



BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON

Revised 30 April 2012

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INTRODUCTION

The Fairchild AFB Base Design Standards shall be used as a supplemental directive to provide detailed information to Architect-Engineer (A-E) firms and other designers performing design services for Fairchild AFB, either through direct contract or via the U. S. Army Corps of Engineers. It is not intended to replace Air Force Instructions (AFIs), Fairchild Air Force Base Instructions (FAFBIs), Unified Facilities Criteria (UFCs), Engineering Technical Letters (ETLs), Military Handbooks (MIL-HDBKs), Construction Technical Letters (CTLs), Civil Engineering Technical Support Office (CETSO) letters, Air Mobility Command (AMC) Commander's Guides, and other design directives established by the Air Force.

All designs shall be in strict accordance with the most current local, state, and federal codes.

Specific projects may require deviations from these standards, but such deviations will require approval from the 92d Civil Engineer Squadron, Programs Flight (92 CES/CEPM). Note: When deviations or conflicts in requirements identified within the specifications and drawings provided as part of the construction contract/task order and those requirements addressed in the Base Design Standard occur, the specifications and drawings take precedent. Any inconsistencies or differences in requirements as indicated in the specifications and drawings shall be resolved in accordance with FAR 52.236-21 (Specifications and Drawings for Construction).

The 30 April 2012 Edition of the Fairchild AFB Base Design Standards supersedes the 30 April 2010 Edition. This edition complies with MasterFormat® 2004.

Submit corrections to 92d Civil Engineer Squadron, Programs Flight (92 CES/CEPM).

REFERENCES

The following publications are referenced in this Base Design Standards. The designer shall confirm that these publications have not been superseded by subsequent publications. In the event a publication has been superseded, the subsequent publication shall become the referenced publication.

This list is not intended to be a complete list of references the contractor shall follow.

Military References

92d Civil Engineer Squadron (these documents must be obtained from 92 CES)

- Architectural Compatibility Plan*, 2005
- Asbestos Management Program*, 2006
- Base General Plan*, 1996
- Cultural/Environmental Resource Inventory*, 1999
- Force Protