Product Requirements, for details.

##### 1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

##### 1.02 DESCRIPTION OF WORK

Furnish and install complete, a preformed, prefinished, metal roofing system. System includes panels, concealed fasteners, brackets, clips, anchoring devices, structurals, spacers and trim, caps, flashing, closures, joint sealer, and other components needed for a complete, permanently weatherproof installation.

##### 1.03 QUALITY ASSURANCE

- A. All proposed roofing systems shall meet or exceed all physical properties of the system specified.
- B. The installer of the system must be approved by the manufacturer.
- C. The installer of the system must at all times have a representative on site who is completely familiar with entire system and who has experience in a minimum of three projects of similar size and scope.
- D. Manufacturer's specifications or instructions for installing materials, equipment or other appurtenances furnished as part of this contract shall govern the installation except as modified herein and as shown on the drawings.
- E. Except as otherwise indicated or recommended by panel manufacturer for superior performance of the work, comply with applicable recommendation and details of the "Architectural Sheet Metal Manual" by SMACNA.

##### 1.04 SUBMITTALS

- A. Manufacturer's Data: Submit copies of specifications, standard detail drawings and installation instructions. Include manufacturer's certification substantiating that materials and finishes comply with the specifications and drawings. Indicate by copy of transmittal that the installer has received a copy of the installation instructions.

- B. Samples: Submit two-2 foot long by full width samples of preformed metal roofing, 2 fastening clips and 12 fasteners. Submit sealant and sealant tape (one tube and one linear foot of tape) and one full size, top and bottom neoprene closure. Submit one prefabricated pipe flashing. Samples shall become property of the Government.
  - C. Shop Drawings: Submit shop drawings showing purlin spacing and attachment, clip spacing and attachment, profile of preformed metal roofing details of formings, anchorages, jointing, trim, flashings and accessories. Show details of edges, terminations and all penetrations. Show small scale layout of entire work.
  - D. Submit newly prepared information, drawn to accurate scale. Shop drawings shall include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:
    - 1. Dimensions.
    - 2. Identification of products and materials included.
    - 3. Compliance with specified standards.
    - 4. Notation of coordination requirements.
    - 5. Notation of dimensions established by field measurement.
  - E. Quality Assurance Data: Written designation and verification of items listed in paragraph 1.03, B and C.
  - F. Certificates: Certificates attesting that the panels and accessories furnished conform to the requirements specified shall be provided. Certificate for the roof assembly furnished shall certify that the assembly complies with the material and fabrication requirements specified and is suitable for the installation at the indicated design slope.
  - G. Additional Data: Submit verification of items listed in paragraph 2.01.J.
- 1.05 APPLICABLE PUBLICATIONS
- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
    - 1. American Iron and Steel Institute (AISI) Publication
      - a. ANSI S100-12, Cold-Formed Steel Design Manual, 2013 Edition
    - 2. ASTM International Publications
      - a. A653-04a Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
      - b. A463-02a, Standard Specification for Steel Sheet, Aluminum Coated, by the Hot-Dip Process.
      - c. A792-03, Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
      - d. B117-03, Standard Practice for Operating Salt Spray (Fog) Apparatus
      - e. D4214-98 Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
      - f. D714-02, Standard Test Method for Evaluating Degree of Blistering Paints.
      - g. D968-93(2001), Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
      - h. D522-93a (2001), Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.

- i. D2244-02e1, Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
  - j. D2247-02, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
  - k. E96-00e1, Standard Test Methods for Water Vapor Transmission of Materials.
3. Underwriter's Laboratories, Inc., (UL) Publication
- a. UL 580, Tests for Uplift Resistance of Roof Assemblies.

## PART 2 PRODUCTS

### 2.00 MATERIALS

- A. Provide preformed metal roofing having as a minimum, the following characteristics:
- 1. Preformed metal roof panels shall match all salient characteristics found in AEP Span, "Design Span HP. It shall be a performance-rated structural standing seam, concealed fastener metal roof panel system.
  - 2. Gauge: 24 steel conforming to ASTM A653, minimum yield 33,000 psi.
  - 3. Pattern: Standing seam with configuration for connecting adjacent sheet panels by interlocking standing seam profile to secure adjacent sheet panels. Panels shall have subtle striations for a clean pan.
  - 4. Rib Depth: 1-3/4", snap locked. Mechanically field crimped is not acceptable.
  - 5. Panel Width: 16"
  - 6. Lengths: Maximum length from ridge to eave with no panel splices.
- B. Coating: Galvanized, conforming to ASTM A653, minimum 0.90 oz of zinc per square foot, total both sides; aluminized, conforming to ASTM A463, minimum 0.65 oz of aluminum per square foot, total both sides, or Galvalume, conforming to ASTM A792, minimum 0.55 oz of aluminum-zinc alloy per square foot.
- C. Exterior and Interior Paint Finish: Provide corrosion-resistant primer and Polyvinylidene Fluoride (PVF2) finish coat (70% Kynar 500). Exterior color shall be an approved match of Sherwin-Williams paint color "Spanish Moss" #SW2070 (AEP Span Color "Cool Weathered Copper". The interior and exterior color finish shall meet the test requirements specified below. The manufacturer shall have conducted tests on previously manufactured sheets of the same type and finish as proposed for the project. The term "appearance of base metal" refers to the metal coating on steel base metal.
- D. Salt Spray Test: A sample of the sheets shall withstand a salt spray test for a minimum of 1000 hours in accordance with ASTM B177, including the scribe requirements in the test, the coating shall contain blisters larger than No. 8 on no more than 20% of exposed area.
- E. Formability Test: When subjected to a 180- degree bend over a 1/16" diameter mandrel in accordance with ASTM D522, exterior coating film shall show no evidence of fracturing to the naked eye.
- F. Accelerated Weathering: Chalking resistance and Color Change: A sample of the sheets shall withstand a weathering test a minimum of 2000 hours in accordance with ASTM G23, using a Type D apparatus, without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with a pen-knife blade or similar instrument shall be considered as an area indicating loss of adhesion. After the 2000-hour weatherometer test, exterior coating change shall not exceed 2 NBS units in accordance with ASTM D2244.

- G. Humidity Test: When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage, or corrosion.
- H. Abrasion Resistant Test: When subjected to the falling sand test in accordance with ASTM D968, the coating system shall withstand a minimum of 30 liters of sand before the appearance of the base metal.
- I. Fastening System: Concealed, galvanized, 18 gauge steel clips formed to accommodate expansion and contraction without detrimental effect on roof panels. Conform to ASTM A653 Grade A. Provide end-lap backer plates to stiffen joints and provide more thickness for fastening screws.
- J. Uplift Rating: Underwriters Laboratories Class 90 wind uplift performance: Since UL 580 standard test does not represent installed conditions, provide additional engineering to insure the necessary additional safety factors are used to govern the actual installation. Assure the complete roof system assembly is detailed to represent actual field installed conditions.
- K. Preformed End Closures: Waterproof semi rigid cross linked polyethylene foam shaped to fit tightly the panel configuration. Molded closure strips shall be closed-cell or solid cell synthetic rubber or neoprene, or polyvinyl chloride pre-molded to match configuration of the covering and shall not absorb or retain water.
- L. Sealants: Provide sealant type to be factory applied into the female lapping rib of the standing seam panel. Minimum service life of 20 years. In addition, provide gunnable sealant for field conditions to meet Fed Spec TT-S-00230C.
- M. Miscellaneous Accessories: Except as noted on the drawings and in the specifications, fabricate trim, fascia, closure pieces, ridge, rakes, flashings, gutters, downspouts, etc., from 24 gauge (minimum) metal, finish same as roof panels where exposed to view from grade, color to match Sherwin-Williams' color #SW2070, "Spanish Moss" (AEP Span Color "Cool Weathered Copper". Provide a complete and waterproof installation. Provide attachment hardware as necessary.
- N. Snow guards: Provide at roof eaves above (at a minimum) all walkways, entries, exits, etc. Extend snow guard at least 3 feet beyond each edge of walking surface. Match finish and color of roof panels. Snow guard system shall match all salient characteristics equal to S-5! Colorgard Component System. The system shall be attached without penetrating the metal panel roof system.
  - 1. Standard clamps shall be compatible with the roof panel profile.
  - 2. Colorgard cross members lengths shall be a minimum of 8'-0", with compatible Colorgard splices. Cross members shall be "punched", and have slotted holes at 4-inches on center. They shall be compatible with the standard clamps.
- O. Flashings:
  - 1. Custom fabricated from material same as roof panels conforming to standards set forth in SMACNA, 24 gauge unless otherwise noted.
  - 2. Dissimilar materials will not be allowed.
- P. Fasteners: As recommended by the system manufacturer, zinc coated or cadmium plated steel, where hidden or concealed. Provide stainless steel with weather seal washers where exposed. The system shall have no fasteners penetrating the panels except at the ridge and/or cove.
- Q. Insulation: Comply with requirements found in Washington State Energy Code, WAC 51-11C (current version).
- R. Felt/Paper: Provide 30 lb asphalt saturated felts conforming to ASTM D226-77 and rosin sheathing paper.

## PART 3 EXECUTION

### 3.00 INSTALLATION

- A. Fasten clips with appropriate fasteners to provide wind uplift ratings as specified.
- B. After installation of decking, cover surface with one ply 30 lb asphalt saturated felt and rosin paper. Apply in shingle fashion. Provide two-inch side lap and four-inch end lap. Fasten as recommended by the insulation manufacturer.
- C. Install roofing system in strict accordance with manufacturer's written instructions, except as modified herein. Sheets or panels shall have approved sidelap with top sheet lap facing away from prevailing weather. Install metal closures at exposed end openings of all sheets.
- D. Flashing attachment and caps shall be mechanically fastened and sealed per manufacturer's recommendations. Install doubled (two) neoprene closures under all flashings to fill voids in roof panel trays. Embed neoprene closures in full width sealant on both top and bottom. Notch metal flashings perpendicular to ribs.
- E. Prefabricated pipe flashings shall be installed in the flat planes of the panel, and not on ribs. Provide piping offsets as necessary to accommodate this requirement. Flashings shall also be installed so as not to impede the flow of water or to dam water on the roof.
- F. Gutters and downspouts shall be of configuration and location as shown on the drawings. Provide gutters in accordance with current edition of SMACNA Architectural Sheet Metal Manual. Provide maximum practical length of gutter served by a downspout, but no greater than 50'-0". Downspouts shall be semi-open faced, except at elbows and transitions. Provide internal water diverters to transition water from closed to open faced portions to prevent water from escaping at the open faced lengths. In no case shall downspouts discharge directly onto pedestrian walkways or pavements. Insides exposed to view shall be finished to match exterior color of downspouts.
- G. Sweep roof of all debris on completion of installation. Job shall be left clean and in a workmanlike and weather tight condition.

### 3.01 GUARANTEE

- A. Prior to acceptance of work, furnish manufacturer's commercial 20-year material performance warranty. Limit to ordinary wear and tear by the elements or defects due to faulty materials and workmanship. In addition, provide a warranty of construction as shown at the end of this section.

### 3.02 PERFORMANCE AGREEMENT SIGN

- A. Provide 24" X 24" minimum size painted aluminum sign. Provide white background color and black copy. Use paint compatible with the aluminum. Copy shall be as shown on the drawings. Permanently mount sign located in the location as directed by the Contracting Officer.

### 3.03 PERFORMANCE AGREEMENT

- A. FAR 52 246-21, Warranty of Construction, is a part of this contract. The requirements of the performance agreement are in addition to the requirement of that clause for the first year from the date of final acceptance. Also, the performance agreement remains in effect for four years thereafter. If the Contractor fails to make required repairs during the performance period, the Government may have the work done by others and charge the cost to the Contractor. The warranty provisions of the contract apply notwithstanding Government inspection and acceptance. For five years from date of final acceptance, the Contractor agrees to inspect, locate and make emergency repairs to defects and leaks in the roof system within 24 hours of receipt of notice from the Contracting Officer. Thereafter, as soon as weather permits, the Contractor agrees to permanently repair the affected areas by restoring them to the standard of the contract, without cost to the Government. However, the Contractor will not be required to make any repairs if it is determined that these leaks or



defects were caused by abuse, or by lightning, hurricane, tornado, hail storm, or other unusual natural phenomena or failure of related work installed by others. Receipt of notice from the Contracting Officer is evidence that the Contracting Officer has had the roof examined and determined that none of the above causes apply and the Contractor is obligated to make the repairs. The Contracting Officer's decision is conclusive. However, the performance agreement does not operate to obligate the surety after completion of work and final payment, except as provided for in FAR 52 246-21 and the Miller Act as amended (40 USC 270).

#### WARRANTY OF CONSTRUCTION

PROJECT NO. \_\_\_\_\_

CONTRACT NO. \_\_\_\_\_

FINAL ACCEPTANCE DATE: \_\_\_\_\_

END OF PERFORMANCE AGREEMENT DATE: \_\_\_\_\_

FIRM: NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

TELEPHONE #: \_\_\_\_\_

CONTRACTOR'S: SIGNATURE: \_\_\_\_\_

PRINTED/TYPED: \_\_\_\_\_

DATE: \_\_\_\_\_

CONTRACTING OFFICER'S: SIGNATURE: \_\_\_\_\_

PRINTED/TYPED: \_\_\_\_\_

DATE: \_\_\_\_\_

END OF SECTION 074113

Note: NOTE: Incorporate the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.



## DIVISION 08 – OPENINGS

### SECTION 087100 – DOOR HARDWARE

#### SPECIFICATION GUIDELINE

#### SECTION 087100 – DOOR HARDWARE

##### SPECIFICATION GUIDELINE

Contact: Gerald Aguiar  
Title: Structures Foreman  
Phone: 509.247.8446  
Email: gerald.aguiar@us.af.mil

The purpose of this attachment is to support the facility's building standards for door hardware. The facility maintains the following hardware and is currently stocking replacement parts. The products listed in this booklet are to be used without substitution on new construction and modernization projects unless products are listed in this package as an alternate.

It is the intent of this booklet to provide guidelines for the architect's specification section 08710, for product groups and the hardware schedule. It remains the architect's responsibility to coordinate these products to meet the applicable building codes, life safety codes, and ADA requirements.

Section 08710 door hardware preamble must specify the following:

##### Door and frame prep

Before hardware installation, verify that all doors and frames are properly prepared to receive the specified hardware. Hollow metal frames shall be prepared for ANSI strike plates per A115.1-2 (4-7/8" high), hinge preps will be mortised and reinforced with a minimum of 10 gauge reinforcement material; minimum of 14 gauge reinforcement material for closer. Hollow metal doors shall be properly prepared and reinforced with a minimum of 16 gauge material for either mortised or cylindrical locks as specified. It is preferred that all hollow metal doors receiving door closers have 14 gauge reinforcement. If this is not possible, the use of sex bolts is mandatory. Wood doors shall be factory prepared to receive the scheduled hardware.

##### Hardware installation

The manufacturer's representative for the locking devices and closing devices must inspect and approve, in writing, the installation of their products. Hardware installed incorrectly must be reported to the architect prior to the architect's final punch list.

**Hanging Devices**

Continuous Hinge	Pemko	Pemko FM HD Full Mortise, Heavy-Duty Geared Hinge	
Alternate	Markar		
Mortise Hinge	Hager	BB1199 SS/ NRP (Heavy use exterior doors) BB1168 (Heavy use interior doors) BB1279 (Interior Doors) Non Removable Pin (NRP) at interior out-swing doors	626 652 652
Alternate	Bommer		

**Securing Devices**

Lock Set	Best	Cylindrical, 9K Series, Trim 15D Deadbolt 8T Series No substitutions, Grade 1. Must meet or exceed 4,000,000 cycles in accordance with ANSI Standard 156.2 Operational Reliability Cycle Test.	626
Alternate	Schlage	Minimum Warranty: 7 years	
Key System	Best	Removable/Interchangeable Core Visual Key Control – Keys Stamped “Do Not Duplicate” Stamp Keys, Stamp Cores, 7-pin SFIC (Existing System)  Facility Standard, No substitutions. All cores and keys must be pinned and cut to the existing Best factory masterkeyed system. 2 keys per core.	
		Provide Knox Box flush mount	
Padlock	Best	21B7220-L include 4 per project	626
Alternate	No Substitution		
Exit Device		Von Duprin 98 Series	
Alternate	Precision Apex 2000	2403CD x 2003C (single door, narrow stile, exterior) 2401CD x 2001 X 2403CD x 2003C x KR822 (pr, narrow stile, ext.) 2103CD x Trim (at single door, exterior) 2101CD x 2103CD x NL Trim X KR822 (at pairs, exterior) FL2108 x 4908A (rated single doors) FL2101 X FL2108 x 4908A x FLKR822 (rated pairs) N674DA-3 Dummy push bars at vestibule doors	630 630 630 630 630 630 630
		<ul style="list-style-type: none"> <li>• All non-rated exit devices to have cylinder dogging</li> <li>• Keyed removable mullions</li> <li>• “ALK” option when specified</li> <li>• Install using SNB for all exit devices</li> <li>• LBR at all interior fire rated corridor openings</li> <li>• Vandal resistant lever</li> <li>• Lever style to match lockset</li> <li>• Install using SNB for all exit devices</li> </ul>	

LBR at all interior fire rated pair openings Grade 1. Must meet or exceed 10,000,000 cycles in accordance with ANSI Standard 156.13 Operational Reliability Cycle Test. Minimum Warranty: 5 years

Coordinator	Trimco	3094 Series x 2/3095 /or/ 3096 • Use coordinator where required by fire code	600
Automatic Flush Bolts	Trimco	3810 x 3810 (Automatic) (metal doors) 3815 x 3815 (Automatic) (wood doors)	626 626
Manual Flush Bolts	Trimco	3917 (Manual) (metal doors) 3913 (Manual) (wood doors)	626 626

### **Closing Device**

Surface Closer	LCN 4000 Series	• No substitutions, tri-pack mounting, non-handed. • Minimum Warranty: Lifetime Mechanical Warranty	
Alternate	Stanley QDC100	• All door frames to be reinforced • Allow for maximum swing of doors • All closers shall have a lifetime warranty	

### **Stops & Holders**

Door Stop	Trimco	1270 CXCP Wall Stop (Interior) 1211 -Floor Stop (Interior) 1214CK –Floor Stop (Exterior) • Allow for maximum swing of doors • Backing required at wall stops	626 626 626
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### **Accessories**

Push / Pull Bars	Trimco	1729	630
Push / Pull Plate	Trimco	1001 x 1017-3B	630
Armor Plate	Trimco	KO050 40" x 2" LDW x B3E x CSK (Single doors) KO050 40" x 1" LDW x B3E x CSK (Pair doors)	630 630
Kick Plate	Trimco	KO050 10" x 2" LDW x B3E x CSK (Single doors) KO050 10" x 1" LDW x B3E x CSK (Pair doors)	630 630
Mop Plate	Trimco	KO050 4" x 2" LDW x B3E x CSK (Single doors) KO050 4" x 1" LDW x B3E x CSK (Pair doors)	630 630
Threshold	Pemko	171A (1/2" x 5" Saddle threshold) • Architect to coordinate with project conditions	MIL
Smoke Seal	Pemko	S88	
Weather Seal	Pemko	305CS (at head and jambs) 18061 (at sill on door – surface mount)	628 628
Astragal	Pemko	355CS	628

Meeting Stile	Pemko	303CV	628
Drip Guard	Pemko	346C x 4" ODW (Exterior doors exposed to rain)	628
Door Silencer	Trimco	1229A (Metal Frames) 1229B (Wood Frames)	Gray Gray

**STANDARD FEATURES**

- **For All Stainless Steel Components - Prefix N**
- Non-handed/reversible
- Single point hold-open in increments of 5° from 85° to 110°
- Hold-open knob can be disengaged to act as a stop only
- 5° to 7° shock compression following hold-open point
- Steel shock absorbing spring
- Die cast end block and shock block
- Maximum opening 110°, minimum door thickness 1 3/4"
- Both wood and machine screws included
- Available in all BHMA plated and sprayed finishes

**All Stops  
Warnock Hersey  
listed**

**WHEN ORDERING,  
please list:**

Model number

Door closer number or other hardware

Mounting means of the door and butt size

Hold-open or dead-stop degree

Door opening and thickness

Finish

**SPECIFICATIONS:**

**Stop only function to be Warnock Hersey listed as manufactured by ABH.**

**Material:**

steel or stainless steel channel 3/32" thick and 1 1/8" depth; arm 1/4" thick and 1" wide; jamb bracket 1/4" thick and 1" wide; sliding block shall have easy access for tension adjustment.

**STAINLESS STEEL SPECIFICATIONS:**

All parts stainless steel as manufactured by ABH

DOOR OPENING		HOLDER NUMBER		
BUTTS OFFSET PIVOTS	CENTER HUNG	HOLD- OPEN	STOP	FRICTION
27" - 29 15/16"	30" - 32 15/16"	1011	1021	1031
30" - 35 15/16"	33" - 38 15/16"	1012	1022	1032
36" - 39 15/16"	39" - 42 15/16"	1013	1023	1033
40" - 43 15/16"	43" - 46 15/16"	1014	1024	1034
44" + Greater	47" + Greater	1015	1025	1035
BHMA NUMBER		C01511	C01541	C01531
FED. SPEC TYPE		1160	—	

Contact ABH for special templating or other door opening  
Average weight/unit 6 lbs.

**STANDARD FEATURES**

- **For All Stainless Steel Components - Prefix N**
- Field adaptable functions
- Non-handed/reversible
- Single point hold-open in increments of 5° from 85° to 110°
- Automatic hold-open and release by push and pull on door
- Friction holder can be adjusted easily on site at any position and held under adjustable pressure
- Maximum opening 110°, minimum door thickness 1 3/8"
- Wood and machine screws included
- Available in all BHMA plated and sprayed finishes

**All Stops  
Warnock Hersey  
listed**

**WHEN ORDERING,  
please list:**

Model number

Door closer number or other hardware

Mounting means of the door and butt size

Hold-open or dead-stop degree

Door opening and thickness

Finish

**SPECIFICATIONS:**

**Stop only function to be Warnock Hersey listed as manufactured by ABH.**

**Material:**  
Channel-steel/stainless steel 3/4" deep, 3/4" wide and .050 thick; arm-stainless steel/steel/brass 3/4" wide and 3/16" thick; jamb bracket 3/4" wide, 3/16" thick and 2 7/8" long; hold-open mechanism with sliding block will engage or release door by push or pull. **Hold-open mechanism can be disengaged to function as stop only.**

DOOR OPENING		HOLDER NUMBER		
BUTTS OFFSET PIVOTS	CENTER HUNG	HOLD- OPEN	STOP	FRICTION
18" - 23 15/16"	—	4011	4021	4031
24" - 29 15/16"	—	4012	4022	4032
30" - 35 15/16"	32" - 37 15/16"	4013	4023	4033
36" - 48"	38" - 48"	4014	4024	4034
BHMA NUMBER		C04511	C04541	C04531
FED. SPEC TYPE		1166	1166A	1164

Contact ABH for special templating or other door opening  
Average weight/unit 1 3/4 lbs.

**STANDARD FEATURES**

- **For All Stainless Steel Components - Prefix N**
- Field adaptable functions
- Non-handed/reversible
- Automatic hold-open and release by push and pull on door
- Hold-open can be disengaged to act as stop only
- Friction holder can be adjusted easily on site at any position and held under adjustable pressure
- Maximum opening 110", minimum door thickness 1 3/8"
- Wood, machine screws included
- Available in all BHMA plated and sprayed finishes

**All Stops  
Warnock Hersey  
listed**

**WHEN ORDERING,  
please list:**

Model number

Door closer number or other hardware

Mounting means of the door and butt size

Hold-open or dead-stop degree

Door opening and thickness

Finish

**SPECIFICATIONS:**

**Stop only function to be Warnock Hersey listed as manufactured by ABH.**

**Material:**  
Channel-stainless steel/steel/brass 3/4" deep, 3/4" wide and .050 thick; arm-steel/brass/stainless steel 3/4" wide and 3/16" thick; bronze jamb bracket 3/4" wide, 3/16" thick and 2 7/8" long; hold open mechanism with sliding block will engage or release door by push or pull.  
**Hold-open mechanism can be disengaged to function as stop only.**

DOOR OPENING		HOLDER NUMBER		
BUTTS OFFSET PIVOTS	CENTER HUNG	HOLD- OPEN	STOP	FRICTION
18" - 23 15/16"	22" - 27 7/16"	4411	4421	4431
24" - 29 15/16"	27 1/2" - 33 7/16"	4412	4422	4432
30" - 35 15/16"	33 1/2" - 38 15/16"	4413	4423	4433
36" - 48"	39" - 48"	4414	4424	4434
BHMA NUMBER		C05511	C05541	C05531
FED. SPEC TYPE		1166	1166A	1164

Contact ABH for special templating or other door opening  
Average weight/unit 1 3/4 lbs.





### 1E Rim Cylinder

Standard rim cylinder applications require the use of Best's 1E rim cylinder series. Best rim cylinders are interchangeable with other manufacturers' rim cylinders. Best rim cylinders are machined from solid bar stock and are available in a variety of finishes. The standard package for the Best rim cylinder includes cylinder, 1E-R3 and 1E-R5 rings, 1E-S2 spindle, clamp plate and clamp plate screws. Best rim cylinders feature the Best interchangeable core and may be masterkeyed into any existing Best system.



### Specifications

Cylinder Nomenclature	Dimension "A"	Door Thickness
1E-62	1 $\frac{3}{16}$ "	1" to 2 $\frac{3}{4}$ "
1E-72	1 $\frac{11}{32}$ "	1 $\frac{1}{4}$ " to 3"


Cylinder diameter - 1  $\frac{5}{32}$ "

To order: see below example: 1E72-S2-RP-626



### Standard 1E74 Mortise Cylinder

Best 1E74 mortise cylinders are supplied as standard on 34H/35H mortise locksets. Special cylinder variations are available for most applications. Best cylinders are machined from solid brass or bronze bar stock. Additional security is provided by a set screw that mounts diagonally into the cylinder wall. This set screw prevents unauthorized removal of the cylinder without use of the control key.

Function & Diag. BHMA#	Deadbolt operated by:
<b>*K-Cylinder Deadlock</b>  EO6071	<ul style="list-style-type: none"> <li>Rotating the inside thumb turn rosette,</li> <li>Turning the outside key.</li> </ul>

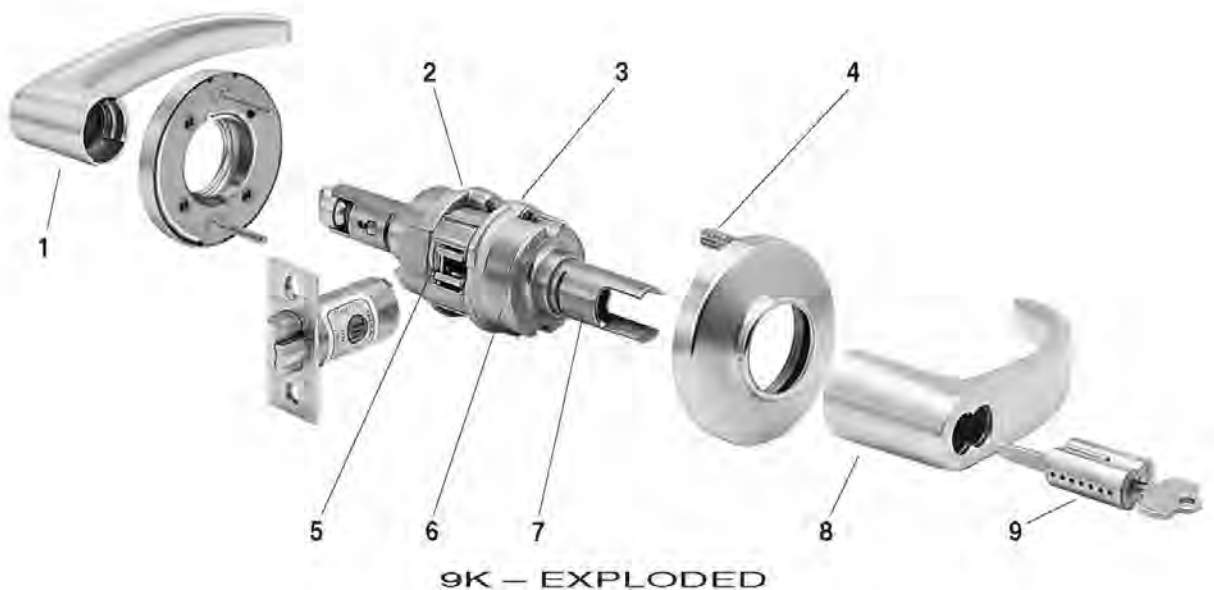
### HOW TO ORDER - 48H/49H SERIES

48H Series	7 Core Housing	K Function Code	S1 Strike	626 Standard Finishes	Options
48H- standard	0-less cylinder (48H only)	K- cylinder x turn	S1- flat strike (default)	48H- 605 606 611 612 613 618	48H: SH- security head
49H- high security	7-7-pin housing 48H accepts all Best cores; 49H only 5C cores	L- cylinder only M- double cylinder R- classroom cylinder x turn	S2- ANSI strike	619 625 626 690 49H- 626 ONLY	49H: K- non UL cylinder

\*\*Must specify key mark and number of keys or designate L/C for less core.

**FEATURES**

1. For versatile applications, lever by knob trim variations are available.
2. Rose locking pin and rose assembly design offers great torque resistance. It prevents the locking pin from twisting, bending, or breaking under attack.
3. The innovative design of the slotted key release cam and locking lug assembly create maximum attack resistance. Even though damaged, the lock still allows key access. In addition, the lever is fully functional from the inside.  
The hub-mounted torsion spring and strong retractor springs help prevent lever sag and offer a smooth and snappy operation.
4. Strong through-bolt mounting studs increase torque resistance.  
Heavy rose liner material is highly attack resistant.
5. Strong retractor springs provide resistance to lever sag.
6. New zinc hubs with a shrouded locking lug, guaranteeing higher quality and increased torque resistance.
7. The outside lever sleeve is a seamless one piece construction made of a hardened steel alloy that provides additional reinforcement in the locking lug slot.
8. Lost Motion feature available allowing lever movement between 45° – 60° without engaging retractor assembly.
9. Interchangeable core allows for quick re-keying and customized masterkeying.



## 9K Series Grade 1 Cylindrical Locks

Federal Spec. 161

ANSI Series 4000

### How To Order

9K	3	7	AB	14	C	STK	626	
Series	Backset	Core Housing	Function Code	Lever Style	Rose Style	Strike Package	Finish	Options
9K	3 – 2-3/4" 4* – 3-3/4" 5* – 5"	0 – Keyless 6 – 6-pin non-IC cylinder 7 – 7-pin housing; accepts all BEST cores	See below (Contact sales support for special functions and pricing.)	14 – Curved with return 15 – Contour angle with return 16 – Curved without return	C – 3" convex D – 3-1/2" convex K – 3" convex no ring L – 3-1/2" convex no ring	STK – Standard S3 – ANSI S3 7/8** STK 7/8*** LS – Less strike	626 690 622 626AM*  Satin* 606 612 613 619  Bright* 605 611 625 618	*3/4 – 3/4" throw latch *AL/B – Abrasive lever both sides *AL/O – Abrasive lever outside *AL/I – Abrasive lever inside *TL/B – Tactile lever both sides *TL/O – Tactile lever outside *TL/I – Tactile lever inside *ATB – Alternate through-bolt mounting *FRL – Full radius latch *LL – Lead lined (N/A for double keyed functions) *LM – Lost motion *SH – Security head screws *Thin Door – 1-3/8"

\*Indicates extra cost. Must specify keymark and number of keys.

\*\*S3 7/8 is the ANSI flat lip strike

\*\*\*STK 7/8 is the standard flat lip strike

Function Description	Function Code	Complete with Combined Core			Less Core	W/ non-IC cyl
		Patented*	Premium	Standard		
Single Keyed						
Entrance	AB	460.00	469.00	456.00	412.00	445.00
Storeroom	D	460.00	469.00	456.00	412.00	445.00
Service station	E	460.00	469.00	456.00	412.00	445.00
Classroom	R	460.00	469.00	456.00	412.00	445.00
Dormitory	T	460.00	469.00	456.00	412.00	445.00
Special	Note**	460.00	469.00	456.00	412.00	445.00
UA	UA	460.00	469.00	456.00	412.00	445.00
Hotel (SPN-standard)	H, HJ	501.00	510.00	497.00	453.00	486.00
Double Keyed						
Corridor	C	557.00	575.00	549.00	461.00	526.00
Storeroom	G	557.00	575.00	549.00	461.00	526.00
Intruder	IN	576.00	594.00	568.00	480.00	545.00
Communicating	S	576.00	594.00	568.00	480.00	545.00
Institutional	W	576.00	594.00	568.00	480.00	545.00
Special	DR, RD	576.00	594.00	568.00	480.00	545.00
Keyless						
Passage	N, NX	N/A	N/A	N/A	295.00	NA
Exit	Y	N/A	N/A	N/A	295.00	NA
Privacy	L	N/A	N/A	N/A	341.00	NA
Patio	P	N/A	N/A	N/A	341.00	NA
Special	LL, M, Q, Z	N/A	N/A	N/A	341.00	NA
Single dummy trim	1DT	N/A	N/A	N/A	123.00	NA
Double dummy trim	2DT	N/A	N/A	N/A	245.00	NA

\*SH – Security head screws  
\*Thin Door – 1-3/8"

0B – non-IC zero bitted  
KA – non-IC keyed alike  
KD – non-IC keyed different

COR – non-IC Corbin-Russwin  
MED – non-IC Medeco  
SAR – non-IC Sargent  
SCH – non-IC Schlage  
YAL – non-IC Yale

SCHRC – Schlage removable core (14 & 15 lever only)  
\*WS – Windstorm (listed for Miami-Dade and Florida Building Code)

Only chose one option:  
[0B,KA, KD] or [COR, MED, SAR, SCH, YAL]

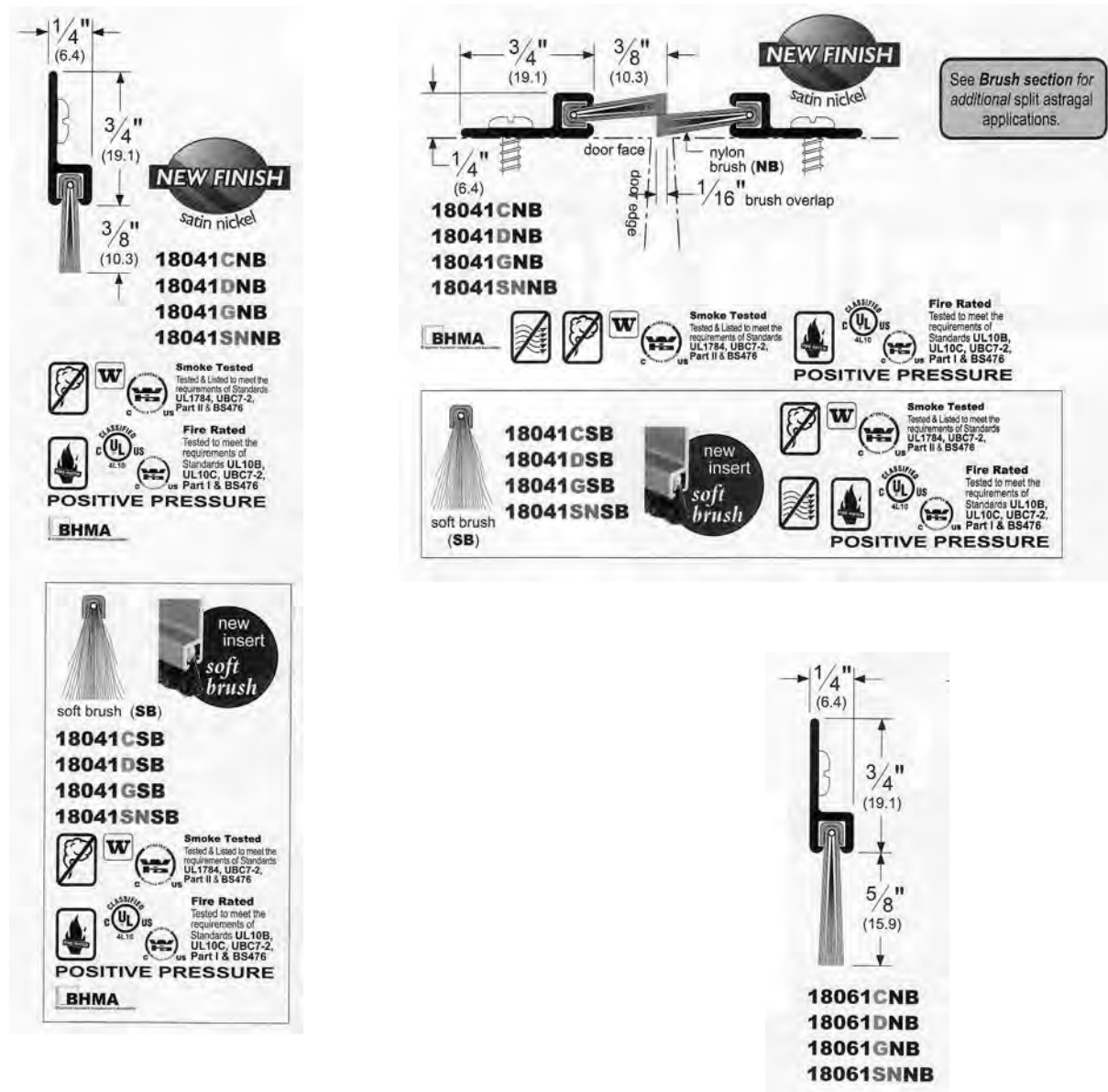
**ATTENTION: Locksets that secure both sides of the door (e.g., G, DR, IN, M, RD, S, W, XD, YD & YR) are controlled by building codes and the Life Safety Code. Delay in unlocking for rapid emergency exit could be hazardous or even fatal.**

\* Patented pricing shown is for CORMAX patented keying. Add \$20.00 for Best Preferred patented keying.

\*\*Single-keyed special functions include: A, B, DZ, EA, RZ, XD, XR, YD, and YR.

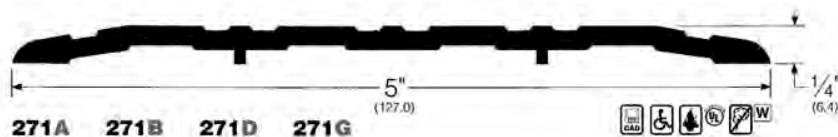
**ATTENTION: Locksets that secure both sides of the door (e.g., G, DR, IN, M, RD, S, W, XD, YD & YR) are controlled by building codes and the Life Safety Code. Delay in unlocking for rapid emergency exit could be hazardous or even fatal.**

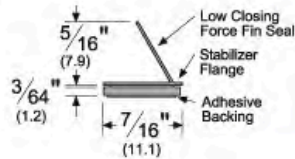
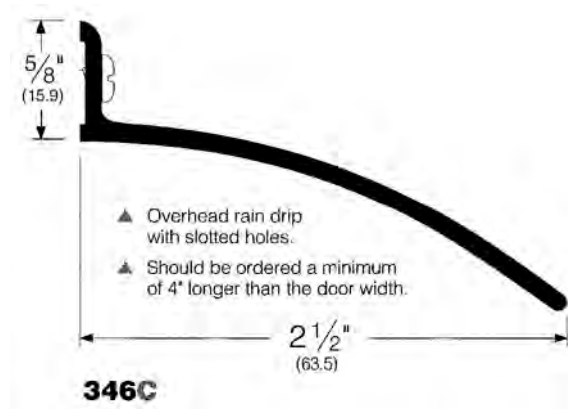




## Saddle Thresholds

■ To use a saddle threshold in an offset condition, use an **elevator** (see page 19).



**HSS2000xS44\_**

Adhesive backed combination intumescent and silicone gasketing.

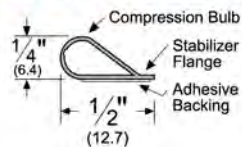
- High temperature silicone.
- Self-extinguishing and non-toxic.
- Longest-lasting commercial grade door seal.
- Seals against smoke, fire, air, sound and weather.
- Unaffected by sunlight, ozone and ultraviolet rays.
- Impervious to fungus and mildew.
- HSS2000xS44 is available in 18, 20, 21 and 24 ft. coils.
- Category B - Doors - additional edge sealing system required - see Category G. Requires Category G system with gasket for fire and possibly smoke.
- Category G - Edge-Sealing Systems - systems that are surface applied to frames or doors and required for Category B doors. Recommended products are HSS2000xS88 for beveled doors and HSS2000xS44 for square edge doors.
- Category H - Gasketing - Smoke and draft control for positive pressure openings.



- |  |                         |
|--|-------------------------|
| <input type="checkbox"/> HSS2000xS44D  | D - Dark Brown Silicone |
| <input type="checkbox"/> HSS2000xS44W  | W - White Silicone      |
| <input type="checkbox"/> HSS2000xS44BL | BL - Black Silicone     |

**S88\_**

AVAILABLE FINISHES: BL, C, D, TAN, W  
AVAILABLE LENGTHS: 17', 18', 20', 21',  
25', 30', 204'



- Seal begins compressing at 1/4"; compresses to seal up to a 1/16" gap.

**1700A****"A" Grip**

ANSI Function	01 Exit Only (cover plate)	02 Dummy Trim	03 Key Retracts Latchbolt	05 Key Locks/Unlocks Thumbpiece	08 Key Locks/Unlocks Lever/Knob	10* Double Cylinder Inside Key Locks/Unlocks Lever/Knob	14 No Cylinder Lever/Knob Always Active	15 No Cylinder Thumbpiece Always Active
<b>Device Nos.</b>	2101 FL2101	2102	2103** FL2103**	2105 FL2105	2108 FL2108	2110 FL2110	2114 FL2114	2115 FL2115
<b>Trim Nos.</b>	1701 R1701 2101 4901 R4901	1702A R1702A 2102C 4902A R4902A	1703A R1703A 2103C 4903A R4903A	1705A R1705A 2105C	4908A V4908A R4908A RV4908A	4908A V4908A R4908A RV4908A	4914A R4914A	1715A R1715A 2015C

**Device with Trim:**

Device No. \_\_\_\_\_ Add **Suffix**: for options, see page 4.  
 Add **Prefix** for options, see page 4. Add **Prefix**: "V" Vandal Resistant Lever Trim  
 "R" Retrofit Trim  
 Add **Suffix**: Lever or Knob Design (A,B,C,D, K)  
 Grip Design (A,B,C)  
 Add **Suffix**: "KNR" Knurled Lever or Grip (*Abrasive Strip*)

**TS2108CD x V4908AKNR x RHRB x 630 x S300 x 3'-0" x 7'-0" x 1-3/4"**

Device w/options      Trim No.      Hand      Finish      Strike      Door Size

**Device Only:** Device no., hand, finish, strike, and door size including thickness:  
 (e.g. TS2108CD x RHRB x 630 x S300 x 3'-0" x 7'-0" x 1-3/4")

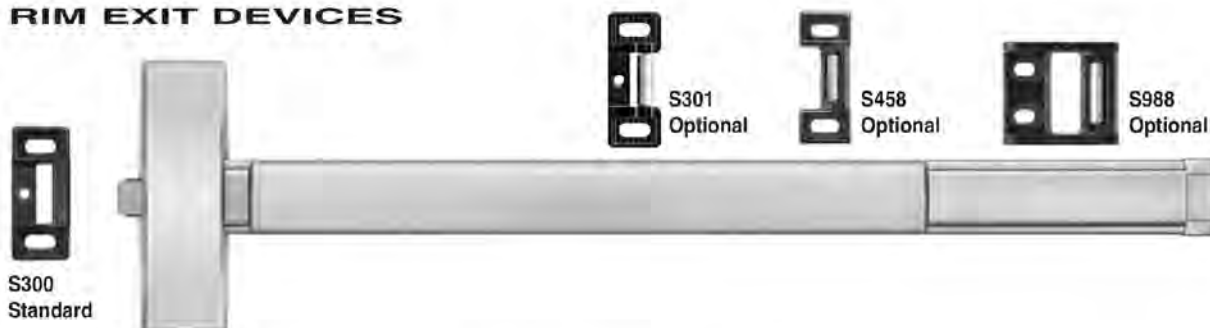
**Trim Only:** Trim no., hand, finish, strike, and door size including thickness: (e.g. V4908A x RHRB x 626 x 1-3/4")

\* "10" Function is handed

\*\* 2103 & FL2103 x Cylinder Only Application includes Cylinder Attachment Kit "CA-03"





**RIM EXIT DEVICES****Apex 2100 Series - Reversible****Apex FL2100 Fire Exit Series - Reversible**

**DOORS** - For all types of single and double doors with a mullion. For mullions, see page 18. Available for 1-3/4" to 2-1/4" thick, up to 4'-0" wide opening. For thicker doors, consult factory. Furnished standard for 1-3/4" thick, 3'-0" wide opening.

**DEVICE** - Covers ANSI A115.2 (Type 161), A115.18 cylinder lock and A115.1 (Type 86) Mortise Lock preparation.

**FUNCTIONS** - Functions are field selectable except for the Double Cylinder option. The device is furnished for a desired function if specified. If not specified the "03" function is furnished standard.

**DOUBLE CYLINDER** - Handed, "10" Function available. Requires two rim type cylinders, not furnished standard. See page 5 and 19.

**BASE MATERIAL** - The Cover, Touchbar, Device Channel, Lock/Hinge Side Filler and End Cap are furnished of heavy wrought Brass, Bronze or Stainless Steel. 628 Devices are furnished with Aluminum, Brass, Bronze and Stainless Steel components. See "Finish & Base Material" chart page 3.

**CHASSIS** - Investment Cast Steel, Zinc Dichromated.

**LATCHBOLT** - Stainless Steel, Deadlocking, 3/4" throw.

**STRIKES** - No. S300, Investment Cast Stainless Steel, Black Powder Coated furnished standard. No. S988, optional strike for use on Aluminum Door applications, please specify when ordering. No. S458, optional strike for use on Mullion applications, please specify when ordering. For optional strike information see page 34.

**DOGGING** - 1/4" turn hex key dogging standard. NOT available on Fire Exit Hardware.

**TOUCHBAR HEIGHT** - 39-15/16" from floor standard. May be varied as situation dictates.

**REVERSIBLE** - Reversible for all functions and Trims. Standard packaging RHRB.

**UL LISTED** - Panic and Fire Exit Hardware. For FIRE EXIT HARDWARE Ratings see page 33. Conforms to UL10C and UBC 7-2.

**ANSI/BHMA** - Devices are BHMA certified for ANSI 156.3, Grade 1.

**FINISHES** - 605, 606, 612, 613, 625, 628, 630. For Finish description see page 3.

**CYLINDERS** - Rim Type, not furnished standard. Specify when required. For cylinder details see page 19.

**STILE WIDTH** - See Stile Information on page 36.

**RETROFIT APPLICATIONS** - The 2100 and FL2100 Series Devices are designed to retrofit into other manufacturers' mounting hole locations. 1700 Series Pull Trim and 4900 Series Lever Trim may also be factory set for these applications by specifying prefix "R" (e.g. 2108 R4908A). Consult factory for details.

**Apex 21 Series — Nonhanded**

The 21 Series Device is designed to be compatible with many manufacturers' Access Control exterior trim. The device incorporates a center driven cam to receive the tailpiece of the access control product. The tailpiece rotation required to retract the latch is a minimum of 50 degrees.

Consult factory for details.

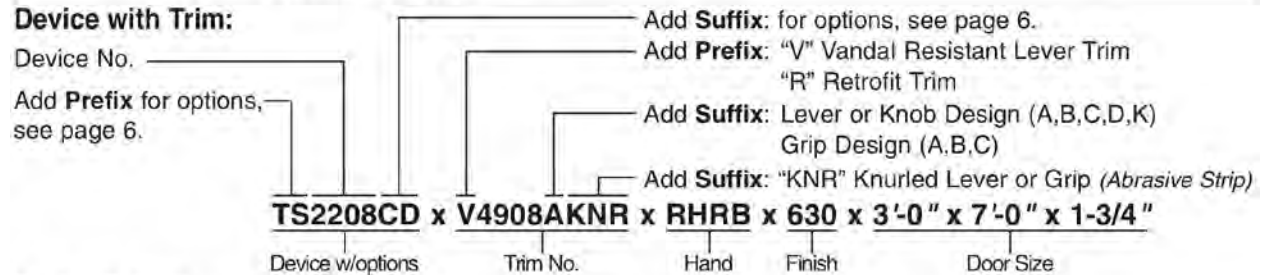
**DEVICE OPTIONS**

Prefix	Description
DE	Delayed Egress .....
E	Electric Device .....
ELR	Electric Latch Retraction .....
FL	Fire Exit Hardware .....
HC	Windstorm and Hurricane Code Device .....
LDS	Latchbolt Monitoring Double Switch .....
LS	Latchbolt Monitoring Switch .....
Q	Wireless Access Management System .....
TDS	Touchbar Monitoring Double Switch .....
TS	Touchbar Monitoring Switch .....
WTDS	Weatherized Touchbar Mon. Dbl. Switch .....
WTS	Weatherized Touchbar Monitoring Switch .....
To specify add Prefix to Device No. (e.g. TS2103)	

Suffix	Description
ALK	Exit Alarm: battery operated .....
ALW	Exit Alarm: remote power .....
BRL	Braille Touchbar .....
CD	Cylinder Dogging .....
DS	Door Position Monitoring Switch .....
LD	Less Dogging .....
SEC	Security Screws .....
SNB	Sex Nut and Bolt .....
WALW	Weatherized Exit Alarm: remote power .....
To specify add Suffix to Device No. (e.g. 2103CD)	



ANSI Function	01 Exit Only (cover plate)	02 Dummy Trim	03 Key Retracts Latchbolt	05 Key Locks/Unlocks Thumbpiece	08 Key Locks/Unlocks Lever/Knob	14 No Cylinder Lever/Knob Always Active	15 No Cylinder Thumbpiece Always Active
Device Nos.	2201 FL2201	2202	2203** FL2203**	2205 FL2205	2208 FL2208	2214 FL2214	2215 FL2215
Trim Nos.	1701 R1701	1702A R1702A	1703A R1703A	1705A R1705A	4908A V4908A R4908A RV4908A	4914A R4914A	1715A R1715A 2015C
	2101 4901 R4901	2102C 4902A R4902A	2103C 4903A R4903A	2105C			



**Device Only:** Device no., hand, finish, strike, and door size including thickness:  
(e.g. TS2208CD x RHRB x 630 x 3'-0" x 7'-0" x 1-3/4")

**Trim Only:** Trim no., hand, finish, strike, and door size including thickness: (e.g. V4908A x RHRB x 626 x 1-3/4")

\* 2203 & FL2203 x Cylinder Only Application includes Cylinder Attachment Kit "CA-03"

## 4900A

"A" Lever



**SURFACE VERTICAL ROD EXIT DEVICES**

S300

**Apex 2200 Series - Reversible****Apex FL2200 Fire Exit Series - Reversible**

**DOORS** - For all types of single and double door applications. Available for 1-3/4" to 2-1/4" thick, up to 4'-0" wide by 10'-0" high openings. For thicker doors, consult factory. Furnished standard for 1-3/4" thick, 3'-0" wide by 7'-0" high openings.

**DEVICE** - Covers ANSI A115.2 (Type 161), A115.18 cylinder lock and A115.1 (Type 86) Mortise Lock preparation.

**FUNCTIONS** - Functions are field selectable. The device is furnished for a desired function if specified. If not specified the "03" function is furnished standard.

**BASE MATERIAL** - The Covers, Touchbar, Device Channel, Lock/Hinge Side Filler, Vertical Rods and End Cap are furnished of heavy wrought Brass, Bronze or Stainless Steel. US28 Devices are furnished with Aluminum, Brass, Bronze and Stainless Steel components. See "Finish & Base Material" chart on page 3.

**CHASSIS** - Investment Cast Steel, Zinc Dichromated.

**TOP LATCHBOLT** - Stainless Steel, Deadlocking, 3/4" throw.

**Note:** All vertical rod lengths are based on 39 15/16" exit device horizontal centerline.



**BOTTOM BOLT** - Steel plated, independent action 5/8" throw, with adjustment range to suit 3/4" door undercut.

**TOP STRIKE** - No. S300 Surface applied, Investment Cast Stainless Steel, Black Powder Coated furnished standard. For optional strikes see page 34.

**BOTTOM STRIKE** - No. S460, Flush mounted, Steel, Black Powder Coated.

**DOGGING** - 1/4" turn hex key dogging standard. NOT available on Fire Exit Hardware.

**TOUCHBAR HEIGHT** - 39-15/16" from floor standard. Specify required height if other than standard.



S460

**DEVICE OPTIONS**

Prefix	Description
DE*	Delayed Egress
E	Electric Device
ELR	Electric Latch Retraction
FL	Fire Exit Hardware
HC	Windstorm and Hurricane Code Device
LS	Latchbolt Monitoring Switch
Q	Wireless Access Management System
TDS	Touchbar Monitoring Double Switch
TS	Touchbar Monitoring Switch
WTDS	Weatherized Touchbar Mon. Dbl Switch
WTS	Weatherized Touchbar Mon. Switch

To specify add Prefix to Device No. (e.g. TS2203)

\*Rod protector required - supplied by other manufacturers.

**REVERSIBLE** - Reversible for all functions and trims. Standard packing RHRB.

**UL LISTED** - Panic and Fire Exit Hardware. For FIRE EXIT HARDWARE Ratings see page 33. Conforms to UL10C and UBC 7-2.

**ANSI/BHMA** - Devices are BHMA certified ANSI 156.3, Grade 1.

**FINISHES** - 605, 606, 612, 613, 625, 628, 630. For finish description see page 3.

**CYLINDERS** - Rim type, not furnished standard. Specify when required. For cylinder details see page 19.

**STILE WIDTH** - See Stile Information on page 36.

**LESS BOTTOM ROD (LBR) OPTION** - Specify suffix "LBR" (e.g. 2208LBR). See UL FIRE LABEL RATING chart on page 39. Fire Rated Devices include FB277 Fire Bolt Assembly. For Fire Bolt Assembly image see page 35.

**RETROFIT APPLICATIONS** - The 2200 and FL2200 Series Devices are designed to retrofit into other manufacturers' mounting hole locations. 1700 Series Pull Trim and 4900 Series Lever Trim may also be factory set for these applications by specifying prefix "R" (e.g. 2208 R4908A).

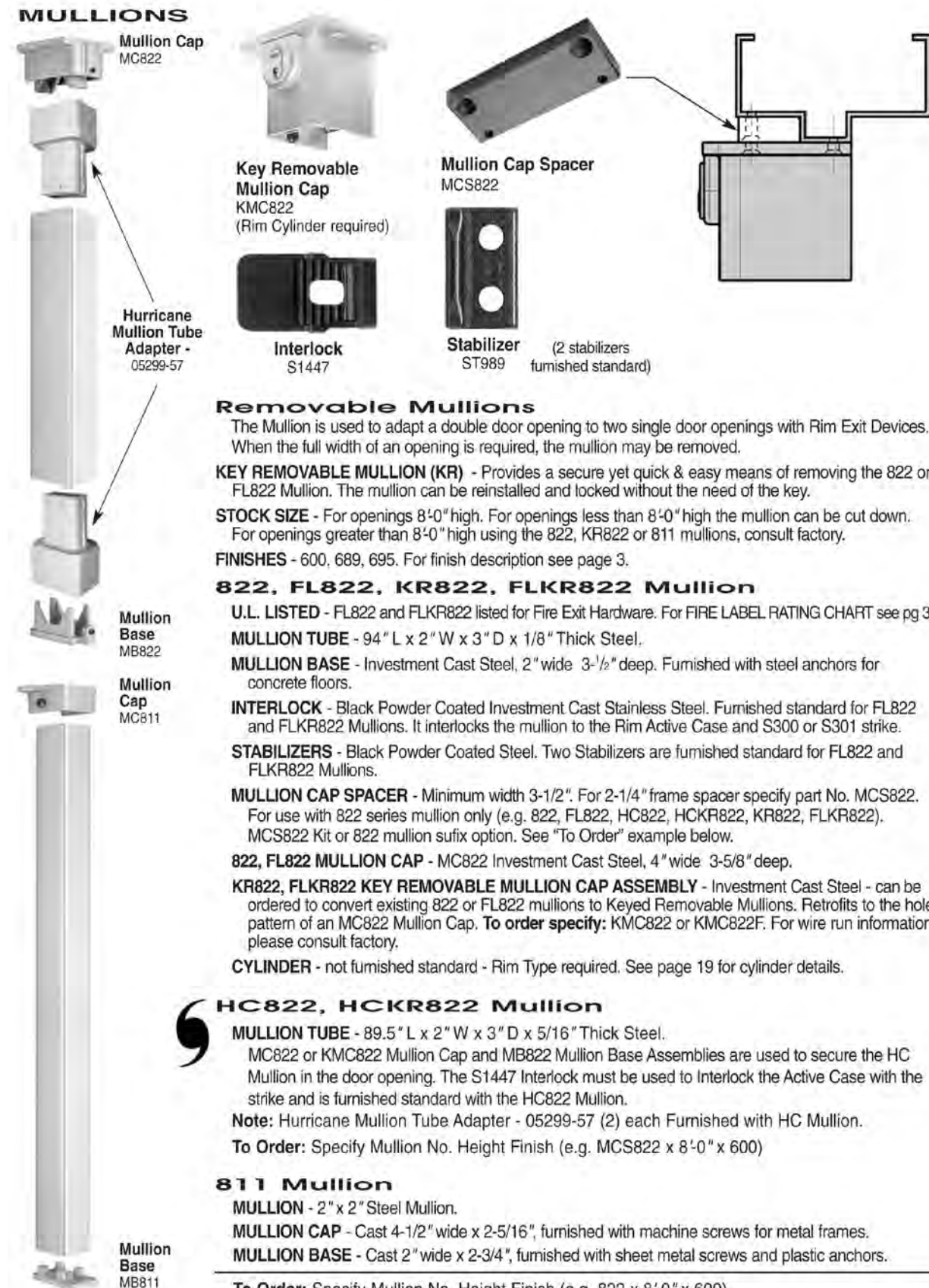
**Apex 22 Series - Reversible**

The 22 Series Device is designed to be compatible with many manufacturers' Access Control exterior trim. The device incorporates a center driven cam to receive the tailpiece of the access control product. The tailpiece rotation required to retract the latch is a minimum of 50 degrees.

**Consult factory for details.**

Suffix	Description
ALK	Exit Alarm: battery operated
ALW	Exit Alarm: remote power
BRL	Braille Touchbar
CD	Cylinder Dogging
DS	Door Position Monitoring Switch
LBR	Less Bottom Rod
LD	Less Dogging
SEC	Security Screws
SNB	Sex Nut and Bolt
TMB	Transom Bracket
WALW	Weatherized Exit Alarm: remote power

To specify add Prefix to Device No. (e.g. TS2203)



## Model 998

### Application

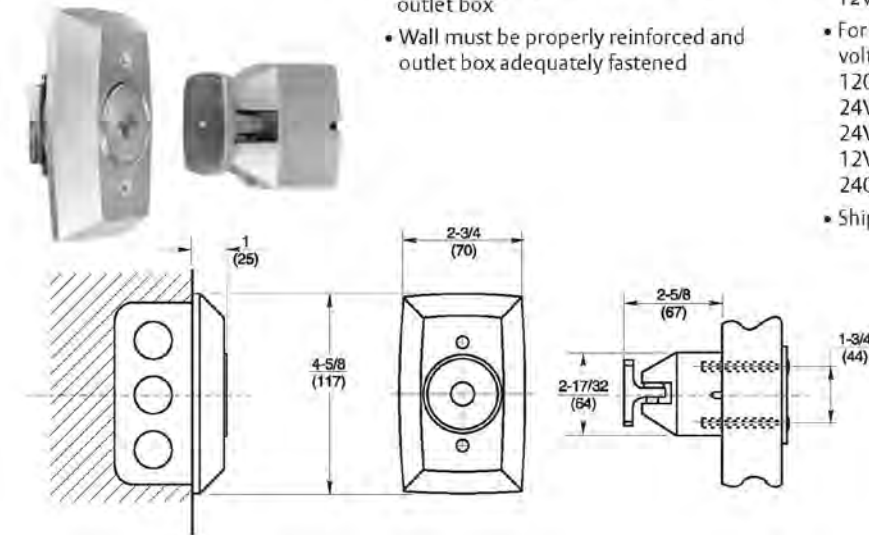
Wall Mount  
Concealed Wiring  
ANSI/C00011

### Product Description & Features

- Total Projection: 3-5/8" (92mm)
- Mounting Requirements:  
2" x 4" x 1-3/4" (51 x 102 x 45mm)  
outlet box
- Wall must be properly reinforced and  
outlet box adequately fastened

### Technical Information

- Voltage and Current:
  - 120VAC, 60Hz., .020 amp
  - 24VAC/DC, 60Hz., .020 amp
  - 12VDC, .040 amp
- For 50-55 lbs. of holding force, specify  
voltage
  - 120VAC, 60Hz. .017 amp
  - 24VAC, 60Hz. .080 amp
  - 24VDC, .068amp
  - 12VDC, .180amp
  - 240VAC, 50/60Hz. .009 amp
- Shipping Weight: 2-1/2 lbs. (1.1 kg)



## ARCHITECTURAL SPECIFICATIONS

### Low Energy Operators shall:

1. Conform to ANSI/BHMA A156.19 as a low energy power opening device
2. Be listed under UL228, UL325, UL10B, UL10C, UBC 7.2 and FCC listed
3. Shall be non-handed
4. Be rated for door panels weighing up to 350 lbs (160 kg)
5. Include a 3/16 horsepower, permanent-magnet DC motor
6. Include a manual door closer within the Low Energy Operator adjustable to meet Americans with Disabilities Act (ADA) 5lbs opening force [Push-Side applications only]
7. Be isolated from mounting plate with rubber mounts to mitigate the transmission of forces between the door and operator
8. Incorporate a position encoder to communicate with the microprocessor controller
9. Incorporate a resetable powered operation counter that tracks both powered and non-powered cycling of the Operator
10. Incorporate the following adjustable settings:
  - i. Hold Open Timer, to 28 seconds
  - ii. Open Speed
  - iii. Backcheck Speed
  - iv. Vestibule Sequence Timer
11. Include DIP switch controls as follows:
  - i. On board diagnostics
  - ii. Power close
  - iii. Push and Go operation
  - iv. Time delay logic for electrified hardware components
12. Include terminals for auxiliary controls as follows:
  - i. Activation devices; provide two discrete inputs
  - ii. Vestibule sequencing
13. Include Control switches as follows:
  - i. Day/Night/Hold-Open
  - ii. Power On-Off, illuminated
14. Include hydraulic closer with R-14 Aluminum Alloy body
15. Function as a standard door closer with adjustable spring force size 1 thru 6 for non-powered operation.
16. Include adhesive Low Energy Operator mounting templates



**FEATURES / BENEFITS**

**Access Controls:** The D-4990 Low Energy Operator may be used with electric latch retraction exit devices, electric strikes, and other electric locking systems. A time delay function is built into the control system eliminating the need for supplemental relays or controls.

**Activation:** The D-4990 Low Energy Operator can be activated with the press of a switch. Virtually any form of “knowing act” can be used to initiate the operator making integration with existing systems easier. For the full line of activation devices that Precision hardware offers see page 10.

**Push and Go Option:** With the flip of a switch, the D-4990 Low Energy Operator can be configured to activate and open based on a slight movement of the door. Utilizing this option eliminates the need for supplemental activation devices but does not preclude their use.

**Hold-Open Timer:** Upon receipt of an activation signal, the operator will power open the door from the closed position. The door may be held in the open position up to 28 seconds (compliance with ANSI/BHMA A156.19 requires the door to remain in the open position for a 5 second minimum). Additionally, a “hold-open” switch is provided to hold the door open for extended periods.

**External Function Switches:** The D-4990 Low Energy Operator is equipped with external function switches providing basic controls.

- **Illuminated Power Switch:** Illuminated to be visible at night, the switch controls power to the operator motor. The D-4990 Low Energy Operator functions as a manual closer with power off.
- **Mode Control Switch:** A three function switch is provided for control of the powered function of the operator. “Day” mode will engage the operator for normal powered operation with activation by push plate, “Push and Go”, or signal from other “knowing act” device. “Night” mode disables the operator for normal powered operation; however, the operator can be configured to receive activation signals from a secure activation device such as a card reader for secure activation, generally from one side. Switching to “Hold-Open” mode will power the operator opening the door, holding it open indefinitely.

**Obstruction Detection:** During the opening cycle an obstruction function effectively reduces the possibility of personal injury in accordance with A156.19. Additionally this feature prevents damage to door and/or surrounding structures. After a stall time-out, the door will close at a rate and force set by the integrated hydraulic closer.

**Power-Close Option:** This switched feature can be used to control exterior openings that require additional closing force to resist interior stack pressures and wind conditions that do not allow the door to close properly. Use this feature to reduce heating and cooling loss and save energy and money.

**D-4990 Door Closer:**

- **Adjustment:** The D-4990 Low Energy Operator (which incorporates the Heavy Duty D-4550 Stanley Door Closer) provides the industry's widest range of field adjustable spring power settings. This allows you to adjust the operator for the correct opening and closing forces to meet any specific application. The closer within the D-4990 Low Energy Operator also incorporates multiple regulating valves, including the V-Slotted Valve Regulation, which maximizes fine tune adjustment capabilities.
- **Door Closer Body:** The incorporated D-4550 Stanley Door Closer body is constructed of R-14 Aluminum Alloy providing wear resistance from contact with the piston during the opening and closing. In addition the R-14 Aluminum Alloy body holds the Cylinder Body dimensionally stable under extreme internal hydraulic pressures.

**Internal Cycle Counter:** The D-4990 Low Energy Operator comes equipped with two independent internal cycle counters. The cycle counters provide current data on manual and powered operations.

**Vestibule Function:** Each D-4990 Low Energy Operator is equipped with a vestibule function control. This field selectable function provides electronic sequencing to control the opening of doors within a vestibule application. Sequencing reduces exposure to the exterior elements. Controlling the opening sequence of a paired vestibule, provides convenience and saves energy to the facility.

**Optional Power Supply:** The optional PS-490 24VDC @ 0.5A power supply is available to provide power to auxiliary electrified hardware such as electric strikes. This optional power supply can be mounted within the D-4990 Low Energy Operator housing.

**HOW TO ORDER D-4990/D-4990T**

<b>D-4990</b>	<b>628</b>	<b>CL2248</b>
<b>Model No.</b>	<b>Finishes</b>	<b>Accessories</b>
<b>D-4990</b> – standard arm (push side) <b>D-4990T</b> – track arm (pull side)	<b>628</b> – satin aluminum, clear anodized <b>313AN</b> – dark bronze anodized For special finishes consult factory	<b>CL2248</b> – push plate mounting post– silver <b>CL2247</b> – push plate mounting post– black <b>CL2249</b> – push plate mounting post– bronze <b>CL2216</b> – 6" round push plate– stainless steel <b>CL4163</b> – 4 1/2" square push plate– stainless steel <b>CL2055</b> – 1 1/2" x 4 1/2" jamb plate– stainless steel <b>CL2025</b> – touchless plate <b>CL4485</b> – radio control receiver <b>CL4490</b> – radio control transmitter <b>PS490</b> – power supply <b>314066</b> – signage kit <b>CL2212</b> – push plate package
page 5		page 10 & 11

Example: D-4990 Low Energy Operator x 628 finish.  
2-CL2216-6" round push plates

## Door Closer Functions

<b>Series</b>	<b>Description</b>
QDC111	Tri-Packed Arm, Non-Hold Open
QDC112	Hold Open Arm
QDC113	Dead Stop Arm
QDC114	Dead Stop Hold Open Arm
QDC115	Extra-Duty Arm (EDA)
QDC116	Hold Open Extra-Duty Arm (HEDA)
QDC117	Heavy-Duty with Compression Stop Arm
QDC118	Heavy-Duty with Compression Stop and Hold Open Arm

## Performance Features

- Tested to significantly exceed the performance requirements for Grade 1 certification.
- Fully adjustable from 1 - 6 allowing for maximum flexibility.
- All-weather oil ensures optimal operational performance in multiple climate conditions.

## FAIRCHILD AIR FORCE BASE DESIGN STANDARDS

11	Tri-Packed Arm, Non-Hold Open
12	Hold Open Arm
13	Dead Stop Arm
14	Dead Stop Hold Open Arm
15	Extra-Duty Arm (EDA)
16	Hold Open Extra-Duty Arm (HEDA)
17	Heavy-Duty with Compression Stop Arm
18	Heavy-Duty with Compression Stop and Hold Open Arm

SN	Sex Nuts
S/TAP	Self-Tapping Screws
DP	Drop Plate
BF	Barrier Free

Base Part Number				
Series	Function	Finish	Options	Handing
<b>QDC1</b>	<b>11</b>	<b>689</b>	<b>SN</b>	

<b>QDC1xx</b>	Grade 1 Extra Heavy-Duty Architectural
---------------	--

<b>689</b>	Painted Aluminum
<b>690</b>	Painted Duranodic Bronze
<b>696</b>	Painted Satin Brass

<b>QDC 116 HEDA Arm Only</b>	
<b>LH</b>	Left Hand
<b>RH</b>	Right Hand

**Example**

If you ordered: QDC111 689 SN

You would get: Grade 1 Extra Heavy-Duty Non-Hold Open Door Closer – Full Adjustable (Sized 1-6), Tri-Packed Arms with both Delayed Action & Backcheck Standard, Painted Aluminum finish, and Sex Nuts.

## Product Specifications

- Handing – All QDC100 Series Closers are non-handed (QDC116 arms are handed).
- Cast-iron construction.
- All-weather fluid.
- Stacked valves prevent oil leaks from screws being backed out too far.
- Cover – plastic cover standard.
- Arms & brackets – Tri-pack standard, additional arms optional.
- Arm material – Heat-treated carbon steel.
- Springs – High-impact hand-drawn steel wires.
- Pinions – Heat-treated chrome molybdenum steel.
- Cylinder construction – Heat-treated free-cutting carbon steel.
- Fasteners – Wood and machine screws standard; sex nuts and self-tapping screws optional.
- Door weights & sizes:

Size	Applicable Door Weight	Door Width Ranges	
		Interior	Exterior
1	33 – 55 LBS (15 – 30 Kg)	32" (0.81m)	28" (0.71m)
2	56 – 99 LBS (30 – 45 Kg)	36" (0.91m)	32" (0.81m)
3	99 – 143 LBS (45 – 65 Kg)	42" (1.07m)	36" (0.91m)
4	143 – 187 LBS (65 – 85 Kg)	48" (1.22m)	42" (1.07m)
5	187 – 264 LBS (85 – 120 Kg)	54" (1.37m)	48" (1.22m)
6*	264 – 330 LBS (120 – 150 Kg)	58" (1.47m)	54" (1.32m)

\*50% spring power adjustment over size 6.





## PRODUCT SPECIFICATIONS

For more information visit [www.hagerco.com](http://www.hagerco.com)

## BB1199

Full Mortise, Ball Bearing, Heavy Weight

## Applications

For use on heavy weight doors and doors requiring high frequency service.



## PRODUCT SPECIFICATIONS

Box Quantity:  
3

Case Quantity:  
24

Certifications:  
ANSI A2111 (Brass) **ANSI A5111 (Stainless Steel)**

Electric Modifications:  
EMN (Electric Monitor Only), ETW (Electric Through-Wire Only),  
ETM (Electric Through-Wire with Monitoring), Quick Connect

Fastener Size - Machine:  
#12-24 x 1/2"

Fastener Size - Wood:  
#12 x 1-1/4"

Features:  
Four ball bearings. Non-rising removable pin with tip and plug.

Finishes:  
US3, US4, US10, US10B, US15, US26, US26D, US32, US32D

Fire Rating:  
Stainless steel model complies with NFPA80 requirements for use  
on fire rated door assemblies

Gauge:  
See Sizing Chart Options

H Height:  
See Sizing Chart Options

Knuckles:  
5

Material:  
~~Brass with Stainless Steel Pin~~, Stainless Steel with Stainless Steel  
Pin

Notes:  
Furnished with fastener hole locations that conform to standards  
approved by ANSI A156.7

Options:  
**NRP (Non-removable pin)**  
Stamped with UL logo when ordered for export

H Width:  
See Sizing Chart Options

**PRODUCT SPECIFICATIONS**For more information visit [www.hagerco.com](http://www.hagerco.com)**BB1168**

Full Mortise, Ball Bearing, Heavy Weight

**Applications**

For use on heavy weight doors and doors requiring high frequency service.

**PRODUCT SPECIFICATIONS**Box Quantity:  
3Case Quantity:  
24Certifications:  
ANSI A8111Electric Modifications:  
EMN (Electric Monitor Only), ETW (Electric Through-Wire Only),  
ETM (Electric Through-Wire with Monitoring), Quick ConnectFastener Size - Machine:  
#12-24 x 1/2"Fastener Size - Wood:  
#12 x 1-1/4"Features:  
Four ball bearings  
Non-rising removable pin with button tip and plug  
Available in two different leaf sizesFinishes:  
LS, USP, US3, US10, US10A, US10B, US15, US26, US26DFire Rating:  
Complies with NFPA80 requirements for use on fire rated door  
assembliesGauge:  
See Sizing Chart OptionsHeight:  
See Sizing Chart OptionsKnuckles:  
5Material:  
Steel with Steel PinOptions:  
NRP (Non-removable pin)  
Stamped with UL logo when ordered for exportWidth:  
See Sizing Chart Options



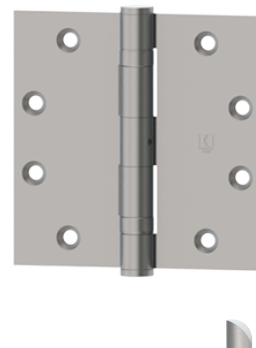
## PRODUCT SPECIFICATIONS

For more information visit [www.hagerco.com](http://www.hagerco.com)

### BB1279

#### Applications

For use on medium weight doors or doors requiring medium frequency service.



#### PRODUCT SPECIFICATIONS

Box Quantity:  
3

Case Quantity:  
24

Certifications:  
ANSI A8112

Electric Modifications:  
EMN (Electric Monitor Only), ETW (Electric Through-Wire Only),  
ETM (Electric Through-Wire with Monitoring), Quick Connect

Fastener Size - Machine:  
1/4-20 x 1/2"

Fastener Size - Wood:  
#14 x 1-1/2"

Features:  
Two ball bearings. Non-rising removable pin with button tip and plug.

Finishes:  
L1, LS, H2H, USP, US3, US4, US10, US10A, US10B, US15, US26,  
US26D

Fire Rating:  
Complies with NFPA80 requirements for use on fire rated door assemblies

Gauge:  
See Sizing Chart Options

H Height:  
See Sizing Chart Options

Knuckles:  
5

Material:  
Steel with Steel Pin

Notes:  
Available with reversible hole pattern.

Options:  
3-1/2" x 3-1/2" (89 mm x 89 mm) available with reversible hole pattern  
NRP (Non-removable pin) **For out-swing door applications**  
Stamped with UL logo when ordered for export

H Width:  
See Sizing Chart Options

TRIMCO#	1001-1	1001-2	1001-3
OA	3 x 12"	3-1/2 x 15"	4 x 16"
BHMA	J301	J301	J301
Push Plate			Br, Bz, Al, SS

TRIMCO#	1018-3	1018-3B
OA	4 x 16"	4 x 16"
P	3-1/8"	3-1/8"
G	1195-1	1195-2
CL	2"	2"
CTC	8"	10"
BHMA	J405	J405

**Pull Plate** - .050" thick. **ADA** Br, Bz, Al, SS

TRIMCO#	1729	1731	1732	1746	1746-1
D	3/4"	1"	1"	1-1/4"	1-1/4"
P	3"	3-1/4"	3-1/4"	3-1/2"	3-1/2"
CTC	Pull - 10" Push-Specify	Pull - 10" Push-Specify	Pull - 12" Push-Specify	Pull - 18" Push-Specify	Pull - 12" Push-Specify
M	3/4" Rd	1" Rd	1" Rd	1-1/4" Rd	1-1/4" Rd
BHMA	J504	J504	J504	J504	J504

**Push / Pull Set** Br, Bz, Al, SS

fOCAL option is available.

**ADA**

TRIMCO#	3094A2	3094B1	3094B2	3094B3
W	43-53"	53-63"	63-75"	75-87"
BHMA	4.1.1 Type 21	4.1.1 Type 21	4.1.1 Type 21	4.1.1 Type 21

Black

**Stop Mounted Coordinator w/ Filler Bar - (UL)**  
 Patent #5033234

TRIMCO#	3095
OA	3-1/4 x 5"
SW	7/8 - 2-1/4"
M	Steel

Black

**Mounting Bracket -**  
For mounting stop-applied hardware. In conjunction with 3094.



**TRIMCO# 3810**

BHMA	4.4 Type 25
Br, Bz, Pl, SS	

**Automatic Flushbolt -**  
Metal Door - To be used  
in pairs on the inactive  
leaf of metal doors.

**UL** Rated 3 hours.  
Patent #5076620

**TRIMCO# 3815**

BHMA	4.4 Type 25
Br, Bz, Pl, SS	

**Automatic Flushbolt -**  
Wood Door - To be used  
in pairs on the inactive  
leaf of wood doors.

**UL** Rated 1-1/2 hours.  
Patent #5076620

**TRIMCO# 3820**

BHMA	4.4 Type 25
Br, Bz, Pl, SS	

**Semi-Auto Flushbolt -**  
Metal Door - For use at top  
of the inactive leaf of metal  
door. Used with 3810.

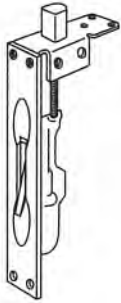
**UL** Rated 3 hours.  
Patent #5004277

**TRIMCO# 3825**

BHMA	4.4 Type 25
Br, Bz, Pl, SS	

**Semi-Auto Flushbolt -**  
Wood Door - For use at top  
of the inactive leaf of wood  
door. Used with 3815.

**UL** Rated 1-1/2 hours.  
Patent #5004277



TRIMCO#	3913	W3913
OA	1 x 6-3/4 x 2-1/2"	1 x 6-3/4 x 2-1/2"
TH	3/4"	3/4"
M	Extruded	Wrought
	UL	UL
		Patent #4315647
		Br, Bz, PI

**Flush Extension Bolt - Wood Door**

Includes metal dust cover. Mounts at top corner of wood door.



TRIMCO#	3917	W3917	3917ET
OA	1 x 6-3/4"	1 x 6-3/4"	1 x 6-3/4"
TH	11/16"	11/16"	1-3/16"
ROD	12"	12"	12"
M	Extruded	Wrought	Extruded
BHMA	LO4081/LO4251	LO4081/LO4251	LO4081
	UL	UL	
			Br, Bz, PI
			Patent #4315647

**NEW****Flush Extension Bolt - Metal Door - 1-1/2" Bolthead (3917-1B)** standard; 3" Bolthead **(3917-3B)** also available. Longer Rod Lengths available on request.

TRIMCO#	KOO38	KOO50
OA	7-16" H	7-16" H
M	.038"	.050"
BHMA		J102
<b>Kick Plate</b>	SS only	Br, Bz, Al, SS
	Add "ILLUM" for Illuminated exit.	

NOTE: All Kickplates are made from solid 260 Brass, 220 Bronze, 304 Stainless Steel or 5005H34 Aluminum. All edges are relieved. Heavy bevel at extra charge. All .038 Protection Plates Stainless Steel only. Specify countersunk if required.

END OF SECTION 087100

139 Victor Street  
St. Louis, Missouri 63104  
314.772.4400  
314.772.0744 fax  
www.hagerco.com

**Hager Commercial Products**  
**Compliance with Buy American Act (BAA), American Recovery and Reinvestment Act (ARRA), and**  
**Steel Product Procurement Act (SPPA)**  
**Section 1**

The products in this section are manufactured in the United States in Montgomery, Alabama. These products are manufactured with domestic steel, brass, aluminum, or stainless steel and meet 52.225.23 (FAR) as a construction material manufactured in the United States. All of these items, except for the exceptions listed under Architectural Hinges, meet the Buy American Act of 1964 and the Buy American Act of 1933, which requires 100% domestic components. Every product in this section complies with SPPA, which requires at least 75% of the total cost of materials to be mined, produced, or manufactured in the United States. All of these products meet the provisions of ARRA Subpart 25.6, Section 1605, 25.601 (2) "A construction material manufactured in the United States."

**Architectural Hinges**

All products

Exceptions: IHTHB953, 1850, the ECCO brand, 3.5" x 3.5", 4.0" x 4.0", 1303, and the 495/496/497 and 615 pivot sets

**Roton Continuous Hinges**

All products are manufactured in the U.S. with domestic aluminum

**Thresholds and Weatherstripping**

All products are manufactured in the U.S. with domestic aluminum, bronze, or stainless

**Trim and Auxiliary**

The following products are manufactured in the U.S. with domestic raw materials:

Mop/Kick/Armor Plates – 190S/193S/194S, 198S, 199B, 204S, 214S, 220S/223S/224S, 225S

Pulls – 1 through 27, 121L

Push Plates – 30S, 50T, 60/70S/80S, 90R

Push/Pull Sets – 31 thru 39, 41 thru 49, 138 thru 170

Push Bars – 125 through 137

Automatic Flush Bolts – 291D, 292D, 293D, 294D, 295M, 295W, 296W

Coordinator – 297D

Signs – 350 thru 369

**Sliding Door Hardware**

Sliding door hardware sets are manufactured in the U.S. with over 51% of domestic materials and cost of the product being assembled in Sterling, Illinois.

139 Victor Street  
St. Louis, Missouri 63104  
314.772.4400  
314.772.0744 fax  
www.hagerco.com

**Hager Commercial Products  
Compliance with Buy American Act (BAA),  
American Recovery and Reinvestment Act (ARRA), and FAR Subpart 25.4 and 25.6.  
Section 2**

**Trim and Auxiliary** (not listed under Section 1), **Locks**, and **Exit Devices** are manufactured in Taiwan and qualify for BAA and ARRA Government projects under the Buy American Act provisions of FAR clause 52.225.23 as a designated country and the Recovery Act provisions of section 1605, Subpart 25.6- ARRA-Buy American Act-Construction Materials, 25.603 Exceptions, as a favored nation and meet the exceptions described in "25.101 General" and "25.103 Exceptions" of the FAR (Federal Acquisition Regulations).

The products in this section qualify as a WTO GPA country. On projects less than \$2,000 and more than \$7.8 million, these products are equal to domestically produced products.

These products can also be used anytime the contracting officer or Government Agency agrees to be bound by the trade agreements or uses the "public interest" exception for expedited projects.

**Door Closers** are made in China, however 25.603 provides for the contracting officer to incorporate foreign construction materials without regard to the restrictions of section 1605 of the Recovery Act or the Buy American Act when one of the following exceptions applies:

1. **Nonavailability**  
It may be determined that a particular construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.
2. **Unreasonable cost**  
The contracting officer concludes that a cost of domestic construction material is unreasonable by using an evaluation factor of 6 percent applied to the cost of foreign unmanufactured construction material.
3. **Inconsistent with public interest**  
The head of the agency may determine that application of the restrictions of 1605 of the Recovery Act to a particular construction material would be inconsistent with the public interest.





DIVISION 09 – FINISHES  
SECTION 096800 – CARPET  
FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

SECTION 096800 – CARPET

PART 1 GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Tufted carpet: roll goods or tiles, as applicable and as specified.
2. Carpet cushion, as specified.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate required.
- B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
  1. Carpet: 12-inch- square sample.
  2. Exposed Edge Stripping and Accessory: 12-inch- long samples.
  3. Carpet Cushion: 6-inch- square sample.
  4. Carpet Seam: 6-inch sample.
- C. Maintenance Data: For carpet to include in maintenance manuals specified in DIVISION 01. Include the following:
  1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements with not less than 5 years of experience with carpet similar to types specified in this section.

- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Product Options: Products and manufacturers named in Part 2 establish requirements for product quality in terms of appearance, construction, and performance. Other manufacturers' products comparable in quality to named products and complying with requirements may be considered. Refer to DIVISION 01 Section "Substitutions."
- D. Mockups: Before installing carpet, install mockups for each type of carpet installation required demonstrating aesthetic effects and qualities of materials and execution. Install mockups to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Install mockups in the location and of the size indicated or, if not indicated, as directed by Contracting Officer to demonstrate the aesthetics effects and execution.
  - 2. Notify Contracting Officer seven days in advance of dates and times when mockups will be installed.
  - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
  - 4. Obtain Contracting Officer's approval of mockups before starting work.
  - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
  - 6. Remove mockups when directed.
  - 7. Approved mockups may become part of the completed work if undamaged at time of substantial completion.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

General: Comply with CRI 104, Standard for Installation of Commercial Carpet.

#### 1.06 PROJECT CONDITIONS

- A. General: Comply with CRI 104, Standard for Installation of Commercial Carpet.
- B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

#### 1.07 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive the Government of other rights the Government may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Carpet Warranty: Written warranty, signed by carpet manufacturer agreeing to replace carpet that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
  - 1. Warranty Period: 10 years from date of substantial completion.
- C. Special Carpet Cushion Warranty: Written warranty, signed by carpet cushion manufacturer agreeing to replace carpet cushion that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet cushion due to unusual traffic, failure of substrate, vandalism, or abuse. Failure includes, but is not limited to, permanent indentation or compression.

1. Warranty Period: 10 years from date of substantial completion.

## PART 2 PRODUCTS

### 2.01 DESCRIPTION

Provide loop pile, cut pile, or cut-and-loop pile carpet as specified or indicated on the drawings. Provide carpet in all locations designated to receive carpet. Provide samples of three different lines of manufacturer's standard carpet samples, from three different manufacturers, that comply with the requirements for each location (9 different samples total). In general, provide earth tones and incorporate similar colors used in the interior color scheme. All carpet shall contain a definite, repetitive pattern. Submissions shall include one of the following: free flowing, artistic, stripes, and geometric forms and shapes. Solid colors shall not be used. Government shall be responsible for final selection.

### 2.02 CARPET – LOOP PILE – NYLON FIBERS

- A. Available Product[s]: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  1. Tufted Carpet Tile – Textured Pattern Loop Pile, as applicable.
    - a. Color: As selected by Contracting Officer from manufacturer's full range.
- B. Size: 24-inches by 24-inches (24" x 24").
- C. Fiber Content: Nylon fibers containing post consumer content. Carpet fiber shall contain the highest practicable percentage of material, which has been recovered or diverted from solid waste (e.g., post consumer waste), but not including material reused in a manufacturing process. Where two materials have comparable price and performance, the one having the higher recovered material content shall be selected.
- D. Dye Method: Solution Dyed.
- E. Surface Pile Weight: 28 oz./sq. yd.<sup>3</sup>, minimum
- F. Gauge: 1/8 inch, minimum
- G. Density: 8,000 oz./yd.<sup>3</sup>, minimum
- H. Texture Appearance Retention Rating (TARR): Carpet shall meet TARR ratings specified in the table below. Carpet shall be evaluated using ASTM D-5252 Hexapod Drum Test as per the commercial carpet test procedure and TARR classification determined using ASTM D-7330.

Space Definition	Traffic Classification	TARR Classification
Private Offices	Moderate	≥ 3.0 TARR
Training, Conference, Courtrooms, etc.	Heavy	≥ 3.0 TARR
Open Office, Cafeteria, Corridors, Lobbies	Severe	≥ 3.5 TARR

- I. Primary Backing: Manufacturer's standard synthetic material.

### 2.03 CARPET CUSHION

- A. Polyurethane-Foam Cushion: Bonded.
  1. Compression Force Deflection at 50 Percent: 15.0 psi per ASTM D 3574.
  2. Thickness: 3/8" to 1/2"
  3. Density: 5.0-lb/cu ft.

- B. Bonded polyurethane carpet cushion shall contain the highest practicable percentage of material which has been recovered or diverted from solid waste (e.g., post consumer waste), but not including material reused in a manufacturing process. Where two materials have comparable price and performance, the one having the higher recovered material content shall be selected.

## 2.04 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by the following:
  - 1. Carpet manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by the following:
  - 1. Carpet manufacturer.
  - 2. Carpet cushion manufacturer.
- C. Tackless Carpet Stripping: Water-resistant plywood in strips as required to match cushion thickness and that complies with CRI 104, Standard for Installation of Commercial Carpet.
- D. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.
- E. Resilient or Metal Edge Strips: As specified, rubber or extruded aluminum with mill finish of width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. General: Comply with CRI 104, Standard for Installation of Commercial Carpet, and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Broom and vacuum clean substrates to be covered immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.03 INSTALLATION – As applicable, provide the following:

- A. Direct-Glue-Down Installation: Comply with CRI 104, Standard for Installation of Commercial Carpet.
- B. Double-Glue-Down Installation: Comply with CRI 104, Standard for Installation of Commercial Carpet.
- C. Carpet with Attached-Cushion Installation: Comply with CRI 104, Standard for Installation of Commercial Carpet.

- D. Stretch-in Installation: Comply with CRI 104, Standard for Installation of Commercial Carpet.
- E. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- F. Glue-Down Installation: Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.
- G. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
  - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by the following:
    - a. Carpet manufacturer.
    - b. Carpet cushion manufacturer.
  - 2. Subfloor finishes comply with requirements specified in DIVISION 03 Section "Cast-in-Place Concrete" for slabs receiving carpet.
  - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
  - 4. Subfloor preparation shall be accepted by carpet manufacturer's representative prior to carpet installation.
- H. For wood subfloors, verify the following:
  - 1. Underlayment over subfloor complies with requirements specified in DIVISION 06 Section "Rough Carpentry."
  - 2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
  - 3. Subfloor preparation shall be accepted by carpet manufacturer's representative prior to carpet installation.
- I. Proceed with installation only after unsatisfactory conditions have been corrected.
- J. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
  - 1. Level adjoining border edges.
- K. Do not bridge building expansion joints with carpet.
- L. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- M. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- N. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- O. Install pattern parallel to walls and borders.
- P. Install carpet cushion seams at 90-degree angle with carpet seams.

### 3.04 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
  - 2. Remove yarns that protrude from carpet surface.
  - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI 104, Standard for Installation of Commercial Carpet.
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION 096800



DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING  
SECTION 230900 – INSTRUMENTATION AND CONTROL FOR HVAC  
ENERGY MANAGEMENT AND CONTROL SYSTEM (EMCS)  
FAIRCHILD GUIDE SPECIFICATION

**Note: NOTE: Incorporate in whole the information in this guide specification, developed by the 92d Civil Engineer Squadron Engineering Flight, to develop UFGS specifications for this section.**

**Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.**

SECTION 230900 – INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish a totally native BACnet-based system based on a distributed control system in accordance with this specification. The operator's workstation, all building controllers, application controllers, and all input/output devices shall communicate using the protocols and network standards as defined by the latest version of ANSI/ASHRAE Standard 135, BACnet. In other words, all workstations and controllers, including unitary controllers, shall be native BACnet devices. No gateways shall be used for communication to controllers installed under this section. Gateways may be used for communication to existing systems or to systems installed under other sections.
- B. Provide all necessary BACnet-compliant hardware and software to meet the system's functional specifications
- C. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.
- D. Implement the detailed design for all analog and binary objects, system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.
- E. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.
- F. Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.
- G. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.
- H. Provide supervisory specialists and technicians at the job site to assist in all phases of system installation, startup, and commissioning.
- I. Provide a comprehensive operator and technician training program as described herein.
- J. Provide as-built documentation, operator's terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.
- K. Provide new sensors, dampers, valves, and install only new electronic actuators. No used components shall be used as any part or piece of installed system. ***[This paragraph can be revised to re-use existing Sensors/Valves/Actuators in this paragraph. You may want to specify where to look on the attached point list for the description of new or re-used devices.]***

## 1.02 SYSTEM DESCRIPTION

- A. Distributed logic control system complete with all software and hardware functions shall be provided and installed. System shall be completely based on the latest version of ANSI/ASHRAE Standard 135, BACnet. This system is to control all mechanical equipment, including all unitary equipment such as VAV boxes, heat pumps, fan-coils, AC units, etc. and all air handlers, boilers, chillers, and any other listed equipment using native BACnet-compliant components. Non-BACnet-compliant or proprietary equipment or systems (including gateways) shall not be acceptable and are specifically prohibited. ***[Add irrigation, lighting control, any other monitoring in this paragraph if desired in project to make sure it is included in project bids and delivered by contractors. Also make sure that provision and installation of these additional control products are coordinated in the other mechanical and electrical sections.]***
- B. Operator's workstation software shall use the latest applicable version of Windows as the computer operating system. The Energy Management and Control System (EMCS) application program shall be written to communicate specifically utilizing BACnet protocols. Software functions delivered on this project shall include password protection, scheduling (including optimum start), alarming, logging of historical data, full graphics including animation, after-hours billing program, demand limiting, full suite of field engineering tools including graphical programming and applications. Systems using operating systems other than that described above are strictly prohibited. All software required to program application specific controllers and all field level devices and controllers will be left with the Government. All software passwords required to program and make future changes to the system will also become the property of the Government. All software required to make any program changes anywhere in the system along with scheduling, and trending applications will be left with the Government. All software passwords required to program and make future changes to schedules, trends and related program changes will also become the property of the Government. All software required for all field engineering tools including graphical programming and applications will be left with the Government. All software passwords required to program and make future changes to field engineering tools including graphical programming and applications will be left with the Government.
- C. Building controllers shall include complete energy management software, including scheduling building control strategies with optimum start and logging routines. All energy management software and firmware shall be resident in field hardware and shall not be dependent on the operator's terminal. Operator's terminal software is to be used for access to field-based energy management functions only. Provide zone-by-zone direct digital logic control of space temperature, scheduling, runtime accumulation, equipment alarm reporting, and override timers for after-hours usage. All application controllers for every terminal unit (VAV, HP, UV, etc.) air handler, all central plant equipment, and any other piece of controlled equipment shall be fully programmable. Application controllers shall be mounted next to controlled equipment and communicate with building controller via BACnet LAN.
- D. Room sensors with digital readouts preferred in occupied areas. Room sensors shall be provided with digital readouts that allow the user to view room temperature, view outside air temperature, adjust the room set point within preset limits and set desired override time. Initial set point shall be pre-determined by FAFB. Provide enable/disable check box on screen with field adjustment initially disabled. Include all necessary wiring and firmware such that room sensor includes field service mode. Field service mode shall allow technician to balance VAV zones and access any parameter in zone controller without additional laptop or handheld computer. ***[If digital readout is not desired replace with the following: Room sensors shall be architecturally pleasing, sense temperature, allow tenant to override system and adjust temperature set point.]***

## 1.03 APPROVED MANUFACTURERS

- A. The base bid shall be the BACtalk system from Alerton. **No substitutions will be allowed.**



#### 1.04 QUALITY ASSURANCE

- A. ***[The bidder shall be regularly engaged in the design, installation and maintenance of BAS systems and shall have demonstrated technical expertise and experience in the design, installation and maintenance of BAS systems similar in size and complexity to this project. Bidders shall provide a list of at least 3 projects, similar in size and scope to this project completed within the past 3 years.]***
- B. The BAS system shall be designed and installed, commissioned and serviced by factory trained personnel. Manufacturer shall have an in-place support facility within 2 hours response time of the site with technical staff, spare parts inventory and necessary test and diagnostic equipment. The control contractor shall provide an experienced project manager for this work, responsible for direct supervision of the design, installation, start up and commissioning of the BAS system. All control drawings, submittal package, graphics, and programming shall be accomplished by local technicians and project managers, so that all changes will be accurately reflected, and that any modifications may be made expeditiously in the field.
- C. Materials and equipment shall be the catalogued products of manufacturers regularly engaged in production and installation of automatic temperature control systems and shall be manufacturer's latest standard design that complies with the specification requirements.
- D. All BAS peer-to-peer network controllers, central system controllers and local user displays shall be UL Listed under Standard UL 916, category PAZX. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.
- E. Control system shall be engineered, programmed and supported completely by the representative's local office that must be within 100 miles of project site.

#### 1.05 REFERENCE STANDARDS

- A. The latest edition of the following standards and codes in effect and amended as of supplier's proposal date, and any applicable subsections thereof, shall govern design and selection of equipment and material supplied:
  - 1. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
  - 2. ANSI/ASHRAE Standard 135-2001, BACnet.
  - 3. Uniform Building Code (UBC), including local amendments.
  - 4. UL 916 Underwriters Laboratories Standard for Energy Management Equipment. Canada and the US.
  - 5. National Electrical Code (NEC).
  - 6. FCC Part 15, Subpart J, Class A
  - 7. EMC Directive 89/336/EEC (European CE Mark)
  - 8. UL-864 UUKL listing for Smoke Controls for any equipment used in smoke control sequences
- B. City, county, state, and federal regulations and codes in effect as of contract date.
- C. Except as otherwise indicated the system supplier shall secure and pay for all permits, inspections, and certifications required for his work and arrange for necessary approvals by the governing authorities.

#### 1.06 SUBMITTALS

- A. Drawings

1. The system supplier shall submit engineered drawings, control sequence, and bill of materials for approval.
2. Drawings shall be submitted in the following standard sizes: 11" x 17" (ANSI B).
3. Three complete sets (copies) of submittal drawings shall be provided.
4. All drawings shall be provided on a CD-ROM in an editable format of Visio or AutoCAD.

**B. System Documentation**

1. Include the following in submittal package:
  - a. System configuration diagrams in simplified block format.
  - b. All input/output object listings and an alarm point summary listing.
  - c. Electrical drawings that show all system internal and external connection points, terminal block layouts, and terminal identification.
  - d. Complete bill of materials, valve schedule and damper schedule.
  - e. Manufacturer's instructions and drawings for installation, maintenance, and operation of all purchased items.
  - f. Overall system operation and maintenance instructions—including preventive maintenance and troubleshooting instructions.
  - g. For all system elements—operator's workstation(s), building controller(s), application controllers, routers, and repeaters,—provide BACnet Protocol Implementation Conformance Statements (PICS) as per ANSI/ASHRAE Standard 135-2001.
  - h. Provide complete description and documentation of any proprietary (non-BACnet) services and/or objects used in the system.
  - i. A list of all functions available and a sample of function block programming that shall be part of delivered system.

**C. Project Management**

1. The vendor shall provide a detailed project design and installation schedule with time markings and details for hardware items and software development phases. Schedule shall show all the target dates for transmission of project information and documents and shall indicate timing and dates for system installation, debugging, and commissioning.

**D. BACnet Device Object Naming Conventions *[Optional]***

1. The BAS manufacturer's representative shall submit a BACnet Device Object Naming Convention Plan (DONCP) to the Government and consulting engineer during the submittal process. The plan must be approved by the Government and consulting engineer prior to implementation. It is the responsibility of the BAS contractor to coordinate the DONCP with the Government and consulting engineer.
2. The DONCP shall be designed to eliminate any confusion between individual points in a facility/campus wide EMCS system. It will also be designed to allow for future expansion and consistency. Each device on a BACnet internetwork (including other manufacturer's devices) must have a unique device instance. This is a major consideration when adding to an existing system or interconnecting networks. Thorough and accessible site documentation is critical.
3. A consistent object (point) naming convention shall be used to facilitate familiarity and operational ease across an eventual large campus or inventory of facilities. The following section is designed as recommendations only. It is the responsibility of the BAS contractor to coordinate the DONCP with the Government and consulting engineer.

4. BACnet requires that all devices have a Device object name that is unique throughout the entire internetwork. To comply with this requirement all BACnet devices shall be configured with a Device Object Name that is based on the naming conventions described in this section. This includes all physical devices as well as any logical BACnet devices that are represented by gateways. The vendor shall coordinate with the Government staff to ensure that the correct names are used. Device Object Name properties shall support strings of at least 50 characters in length.
- 1.07 WARRANTY
- A. Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of one year from completion of system acceptance.
  - B. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner after failure notification to the vendor. The maximum acceptable response time to provide this service at the site shall be 24 hours Monday through Friday, 48 hours on Saturday and Sunday.
  - C. This warranty shall apply equally to both hardware and software.
- 1.08 RELATED WORK IN OTHER SECTIONS ***[Use this section to spell out those other areas of the specification that the control system contractor needs to review. This should include all contractual items and all areas that will interface with the control systems like lighting, irrigation, chillers, fire alarm, etc.]***
- A. Refer to Division 0 and Division 1 for related contractual requirements.
  - B. Refer to Section 230000 for General Mechanical Provisions.
  - C. Refer to Section 260000 for General Electrical Provisions.

## PART 2 PRODUCTS

### 2.01 OPERATOR'S WORKSTATION

- A. General structure of workstation interaction shall be a standard client/server relationship. Server shall be used to archive data and store system database. Clients shall access server for all archived data. Each client shall include flexibility to access graphics from server or local drive. Server shall support a minimum of 50 clients simultaneously. (Server and operator's workstation is existing.)
- B. BACnet Conformance
  1. Operator's workstation shall as a minimum support Point-to-Point (PTP) and Ethernet BACnet LAN types. It shall communicate directly via these BACnet LANs as a native BACnet device. Operator's terminal shall comply with the requirements of a BACnet conformance class 3 device and support all BACnet services necessary to provide the following BACnet functional groups:
    - a. Clock Functional Group
    - b. Event Response Functional Group
    - c. Time Master Functional Group
    - d. Device Communications
  2. Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
  3. Standard BACnet object types accessed by the workstation shall include as a minimum: Analog Value, Analog Input, Analog Output, Binary Value, Binary Input, Binary Output,

Calendar, Device, Event Enrollment, File, Notification Class, Program and Schedule object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

4. The Operator Workstation shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the LAN. Must support interoperability on wide area networks (WANs), metropolitan area networks (MANs), and campus area networks (CANs). Workstation shall support Foreign Device Registration to allow temporary workstation connection to IP network.

#### C. Displays

1. Operator's workstation shall display all data associated with project as called out on drawings and/or object type list supplied. Graphic files shall be created using digital, full color photographs of system installation, AutoCAD or Visio drawing files of field installation drawings and wiring diagrams from as-built drawings. Operator's workstation shall display all data using three-dimensional graphic representations of all mechanical equipment. System shall be capable of displaying graphic file, text, and dynamic object data together on each display and shall include animation. Information shall be labeled with descriptors and shall be shown with the appropriate engineering units. All information on any display shall be dynamically updated without any action by the user. Workstation shall allow user to change all field-resident EMCS functions associated with the project, such as set points, weekly schedules, exception schedules, etc. from any screen no matter if that screen shows all text or a complete graphic display. This shall be done without any reference to object addresses or other numeric/mnemonic indications.
2. All displays and programming shall be generated and customized by the local EMCS supplier and installer. Systems requiring factory development of graphics or programming of DDC logic are specifically prohibited.
3. Binary objects shall be displayed as "ACTIVE/INACTIVE/NULL". Text shall be justified left, right or center as selected by the user. Also, allow binary objects to be displayed as individual change-of-state graphic objects on the display screen such that they overlay the system graphic. Each binary object displayed in this manner shall be assigned up to three graphic files for display when the point is ON, OFF or in alarm. For binary outputs, toggle the object's commanded status when the graphic item is selected with the system mouse. Similarly, allow the workstation operator to toggle the binary object's status by selecting with the mouse a graphic of a switch or light, for example, which then displays a different graphic (such as an "ON" switch or lighted lamp). Additionally, allow binary objects to be displayed as an animated graphic. Animated graphic objects shall be displayed as a sequence of multiple graphics to simulate motion. For example: when a pump is in the OFF condition, display a stationary graphic of the pump. When the operator selects the pump graphic with the mouse, the represented object's status is toggled and the graphic of the pump's impeller rotates in a time-based animation. The operator shall be able to click on an animated graphical object or switch it from the OFF position to ON, or ON to OFF. Allow operator to change graphic file assignment and also create new and original graphics online. System shall be supplied with a library of standard graphics, which may be used unaltered or modified by the operator. Systems that do not allow customization or creation of new graphic objects by the operator (or with third-party software) shall not be allowed.
4. Analog objects shall be displayed with operator modifiable units. Analog input objects may also be displayed as individual graphic items on the display screen as an overlay to the system graphic. Each analog input object may be assigned a minimum of five graphic files, each with high/low limits for automatic selection and display of these graphics. As an example, a graphic representation of a thermometer would rise and fall in response to either the room temperature or its deviation from the controlling set point.

Analog output objects, when selected with the mouse, shall be displayed as a prompted dialog (text only) box. Selection for display type shall be individual for each object. Analog object values may be changed by selecting either the “increase” or “decrease” arrow in the analog object spinner box without using the keypad. Pressing the button on the right side of the analog object spinner box allows direct entry of an analog value and accesses various menus where the analog value may be used, such as trend logs.

5. Analog objects may also be assigned to an area of a system graphic, where the color of the defined area changes based on the analog object’s value. For example, an area of a floor-plan graphic served by a single control zone would change color with respect to the temperature of the zone or its deviation from set point. All editing and area assignment shall be created or modified online using simple icon tools.
6. A customized menu label (push-button) shall be used for display selection. Menu items on a display shall allow penetration to lower level displays or additional menus. Dynamic point information and menu label push buttons may be mixed on the same display to allow sub-displays to exist for each item. Each display may be protected from viewing unless operator has appropriate security level. A security level may be assigned to each display and system object. The menu label shall not appear on the graphic if the operator does not have the appropriate security level.
7. A mouse shall be used to move the pointer arrow to the desired item for selection of new display or to allow the operator to make changes to object data.

#### D. Password Protection

1. Provide security system that prevents unauthorized use unless operator is logged on. Access shall be limited to operator’s assigned functions when user is logged on. This includes displays as outlined above.
2. Each operator’s terminal shall provide security for 200 users minimum. Each user shall have an individual User ID, User Name and Password. Entries are alphanumeric characters only and are case sensitive (except for User ID). User ID shall be 0–8 characters, User Name shall be 0–29 characters, and Password shall be 4–8 characters long. Each system user shall be allowed individual assignment of only those control functions and menu items to which that user requires access. All passwords, user names, and access assignments shall be adjustable online at the operator’s terminal. Each user shall also have a set security level, which defines access to displays and individual objects the user may control. System shall include 10 separate and distinct security levels for assignment to users.
3. System shall include an Auto Logout Feature that shall automatically logout user when there has been no keyboard or mouse activity for a set period of time. Time period shall be adjustable by system administrator. Auto Logout may be enabled and disabled by system administrator. Operator terminal shall display message on screen that user is logged out after Auto Logout occurs.

#### E. Operator Activity Log

1. Operator Activity Log shall be included with system that tracks all operator changes and activities. System shall track what is changed in the system, who performed this change, date and time of system activity and value of the change before and after operator activity. Operator shall be able to display all activity, sort the changes by user and also by operation.
2. Log shall be gathered and archived to hard drive on operator workstation as needed. Operator shall be able to export data for display and sorting in a spreadsheet.
3. Any displayed data, that is changeable by the operator, may be selected using the right mouse button and the operator activity log shall then be selectable on the screen.

Selection of the operator activity log using this method shall show all operator changes of just that displayed data.

#### F. Scheduling

1. Operator's workstation shall show all information in easy-to-read daily format including calendar of this month and next. All schedules shall show actual ON/OFF times for day based on scheduling priority. Priority for scheduling shall be events, holidays and daily with events being the highest.
2. Holiday and special event schedules shall display data in calendar format. Operator shall be able to schedule holidays and special events directly from these calendars.
3. Operator shall be able to change all information for a given weekly or exception schedule if logged on with the appropriate security access.
4. System shall include a Schedule Wizard for set up of schedules. Wizard shall walk user through all steps necessary for schedule generation. Wizard shall have its own pull-down selection for startup or may be started by right clicking on value displayed on graphic and then selecting Schedule.
5. Scheduling shall include optimum start based on outside air temperature, current heating/cooling set points, indoor temperature and history of previous starts. Each and every individual zone shall have optimum start time independently calculated based on all parameters listed. User shall input schedules to set time that occupied set point is to be attained. Optimum start feature shall calculate the startup time needed to match zone temperature to set point. User shall be able to set a limit for the maximum startup time allowed.

#### G. Alarm Indication and Handling

1. Operator's workstation shall provide audible, visual, and printed means of alarm indication. The alarm dialog box shall always become the top dialog box regardless of the application(s), currently running. Printout of alarms shall be sent to the assigned terminal and port.
2. System shall provide log of alarm messages. Alarm log shall be archived to the hard disk of the system operator's terminal. Each entry shall include a description of the event-initiating object generating the alarm. Description shall be an alarm message of at least 256 characters in length. Entry shall include time and date of alarm occurrence, time and date of object state return to normal, time and date of alarm acknowledgment and identification of operator acknowledging alarm .
3. Alarm messages shall be in user-definable text (English or other specified language) and shall be entered either at the operator's terminal or via remote communication.
4. System shall include an Alarm Wizard for set up of alarms. Wizard shall walk user through all steps necessary for alarm generation. Wizard shall have its own pull-down selection for startup or may be started by right clicking on value displayed on graphic and then selecting alarm setup.
5. System shall include the provision to e-mail and dial out alarms to pagers, cell phones, or workstations, as desired.

#### H. Trend Log Information

1. System server shall periodically gather historically recorded data stored in the building controllers and archive the information. Archived files shall be appended with new sample data, allowing samples to be accumulated. Systems that write over archived data shall not be allowed, unless limited file size is specified. Samples may be viewed at the operator's workstation. Operator shall be able to scroll through all trended data. All trend log information shall be displayed in standard engineering units.

2. Software shall be included that is capable of graphing the trend logged object data. Software shall be capable of creating two-axis (x,y) graphs that display up to ten object types at the same time in different colors. Graphs shall show object values relative to time.
  3. Operator shall be able to change trend log setup information. This includes the information to be logged as well as the interval at which it is to be logged. All input, output, and value object types in the system may be logged. All operations shall be password protected. Setup and viewing may be accessed directly from any and all graphics on which object is displayed.
  4. System shall include a trend Wizard for setup of logs. Wizard shall walk user through all necessary steps. Wizard shall have its own pull-down selection for startup, or may be started by right clicking on value displayed on graphic, and then selecting Trend logs from the displayed menu.
  5. Trend logs shall record based upon time interval or change of value, as desired.
- I. Energy Log Information
1. System server shall be capable of periodically gathering energy log data stored in the field equipment and archive the information. Archive files shall be appended with new data, allowing data to be accumulated. Systems that write over archived data shall not be allowed unless limited file size is specified. Display all energy log information in standard engineering units.
  2. All data shall be stored in data base file format for direct use by third-party programs. Operation of system shall stay completely online during all graphing operations.
  3. Operator shall be able to change the energy log setup information as well. This includes the meters to be logged, meter pulse value, and the type of energy units to be logged. All meters monitored by the system may be logged. System shall support using flow and temperature sensors for BTU monitoring.
  4. System shall display archived data in tabular format form for both consumption and peak values. Data shall be shown in hourly, daily, weekly, monthly and yearly formats. In each format the user shall be able to select a specific period of data to view.
- J. Demand Limiting
1. System shall include demand limiting program that includes two types of load shedding. One type of load shedding shall shed/restore equipment in binary fashion based on energy usage when compared to shed and restore settings. The other type of shedding shall adjust operator selected control set points in an analog fashion based on energy usage when compared to shed and restore settings. Shedding may be implemented independently on each and every zone or piece of equipment connected to system.
  2. Binary shedding shall include minimum of 5 priority levels of equipment shedding. All loads in a given priority level shall be shed before any loads in a higher priority level are shed. Load shedding within a given priority level shall include two methods. In one the loads shall be shed/restored in a "first off-first on" mode and in the other the loads are just shed/restored in a linear fashion.
  3. Analog shed program shall generate a ramp that is independently used by each individual zone or individual control algorithm to raise the appropriate cooling setting and lower appropriate heating setting to reduce energy usage.
  4. Status of each and every load shed program shall be capable of being displayed on every operator terminal connected to system. Status of each load assigned to an individual shed program shall be displayed along with English description of each load.
- K. Tenant Activity

1. System shall include program that monitors after-hours overrides by tenants, logs that data and generates a bill based on usage and rate charged for each tenant space. Tenant Activity program shall be able to assign multiple zones, from a list of every zone connected to system, to a particular tenant. Every zone is monitored for after-hour override usage and that data logged in server. Operator may then generate a bill based on the usage for each tenant and the rate charged for any overtime use.
  2. Configuration shall include entry of the following information for use in logging and billing.
    - a. Tenants contact name and address
    - b. One or multiple tenant zones that make up a total tenant space including a separate billing rate for each separate zone.
    - c. Minimum and maximum values an event duration and event limit
    - d. Property management information
    - e. Overall billing rate
    - f. Seasonal adjustments or surcharge to billing rate
    - g. Billing notification type such including, but not limited to printer, file and email
    - h. Billing form template
  3. Logging shall include recording the following information for each and every tenant event.
    - a. Zone description
    - b. Time the event begins
    - c. Total override time
    - d. Limits shall be applied to override time
  4. A tenant bill shall be generated for a specific period using all the entered configuration data and the logged data. User with appropriate security level shall be able to view and override billing information. User shall be able to select a billing period to look to view and be able to delete events from billing and be able to edit a selected tenant activity event's override time.
- L. Configuration/Setup
1. Provide means for operator to display and change system configuration. This shall include, but not be limited to, system time, day of the week, date of daylight savings set forward/set back, printer termination, port addresses, modem port and speed, etc. Items shall be modified using understandable terminology with simple mouse/cursor key movements.
- M. Field Engineering Tools
1. Operator's workstation software shall include field-engineering tools for programming all controllers supplied. All controllers shall be programmed using graphical tools that allow the user to connect function blocks on screen that provide sequencing of all control logic. Function blocks shall be represented by graphical displays that are easily identified and distinct from other types of blocks. Graphical programming that uses simple rectangles and squares is not acceptable.
  2. User shall be able to pick graphical function block from menu and place on screen. Provide zoom in and zoom out capabilities. Function blocks shall be downloaded to controller without any reentry of data.
  3. Programming tools shall include a real time operation mode. Function blocks shall display real time data and be animated to show status of data inputs and outputs when in



real time operation. Animation shall show change of status on logic devices and countdown of timer devices in graphical format.

4. Field engineering tools shall also include a database manager of applications that include logic files for controllers and associated graphics. Operator shall be able to select unit type, input/output configuration and other items that define unit to be controlled. Supply minimum of 250 applications as part of workstation software.
5. Field engineering tool shall include Device Manager for automatic detection of devices connected anywhere on the BACnet network by scanning of the entire network. This function shall display device instance, network identification, model number and description of connected devices. It shall record and display software file loaded into each controller. A copy of each file shall be stored on the computer's hard drive. If needed, this file shall be downloaded to the appropriate controller by selection using the mouse.
6. System shall include backup/restore function that will back up entire system to selected medium and then restore system from that media.

#### N. Software

1. At the conclusion of project, contractor shall leave with Government a CD ROM/DVD that includes the complete system installation and project graphics, set points, system parameters, etc. This backup shall allow the Government to completely restore the installed system in the case of a computer malfunction.

## 2.02 BUILDING CONTROLLER

### A. General Requirements

1. Building Controller shall be approved by the BTL as meeting the BACnet Building Controller requirements.
2. Building controller shall be of scalable design such that the number of trunks and protocols may be selected to fit the specific requirements of a given project.
3. The controller shall be capable of panel-mounted on DIN rail and/or mounting screws.
4. The controller shall be capable of providing global control strategies for the system based on information from any objects in the system, regardless if the object is directly monitored by the building controller module or by another controller.
5. The controller shall be capable of running up to six (6) independent control strategies simultaneously. The modification of one control strategy does not interrupt the function or runtime others.
6. The software program implementing the DDC strategies shall be completely flexible and user-definable. All software tools necessary for programming shall be provided as part of project software. Any systems utilizing factory pre-programmed global strategies that cannot be modified by field personnel on-site, using a wide area network (WAN) or downloaded through remote communications are not acceptable. Changing global strategies using firmware changes is also unacceptable.
7. Programming shall be object-oriented using control function blocks and support DDC functions. All flowcharts shall be generated and automatically downloaded to controller. Programming tool shall be supplied and be resident on workstation. The same tool shall be used for all controllers.
8. The programming tool shall provide means to graphically view inputs and outputs to each program block in real-time as program is executing. This function may be performed using the operator's workstation or field computer.

9. Controller shall have 6,000 Analog Values and 6,000 Binary Values.
10. Controller IP configuration can be done via a direct USB connect with an operator's workstation or field computer.
11. Controller shall have at a minimum a Quad Core 996Ghz processor to ensure fast processing speeds.
12. Global control algorithms and automated control functions shall execute using a 64-bit processor.
13. Controller shall have a minimum of 1 GB of DDR3 SDRAM on a 533 MHz bus to ensure high speed data recording, large data storage capacity and reliability.
14. Controller shall support two (2) on-board EIA-485 ports capable of supporting various EIA-485 protocols including, but not limited to BACnet MS/TP and Modbus.  
Ports are capable of supporting various EIA-485 protocols including, but not limited to BACnet MS/TP and Modbus.
15. Controller shall support two (2) ports—each of gigabit speed—Ethernet (10/100/1000) ports.  
Ports are capable of supporting various Ethernet protocols including, but not limited to BACnet IP, FOX, and Modbus.
16. All ports shall be capable of having protocol(s) assigned to utilize the port's physical connection.
17. The controller shall have at a minimum four (4) onboard inputs, two (2) universal inputs and two (2) binary inputs.
18. Schedules  
Building controller modules shall provide normal seven-day scheduling, holiday scheduling and event scheduling.  
Each building controller shall support a minimum of 380 BACnet Schedule Objects and 380 BACnet Calendar Objects.
19. Logging Capabilities  
Each building controller shall log as minimum 2,000 objects at 15-minute intervals. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.  
Logs may be viewed either on-site or off-site using WAN or remote communication.  
Building controller shall periodically upload trended data to networked operator's workstation for long-term archiving if desired.  
Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.
20. Alarm Generation  
Alarms may be generated within the system for any object change of value or state (either real or calculated). This includes things such as analog object value changes, binary object state changes, and various controller communication failures.  
Each alarm may be dialed out as noted elsewhere.  
Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site using remote communications.  
Controller must be able to handle up to 2,000 alarm setups stored as BACnet event enrollment objects, with system destination and actions individually configurable.

## 21. Demand Limiting

Demand limiting of energy shall be a built-in, user-configurable function. Each controller module shall support shedding of up to 1,200 loads using a minimum of two types of shed programs.

Load shedding programs in building controller modules shall operate as defined in section 2.1.J of this specification.

## 22. Tenant Activity Logging

Tenant Activity logging shall be supported by a building controller module. Each independent module shall support a minimum of 380 zones.

Tenant Activity logging shall function as defined in section 2.1.K of this specification.

## B. BACnet MS/TP

BACnet MS/TP LAN must be software-configurable from 9.6 to 115.4Kbps

Each BACnet MS/TP LAN shall support 64 BACnet devices at a minimum.

All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

## C. BACnet IP

The building controller shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the local area network (LAN).

Must support interoperability on WANs and campus area networks (CANs), and function as a BACnet Broadcast Management Device (BBMD).

Each controller shall support at a minimum 128 BBMD entries.

BBMD management architecture shall support 3,000 subnets at a minimum.

Shall support BACnet Network Address Translation.

All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

## D. Expansion Ports

1. Controller shall support two (2) expansion ports.

Combining the two on-board EIA-458 ports with fully loaded expansion ports, the controller shall support six (6) EIA-485 trunks simultaneously.

2. Expansion cards that mate to the expansion ports shall include:

Dual port EIA-485 card.

LON network card.

## E. Niagara Framework

1. Controller shall utilize the Tridium Niagara Framework.

Niagara Framework shall be version 3.8 or newer.

All Niagara licensing shall be stored on a removable MicroSD card for fast in-field replacement of controller.

2. The Niagara License for the controllers shall be an open license.

The controller shall be programmable via Niagara Workplace programming tool.

The controller shall be programmable via a Niagara embedded Workplace programming tool.

F. Power Supply

1. Input for power shall accept between 17 and 30VAC, 47 and 63Hz.
2. Optional rechargeable battery for shutdown of controller including storage of all data in flash memory.
3. On-board capacitor will ensure continuous operation of real-time clocks for minimum of 14 days.

G. Controller shall be in compliance with the following:

1. UL 916 for open energy management
2. FCC Class B
3. ROHS
4. IEC 60703
5. C-Tick Listed

H. Controller shall operate in the following environmental conditions:

1. -4 to 149 °F (-20 to 65 °C) without optional battery, or 32 to 122 °F (0 to 50 °C) with optional battery.
2. 0 to 95% relative humidity (RH), non-condensing.

## 2.03 CENTRAL PLANT AND AIR HANDLER APPLICATION CONTROLLERS

A. Provide one or more native BACnet application controllers for each air handler and provide native BACnet application controllers as needed for central plant control that adequately cover all objects listed in object list. All controllers shall interface to building controller through either MS/TP LAN using BACnet protocol, or Ethernet LAN using BACnet over Ethernet or BACnet TCP/IP. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of units. Controllers shall be fully programmable using graphical programming blocks. Programming tool shall be resident on operator workstation and be the same tool as used for the building controller. No auxiliary or non-BACnet controllers shall be used.

B. BACnet Conformance

Application controllers shall be approved by the BTL as meeting the BACnet Advanced Application Controller requirements.

Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

Standard BACnet object types supported shall include, as a minimum, Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Multi-state Values, Device, File, and Program object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. Application controllers shall include universal inputs with 12-bit resolution that accept 3K and 10K thermistors, 0–10VDC, Platinum 1000 ohm RTD, 0–5VDC, 4–20mA and dry contact signals. Any input on a controller may be either analog or digital with a minimum of three inputs that accept pulses. Controller shall also include support and modifiable programming for interface to intelligent room sensor with digital display. Controller shall include binary and analog outputs on board. Analog

outputs with 12-bit resolution shall support either 0–10VDC or 0–20mA. Binary outputs shall have LED indication of status. Software shall include scaling features for analog outputs. Application controller shall include 20VDC voltage supply for use as power supply to external sensors.

All outputs must have onboard Hand-Off-Auto (HOA) switches and a status indicator light. HOA switch position shall be monitored. Each analog output shall include a potentiometer for manually adjusting the output when the HOA switch is in the Hand position.

The position of each and every HOA switch shall be available system wide as a BACnet object property.

D. All program sequences shall be stored on board application controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller up to 20 times per second (minimum of 10 times per second) and capable of multiple PID loops for control of multiple devices. All calculations shall be completed using floating-point math and system shall support display of all information in floating-point nomenclature at operator's terminal.

The following control blocks shall be supported:

Natural Log

Exponential

Log base 10

X to the power of Y

Nth square root of X

5th Order Polynomial Equations

Astronomical Clock (sunrise/sunset calculation)

Time based schedules

E. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely using modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using programming tools as described in operator's terminal section.

F. Application controller shall include support for intelligent room sensor (see Section 2.10.B.) Display on intelligent room sensor shall be programmable at application controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode, based on which button is pressed on the sensor. See sequence of operation for specific display requirements at intelligent room sensor.

G. Schedules

The controller shall support a minimum of 3 BACnet Schedule Objects and have a real time clock on board with battery backup to maintain time through a power loss.

H. Logging Capabilities

Controller shall support a minimum of 50 trendlogs. Any object in the controller (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.

Controller shall periodically upload trended data to system server for long-term archiving if desired. Archived data stored in (MS Jet Database or SQL) database form and shall be available for use in third-party spreadsheet or database programs.

I. Alarm Generation

Alarms may be generated within the controller for any object change of value or state (either real or calculated). This includes things such as analog object value changes, and binary object state changes.

Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site using remote communications.

Controller must be able to handle up to 25 alarm setups stored as BACnet event enrollment objects, with system destination and actions individually configurable.

J. The controller processor shall be a 32-bit processor.

K. The packaging of the controller shall provide operable doors to cover the terminals once installation is complete. The housing of the controller shall provide for DIN rail mounting and also fully enclose circuit board.

2.04 EXPANDABLE CENTRAL PLANT APPLICATION CONTROLLERS [***This section is only needed for projects where expandable/stand-alone Central Plant and AHU controllers are required, or for systems that require MONITORED H-O-A SWITCHES FOR BINARY AND ANALOG OUTPUTS. Delete for other projects.***]

A. General

1. Expandable application controller shall be capable of providing control strategies for the system based on information from any or all connected inputs. The program that implements these strategies shall be completely flexible and user definable. Any systems utilizing factory pre-programmed global strategies that cannot be modified by field personnel on-site via simple download are not acceptable. Changing global strategies via firmware changes is also unacceptable. Program execution of controller shall be a minimum of once per second.
2. Programming shall be object-oriented using control program blocks. Controller shall support a minimum of 500 Analog Values and 500 Binary Values. Each and every analog and binary value shall support standard BACnet priority arrays. Programming tool shall be provided with system and shall be the same tool that is used to program the Building Controller. All flowcharts shall be generated and automatically downloaded to controller. No re-entry of database information shall be necessary.
3. Provide means to graphically view inputs and outputs to each program block in real-time as program is executing. This function may be performed via the operator's terminal or field computer.
4. Controller shall have adequate data storage to ensure high performance and data reliability. Battery shall retain static RAM memory and real-time clock functions for a minimum of 1.5 years (cumulative). Battery shall be a field-replaceable (non-rechargeable) lithium type. Unused battery life shall be 10 years.
5. The onboard, battery-backed real time clock must support schedule operations and trend logs.
6. Global control algorithms and automated control functions should execute via 32-bit processor.
7. Controller shall include both on-board 10BASE-T/100BASE-TX Ethernet BACnet communication over twisted pair cable (UTP) and shall include BACnet IP communication. In addition, controller shall include BACnet PTP connection port. Controller shall also operate as a device on an MS/TP trunk.
8. The base unit of the controller shall host up to 8 expansion modules with various I/O combinations. These inputs and outputs shall include universal 12-bit inputs, binary triac outputs, and 8-bit switch selectable analog outputs (0-10V or 0-20 mA). Inputs shall support 3K and 10K thermistors, 0-5VDC, 0-10VDC, 4-20mA, dry contacts and pulse inputs directly.

9. All outputs must have onboard Hand-Off-Auto switches and a status indicator light. HOA switch position shall be monitored. Each analog output shall include a potentiometer for manually adjusting the output when the HOA switch is in the Hand position.
10. The position of each and every HOA switch shall be available system wide as a BACnet object. Expandable Central Plant Controller shall provide up to 176 discreet inputs/outputs per base unit.

**B. BACnet Conformance**

1. Central Plant/AHU Controller shall as a minimum support Point-to-Point (PTP), MS/TP and Ethernet BACnet LAN types. It shall communicate directly via these BACnet LANs as a native BACnet device and shall support simultaneous routing functions between all supported LAN types. Building controller shall be a BACnet conformance class 3 device and support all BACnet services necessary to provide the following BACnet functional groups:
  - a. Clock Functional Group
  - b. Files Functional Group
  - c. Reinitialize Functional Group
  - d. Device Communications Functional Group
  - e. Event Initiation Functional Group
2. Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All necessary tools shall be supplied for working with proprietary information.
3. Standard BACnet object types supported shall include as a minimum: Analog Input, Binary Input, Analog Output, Binary Output, Analog Value, Binary Value, Device, File, Group, Event Enrollment, Notification Class, Program and Schedule object types. All necessary tools shall be supplied for working with proprietary information.
4. The Controller shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the LAN. Must support interoperability on wide area networks (WANs), metropolitan area networks (MANs), campus area networks (CANs) and function as a BACnet Broadcast Management Device (BBMD).

**C. Schedules**

1. Each Central Plant/AHU controller shall support a minimum of 50 BACnet Schedule Objects.

**D. Logging Capabilities**

1. Each controller shall support a minimum of 200 trend logs. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
2. Controller shall periodically upload trended data to system server for long term archiving if desired.
3. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.

**E. Alarm Generation**

1. Alarms may be generated within the system for any object change of value or state either real or calculated. This includes things such as analog object value changes, binary object state changes, and various controller communication failures.
2. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site via remote communications.
3. Controller must be able to handle up to 200 alarm setups stored as BACnet event enrollment objects – system destination and actions individually configurable.

#### 2.05 TERMINAL UNIT APPLICATION CONTROLLERS (Heat Pumps, AC Units, Fan Coils)

- A. Provide one native BACnet application controller for each piece of unitary mechanical equipment that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller via MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of unit.
- B. BACnet Conformance
  1. Application controllers shall as a minimum support MS/TP BACnet LAN types. They shall communicate directly via this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. ARCNET communication ports shall not be allowed. Application controllers shall be of BACnet conformance class 3 and support all BACnet services necessary to provide the following BACnet functional groups:
    - a. Files Functional Group
    - b. Reinitialize Functional Group
    - c. Device Communications Functional Group
  2. Please refer to section 22.2, BACnet Functional Groups in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
  3. Standard BACnet object types supported shall include as a minimum: Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
- C. Application controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5 VDC, 4–20 mA, dry contact signals and a minimum of 3 pulse inputs. Any input on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor. Controller shall include binary outputs on board with analog outputs as needed.
- D. All program sequences shall be stored on board controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using same programming tools as building controller and as described in operator workstation section. All programming tools shall be provided and installed as part of system.
- E. Application controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on room sensor shall be programmable at controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to



show specific controller data in each mode based on which button is pressed on the sensor. See sequence of operation for specific display requirements at intelligent room sensor.

## 2.06 VAV BOX CONTROLLERS—SINGLE DUCT

- A. Provide one native BACnet application controller for each VAV box that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller via MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include on board CFM flow sensor, inputs, outputs and programmable, self-contained logic program as needed for control of units.
- B. BACnet Conformance
  - 1. Application controllers shall as a minimum support MS/TP BACnet LAN types. They shall communicate directly via this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. ARCNET communication protocols shall not be allowed. Application controllers shall be of BACnet conformance class 3 and support all BACnet services necessary to provide the following BACnet functional groups:
    - a. Files Functional Group
    - b. Reinitialize Functional Group
    - c. Device Communications Functional Group
  - 2. Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
  - 3. Standard BACnet object types supported shall include as a minimum: Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary programming tools shall be supplied for working with proprietary information.
- C. Application controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5 VDC, and dry contact signals. Inputs on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor with digital display. Controller shall also include binary outputs on board. For applications using variable speed parallel fans, provide a single analog output selectable for 0-10 V or 0-20 mA control signals. Application controller shall include microprocessor driven flow sensor for use in pressure independent control logic. All boxes shall be controlled using pressure independent control algorithms and all flow readings shall be in CFM (LPS if metric).
- D. All program sequences shall be stored on board application controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using the same programming tool as Building Controller and as described in operator workstation section. All programming tools shall be provided as part of system.
- E. Application controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on room sensor shall be programmable at application controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is

pressed on the sensor. See sequence for specific display requirements for intelligent room sensor.

- F. On board flow sensor shall be microprocessor driven and pre-calibrated at the factory. Pre-calibration shall be at 16 flow points as a minimum. All factory calibration data shall be stored in EEPROM. Calibration data shall be field adjustable to compensate for variations in VAV box type and installation. All calibration parameters shall be adjustable through intelligent room sensor. Operator workstation, portable computers and special hand-held field tools shall not be needed for field calibration.
- G. Provide duct temperature sensor at discharge of each VAV box that is connected to controller for reporting back to operator workstation.

## 2.07 SENSORS and MISCELLANEOUS DEVICES

### A. Temperature Sensors

- 1. All temperature sensors to be solid-state electronic, interchangeable with housing appropriate for application. Wall sensors to be installed as indicated on drawings. Mount 48 inches above finished floor. Duct sensors to be installed such that the sensing element is in the main air stream. Immersion sensors to be installed in wells provided by control contractor, but installed by mechanical contractor. Immersion wells shall be filled with thermal compound before installation of immersion sensors. Outside air sensors shall be installed away from exhaust or relief vents, not in an outside air intake, and in a location that is in the shade most of the day.

### B. Intelligent Room Sensor with Touchscreen

#### 1. Hardware

- a. Room sensor shall include:

Backlit touchscreen LCD digital display

Temperature sensor

Humidity sensor

Programmable Status Light indicator

CO2 sensor

- b. Temperature sensor shall be a Uni-Curve Type II thermistor with an accuracy of  $\pm 0.36^{\circ}\text{F}$  ( $0.3^{\circ}\text{C}$ ) at calibration point over the range of 32 to 158  $^{\circ}\text{F}$  or better.
- c. Humidity sensor shall have an accuracy of  $\pm 3\%$  from 10 to 90% relative humidity (RH) or better, non-condensing.
- d. The intelligent room sensor's Status Light indicator shall have a minimum of four (4) colors (blue, red, amber and green) that will cast a glow onto the wall below the sensor to be used as visual indicator to the occupants of the condition of the system. The color and on/off state of the Status Light indicator shall be fully programmable.
- e. CO2 sensor shall have an accuracy of  $\pm 30$  ppm over the range of 0-5000 ppm or better.
- f. CO2 sensor shall utilize Automatic Baseline Correction to maintain sensor calibration with the need for manual calibration
- g. The user shall interact with the smart sensor using a touchscreen, with no buttons

allowed.

- h. The intelligent room sensor shall have provisions for a tamper proof installation requiring tools to be removed from the wall.
- i. The touchscreen shall have a surface hardness of Mohs 7 or greater to prevent being easily scratched.
- j. Controller shall function as room control unit, and allow occupant to raise and lower set point, and activate terminal unit for override use—all within limits as programmed by building operator.

## 2. Display Content

- a. The intelligent room sensor shall simultaneously display room set point, room temperature, and outside temperature at each controller.
- b. The intelligent room sensor shall have the ability to add or remove from the display time-of-day, room humidity, and indoor air temperature to customize the view for the customer.
- c. The intelligent room sensor must have the capability to show temperatures in degrees Fahrenheit or degrees Celsius.
- d. A communication loss or improper communications wiring shall be displayed on the LCD screen to aid in trouble shooting.
- e. Information about the version of firmware shall be displayable on the LCD screen.
- f. A cleaning mode will be provided to allow for the touchscreen to be cleaned without inadvertently making changes to system parameters.
- g. The intelligent room sensor shall have the ability to display the status of a lighting zone and control the on/off state of the zone from the touchscreen using a tenant-accessible display page.
- h. The intelligent room sensor shall have the ability to display the status of a window zone (e.g., blinds) and control the on/off state of the zone from the touchscreen using a tenant-accessible display page.
- i. After Hours Override shall:

Override time may be set and viewed in 30-minute increments.

Override time countdown shall be automatic, but may be reset to zero by occupant from the sensor.

Time remaining shall be displayed.

Display shall show the word "OFF" in unoccupied mode unless a function button is pressed.

## 3. Other Modes

- a. The intelligent room sensor shall also allow service technician access to hidden functions for advanced system configuration. This functionality shall be accessed-protected with a configurable PIN number.

- b. Field Service Mode shall allow access to common parameters as dictated by the application's sequence of operations. The parameters shall be viewed and set from the intelligent room sensor with no computer or other field service tool needed.
      - c. If the intelligent room sensor is connected to VAV controller, Balance Mode shall allow a VAV box to be balanced and all air flow parameters viewed. The balancing parameters shall be viewed and set from the intelligent room sensor with no computer or other field service tool needed.
    - 4. Intelligent Room Sensor shall be in compliance of the following:
      - a. UL Standard for Safety 916
      - b. FCC Part 15.107 & 109, Class B, CFR47-15
      - c. EMC Directive 89/336/EEC (European CE Mark)
  - A. Network Connection Tool
    - 1. Network connection tool shall allow technician to connect a laptop to any MS/TP network or at any MS/TP device and view and modify all information throughout the entire BACnet network. Laptop connection to tool shall be via Ethernet or PTP.
    - 2. Provide quick connect to MS/TP LAN at each controller. Tool shall be able to adjust to all MS/TP baud rates specified in the BACnet standard.
    - 3. Provide 1 Network Connection Tool for this project.
- 2.08 Electronic Actuators and Valves
- A. ***[If this project is a retrofit project, include this comment:] [Note: See point list for description of re-used existing sensors, actuators, or valves. Otherwise, provide as described below and called out in the sequence of operation.]***
  - B. Quality Assurance for Actuators and Valves
    - 1. UL Listed Standard 873 and C.S.A. Class 4813 02 certified.
    - 2. NEMA 2 rated enclosures for inside mounting, provide with weather shield for outside mounting.
    - 3. Five-year manufacturer's warranty. Two-year unconditional and three-year product defect from date of installation.
  - C. Execution Details for Actuators and Valves
    - 1. Furnish a Freeze-stat and install "Hard Wire" interlock to disconnect the mechanical spring return actuator power circuit for fail-safe operation. Use of the control signal to drive the actuators closed is not acceptable.
    - 2. Each DDC analog output point shall have an actuator feedback signal, independent of control signal, wired and terminated in the control panel for true position information and troubleshooting. Or the actuator feedback signal may be wired to the DDC as an analog input for true actuator position status.
    - 3. VAV box damper actuation shall be Analog (2-10vdc, 4-20ma).
    - 4. Re-heat valve actuation shall be Analog (2-10vdc, 4-20ma).
    - 5. Primary valve control (AHU, convertors, etc.) shall be Analog (2-10vdc, 4-20ma).
  - D. Actuators for Damper and Control Valves ½" to 6" shall be Electric unless otherwise specified, provide actuators as follows:

1. UL Listed Standard 873 and Canadian Standards association Class 481302 shall certify Actuators.
2. NEMA 2 rated actuator enclosures are. Use additional weather shield to protect actuator when mounted outside.
3. 5 year Manufacturer's Warranty. Two-year unconditional + Three year product defect from date of installation.
4. Mechanical spring shall be provided when specified. Capacitors or other non-mechanical forms of fail-safe are not acceptable.
5. Position indicator device shall be installed and made visible to the exposed side of the Actuator. For damper short shaft mounting, a separate indicator shall be provided to the exposed side of the Actuator.
6. Overload Protection: Actuators shall provide protection against actuator burnout by using an internal current limiting circuit or digital motor rotation sensing circuit. Circuit shall insure that actuators cannot burn out due to stalled damper or mechanical and electrical paralleling. End switches to deactivate the actuator at the end of rotation are acceptable only for Butterfly Valve actuators.
7. A push button gearbox release shall be provided for all non-spring actuators.
8. Modulating actuators shall be 24Vac and consume 10VA power or less.
9. Conduit connectors are required when specified and when code requires it.

E. Damper Actuators:

1. Outside Air and Exhaust Air Damper Actuators shall be Mechanical Spring Return. Capacitors or other non-mechanical forms of fail-safe are not acceptable. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the damper as required.
2. Economizer Actuators shall utilize Analog control 2-10 VDC, Floating control is not acceptable.
3. Electric damper actuators (including VAV box actuators) shall be direct shaft mounted and use a V-bolt and toothed V-clamp causing a cold weld effect for positive gripping. Single bolt or setscrew type fasteners are not acceptable.
4. One electronic actuator shall be direct shaft mounted per damper section. No connecting rods or jackshafts shall be needed. Small outside air and return air economizer dampers may be mechanically linked together if one actuator has sufficient torque to drive both and damper drive shafts are both horizontal installed.
5. Multi-section dampers with electric actuators shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft mounted per damper section. (See below execution section for more installation details.)

F. Valve Actuators 1/2" to 6"

1. Mechanical spring shall be provided on all actuators for pre-heat coil and actuators for AHU heating or cooling coil when units are mounted outside. See plans for fail save flow function: Normal Open or Normal Closed. Capacitors or other non-mechanical forms of fail-safe are not acceptable.
2. All zone service actuators shall be non-spring return unless otherwise specified.
3. The valve actuator shall be capable of providing the minimum torque required for proper valve close off for the required application.
4. All control valves actuators shall have an attached 3-foot cable for easy installation to a junction box.

5. Override handle and gearbox release shall be provided for all non-spring return valve actuators.
- G. Control Valves 1/2" to 6": The BAS contractor shall furnish all specified motorized control valves and actuators. BAS contractor shall furnish all control wiring to actuators. The Plumbing contractor shall install all valves. Equal Percentage control characteristic shall be provided for all water coil control valves. Linear valve characteristic is acceptable for 3-way valves 2-1/2 inch and above.
  1. Characterized Control Valves shall be used for hydronic heating or cooling applications and small to medium AHU water coil applications to 100GPM. Actuators are non-spring return for terminal unit coil control unless otherwise noted. If the coil is exposed to the Outside Air stream then see plans for Spring Return requirement.
    - a. Leakage is Zero percent. Close-off is 200psi. Maximum differential is 30psi. Rangeability is 500:1.
    - b. Valves 1/2 inch through 2 inches shall be nickel-plated forged brass body, NPT screw type connections.
    - c. Valves 1/2 inch through 1-1/4 inches shall be rated for ANSI Class 600 working pressure. Valves 1-1/2 inch and 2 inches shall be rated for ANSI Class 400 working pressure.
    - d. The operating temperature range shall be 0°F to 250° F.
    - e. Stainless steel ball & stem shall be furnished on all modulating valves.
    - f. Seats shall be fiberglass reinforced Teflon.
    - g. Two-way and three-way valves shall have an equal percentage control port. Full stem rotation is required for maximum flow to insure stable BTU control of the coil.
    - h. Three-way valve shall be applicable for both mixing and diverting.
    - i. The characterizing disc is made of TEFZEL and shall be keyed and held secure by a retaining ring.
    - j. The valves shall have a blowout proof stem design.
    - k. The stem packing shall consist of 2 lubricated O-rings designed for on-off or modulating service and require no maintenance.
    - l. The valves shall have an ISO type, 4-bolt flange, for mounting actuator in any orientation parallel or perpendicular to the pipe.
    - m. A non-metallic thermal isolation adapter shall separate valve flange from actuator.
    - n. One fastening screw shall secure the direct coupling of the thermal isolation adapter between the actuator and the valve. This will prevent all lateral or rotational forces from affecting the stem and its packing O-rings.
  2. Globe valves 1/2" to 2" shall be used for steam control or water flow applications.
    - a. Valves shall be bronze body, NPT screw type, and shall be rated for ANSI Class 250 working pressure.
    - b. Valves 1/2 inch (DN15) through 2 inches (DN50) with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (0.1%).
    - c. The operating temperature range shall be 20°F to 280° F.
    - d. Spring loaded TFE packing shall protect against leakage at the stem.
    - e. Two-way valves shall have an equal percentage control port.
    - f. Three-way valves shall a linear control and bypass port.

- g. Mixing and diverting valves must be installed specific to the valve design.
  - 3. Globe Valve 2-1/2" to 6"
    - a. Valves 2-1/2 inch (DN65) through 6 inches (DN50) shall be iron body, 125 lb. flanged with Class III (0.1%) close-off leakage at 50 psi differential.
    - b. Valves with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (0.1%).
    - c. Flow type for two-way valves shall be equal percentage. Flow type for three-way valves shall be linear.
    - d. Mixing and diverting valves must be installed specific to the valve design.
- H. Butterfly valves
  - 1. Butterfly Valves shall be sized for modulating service at 60-70 degree stem rotation. Isolation valves shall be line-size. Design velocity shall be less than 12 feet per second when used with standard EPDM seats.
    - a. Body is Cast Iron.
    - b. Disc is Aluminum Bronze standard.
    - c. Seat is EPDM Standard.
    - d. Body Pressure is 200 psi, -30F to 275F.
    - e. Flange is ANSI 125/250.
    - f. Media Temperature Range is -22°F to 240°F.
    - g. Maximum Differential Pressure is 200 psi for 2" to 6" size.
- I. Butterfly Valve Industrial Actuators
  - 1. Actuators shall be approved under Canadian Standards Association or other Nationally Recognized Testing Laboratory to UL standards. CSA Class 4813 02 or equal. Enclosure shall be NEMA 4 (weatherproof) enclosure and will have an industrial quality coating.
    - a. Actuator shall have a motor rated for continuous duty. The motor shall be fractional horsepower; permanent split capacitor type designed to operate on a 120 VAC, 1 pH, 60 Hz supply. Two adjustable cam actuated end travel limit switches shall be provided to control direction of travel. A self-resetting thermal switch shall be imbedded in the motor for overload protection.
    - b. Reduction gearing shall be designed to withstand the actual motor stall torque. Gears shall be hardened alloy steel, permanently lubricated. A self-locking gear assembly or a brake shall be supplied.
    - c. Actuator shall have a 6 ft wiring harness provided for ease in field wiring (above 1500 in-lbs). Two adjustable SPDT cam-actuated auxiliary switches, rated at 250 VAC shall be provided for indication of open and closed position. Actuator shall have heater and thermostat to minimize condensation within the actuator housing.
    - d. Actuator shall be equipped with a hand wheel for manual override to permit operation of the valve in the event of electrical power failure or system malfunction. Hand wheel must be permanently attached to the actuator and when in manual operation electrical power to the actuator will be permanently interrupted. The hand wheel will not rotate while the actuator is electrically driven.
    - e. The actuator shall be Analog or two position as called out in the control sequence of operation. All Analog valves shall be positive positioning, and respond to a 2-10 VDC, 4-20 mA, or adjustable signal as required. Analog actuators shall have a digital

control card allowing any voltage input for control and any DC voltage feedback signal for position indication.

2. Performance Verification Test

- a. Control loops shall cause productive actuation with each movement of the actuator and actuators shall modulate at a rate which is stable and responsive. Actuator movement shall not occur before the effects of previous movement have affected the sensor.
- b. Actuator shall have capability of signaling a trouble alarm when the actuator Stop-Go Ratio exceeds 30%.

3. Actuator Mounting for Damper and Valve arrangements shall comply to the following:

- a. Damper Actuators: Shall not be installed in the air stream.
- b. A weather shield shall be used if actuators are located outside. For Damper Actuators use clear plastic enclosure.
- c. Damper or valve actuator ambient temperature shall not exceed 122 degrees F through any combination of medium temperature or surrounding air. Appropriate air gaps, thermal isolation washers or spacers, standoff legs, or insulation shall be provided as necessary.
- d. Actuator cords or conduit shall incorporate a drip leg if condensation is possible. Water shall not be allowed to contact actuator or internal parts. Location of conduits in temperatures dropping below dew point shall be avoided to prevent water from condensing in conduit and running into actuator.
- e. Damper mounting arrangements shall comply to the following:
  - i. The ventilation subcontractor shall furnish and install damper channel supports and sheet metal collars.
  - ii. No jack shafting of damper sections shall be allowed.
  - iii. Multi-section dampers shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft mounted per section.
- f. Size damper sections based on actuator manufacturers specific recommendations for face velocity, differential pressure and damper type. In general:
  - i. Damper section shall not exceed 24 ft.-sq. with face velocity  $\leq$  1500 FPM.
  - ii. Damper section shall not exceed 18 ft.-sq. with face velocity  $\leq$  2500 FPM.
  - iii. Damper section shall not exceed 13 ft.-sq. with face velocity  $\leq$  3000 FPM.
- g. Multiple section dampers of two or more shall be arranged to allow actuators to be direct shaft mounted on the outside of the duct.
- h. Multiple section dampers of three or more sections wide shall be arranged with a 3-sided vertical channel (8" wide by 6" deep) within the duct or fan housing and between adjacent damper sections. Vertical channel shall be anchored at the top and bottom to the fan housing or building structure for support. The sides of each damper frame shall be connected to the channels. Holes in the channel shall allow damper drive blade shafts to pass through channel for direct shaft mounting of actuators. Open side of channel shall be faced down stream of the airflow, except for exhaust air dampers.
- i. Multiple section dampers to be mounted flush within a wall or housing opening shall receive either vertical channel supports as described above or sheet metal stand out collars. Sheet metal collars (12" minimum) shall bring each damper section out of the wall to allow direct shaft mounting of the actuator on the side of the collar.



#### 4. Valve Sizing for Water Coil

- a. On/Off Control Valves shall be line size.
- b. Modulating Control Valve Body Size may be reduced at most two pipe sizes from the line size or not less than  $\frac{1}{2}$  the pipe size. The BAS contractor shall size all water coil control valves for the application as follows:
  - i. Booster-heat valves shall be sized not to exceed 4-9psi differential pressure. Size valve for 50% Valve Authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.
  - ii. Primary valves shall be sized not to exceed 5-15psi differential pressure. Size valve for 50% Valve Authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.
  - iii. Butterfly valves shall be sized for modulating service at 60-70 degree rotation. Design velocity shall be 12 feet per second or less when used with standard EPDM seats.
- c. Valve Mounting arrangements shall comply to the following:
  - i. Unions shall be provided on all ports of two-way and three-way valves.
  - ii. Install three-way equal percentage Characterized Control valves in a mixing configuration with the "A" port piped to the coil.
  - iii. Install 2 $\frac{1}{2}$  inch and above, Three-Way globe valves, as manufactured for mixing or diverting service to the coil.

#### 2.09 ENCLOSURES

- A. All controllers, power supplies and relays shall be mounted in enclosures.
- B. Enclosures may be NEMA 1 when located in a clean, dry, indoor environment. Indoor enclosures shall be NEMA 12 when installed in other than a clean environment.
- C. Enclosures shall have hinged, locking doors.
- D. Provide laminated plastic nameplates for all enclosures in any mechanical room or electrical room. Include location and unit served on nameplate. Laminated plastic shall be 1/8" thick sized appropriately to make label easy to read.

### PART 3 EXECUTION

#### 3.04 EXAMINATION

- A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence.
- B. Notify the Government representative in writing of conditions detrimental to the proper and timely completion of the work.
- C. Do not begin work until all unsatisfactory conditions are resolved.

#### 3.05 INSTALLATION (GENERAL)

- A. Install in accordance with manufacturer's instructions.
- B. Tune MS/TP LAN Trunks in accordance with manufacturer's instructions.
- C. Provide all miscellaneous devices, hardware, software, interconnections installation and programming required to ensure a complete operating system in accordance with the sequences of operation and point schedules.

#### 3.06 LOCATION AND INSTALLATION OF COMPONENTS

- A. Locate and install components for easy accessibility; in general, mount 48 inches above floor with minimum 3'-0" clear access space in front of units. Obtain approval on locations from Government representative prior to installation.
  - B. All instruments, switches, transmitters, etc., shall be suitably wired and mounted to protect them from vibration, moisture and high or low temperatures.
  - C. Identify all equipment and panels. Provide permanently mounted tags for all panels.
  - D. Provide stainless steel or brass thermo wells suitable for respective application and for installation under other sections—sized to suit pipe diameter without restricting flow.
- 3.07 INTERLOCKING AND CONTROL WIRING ***[if this is a retrofit project, after a field inspection, this section can be modified to include re-useable wire, such as interlock, trunk, or sensor wiring. It is important to first confirm the quality and condition of the existing wire, as some existing wire may present WORKMANSHIP, shielding or capacitance problems.]***
- A. Provide all interlock and control wiring. All wiring shall be installed neatly and professionally, in accordance with Specification Division 16 and all national, state and local electrical codes.
  - B. Provide wiring as required by functions as specified and as recommended by equipment manufacturers, to serve specified control functions. Provide shielded low capacitance wire for all communications trunks.
  - C. Control wiring shall not be installed in power circuit raceways. Magnetic starters and disconnect switches shall not be used as junction boxes. Provide auxiliary junction boxes as required. Coordinate location and arrangement of all control equipment with the Government representative prior to rough-in.
  - D. Provide auxiliary pilot duty relays on motor starters as required for control function.
  - E. Provide power for all control components from nearest electrical control panel or as indicated on the electrical drawings—coordinate with electrical contractor.
  - F. All control wiring in the mechanical, electrical, telephone and boiler rooms to be installed in raceways. All other wiring to be installed neatly and inconspicuously per local code requirements. If local code allows, control wiring above accessible ceiling spaces may be run with plenum rated cable (without conduit).
- 3.08 DDC OBJECT TYPE SUMMARY
- A. Provide all database generation.
  - B. Displays
    - 1. System displays shall show all analog and binary object types within the system. They shall be logically laid out for easy use by the Government. Provide outside air temperature indication on all system displays associated with economizer cycles.
  - C. Run Time Totalization
    - 1. At a minimum, run time totalization shall be incorporated for each monitored supply fan, return fan, exhaust fan, hot water and chilled water pumps. Warning limits for each point shall be entered for alarm and or maintenance purposes.
  - D. Trendlog
    - 1. All binary and analog object types (including zones) shall have the capability to be automatically trended.
  - E. Alarm

1. All analog inputs (High/Low Limits) and selected binary input alarm points shall be prioritized and routed (locally or remotely) with alarm message per Government requirements.

F. Database Save

1. Provide back-up database for all stand-alone application controllers on disk.

3.09 FIELD SERVICES

- A. Prepare and start logic control system under provisions of this section.
- B. Start-up and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.
- C. Provide Government Representative with spare parts list. Identify equipment critical to maintaining the integrity of the operating system.

3.10 AS BUILT DOCUMENTATION REQUIRED

- A. Provide "as-built" copy of control drawings, graphic software, and programs, along with actual customized per-point check out sheets including technicians' signature and checkout date.
- B. Provide an additional "as-built" copy of control drawings in an 8 1/2 x 11" white binder with an electronic copy of the drawings to the EMCS section.
- C.

3.11 TRAINING

- A. Provide application engineer to instruct Government in operation of systems and equipment.
- B. Provide system operator's training to include (but not limited to) such items as the following: modification of data displays, alarm and status descriptors, requesting data, execution of commands and request of logs. Provide this training to a minimum of 3 persons.
- C. Provide on-site training above as required, up to **[X]** hours as part of this contract.
- D. **[Consider adding at least a one week factory training class for one operator. Include this paragraph if training class is provided.]** Provide tuition for at least **[X]** individuals for a one-week factory training class. If applicable, costs for travel, lodging and meals will be the responsibility of the Government.

3.12 DEMONSTRATION

- A. Provide systems demonstration.
- B. Demonstrate complete operating system to Government representative.
- C. Provide certificate stating that control system has been tested and adjusted for proper operation.
- D. **[Add commissioning requirements here, if desired. Note: The requirements must be edited to match the commissioning agent proposal. It is recommended that the specs for commissioning come from the commissioning spec template (by others)]**

PART 4 SEQUENCE OF OPERATIONS

4.04 GENERAL

- A. Provide a complete and operational temperature control and building automation system based on the following points and sequence of operation. The system shall be complete as to sequences and standard control practices. The determined point list is the minimum amount of points that are to be provided. If additional points are required to meet the sequence of operation, they will be provided.
- B. **[INSERT SEQUENCE OF OPERATIONS AND POINTS LIST HERE:]**

### C. BACnet Object List

1. The following points as defined for each piece of equipment are designated as follows:
  - a. Binary Out (BO) - Defined as any two-state output (start/stop) (enable/disable), etc.
  - b. Binary In (BI) - Defined as any two-state input (alarm, status), etc.
  - c. Analog In (AI) - Defined as any variable input (temperature) (position), etc.
  - d. Analog Out (AO) - Defined as any electrical variable output. 0–20mA, 4–20mA and 0–10VDC are the only acceptable analog outputs. The driver for analog outputs must come from both hardware and software resident in the controllers. Transducers will not be acceptable under any circumstance.

### D. Web Interface Specification

#### 1. Overview

##### a. General Description

- i. BAS supplier shall provide web-based access to the system as part of standard installation. User shall be able to access all displays of real-time data that are part of the BAS via a standard Web browser. The web-page software shall not require a user licensing fee or annual fees. The web-page host must be able to support on average 50 simultaneous users with the ability to expand the system to accommodate an unlimited number of users.

##### b. Browser Technology

- i. Browser shall be standard version of Microsoft IE 6.0 or later and Netscape Navigator 4.76 or later. No special vendor-supplied software shall be needed on computers running browser. All displays shall be viewable and the Web-page host shall directly access real-time data from the BAS BACnet network. Data shall be displayed in real time and update automatically without user interaction. User shall be able to change data on displays if logged in with the appropriate user name and password.

##### c. Communications

- i. The network shall communicate via BACnet, allowing the Web-page host to gather data directly from units on the local LAN or from other projects connected over a WAN. The network shall also provide the connection to the BAS server for Web page generation.
- ii. The Web-page host shall provide for complete isolation of the IP and BACnet networks by not routing networking packets between the two networks.
- iii. Metropolitan area network (MAN) is existing and provided by Fairchild AFB.

#### 2. Display of Data

- a. Web page graphics shown on browser shall be replicas of the BAS displays. User shall need no additional training to understand information presented on Web pages when compared to what is shown on BAS displays. Web page displays shall include animation just as BAS displays. Fans shall turn, pilot lights shall blink, and coils shall change colors, and so on.
- b. Real-time data shall be shown on all browser Web pages. This data must be directly gathered via the BACnet network and automatically updated on browser Web page displays without any user action. Data on the browser shall automatically refresh as changes are detected without re-drawing the complete display.
- c. It shall be possible for user from browser Web page to change data if the user is logged on with the appropriate password. Clicking on a button or typing in a new

value shall change digital data. Using pull-down menus or typing in a new value shall change analog data.

- d. Data displays shall be navigated using pushbuttons on the displays that are simply clicked on with the mouse to select a new display. Alternatively, the standard back and forward buttons of the browser can be used for display navigation.

3. Web Page Generation

- a. Web pages shall be generated automatically from the BAS displays that reside on the BAS server. User shall access Web-page host via the network and shall initiate a web page generation utility that automatically takes the BAS displays and turns them into Web pages. The Web pages generated are automatically installed on the Web page host for access via any computer's standard browser. Any system that requires use of an HTML editor for generation of Web pages shall not be considered.

4. Password Security and Activity Log

- a. Access via Web browser shall utilize the same hierarchical security scheme as BAS system. User shall be asked to log in once the browser makes connection to Web-page host. Once the user logs in, any and all changes that are made shall be tracked by the BAS system. The user shall be able to change only those items that the user has authority to change. A user activity report shall show any and all activity of the users that have logged in to the system regardless of whether those changes were made using a browser or via the BAS workstation.

5. BACnet Communication

- a. Web-page host shall communicate using the ASHRAE BACnet protocol standard to all devices on the BAS network.

6. Functionality

- a. Graphic Viewing, Point Commanding, Scheduling, Trend Viewing, and Alarming shall all be viewable and commandable through WEB Interface.

END OF SECTION 230900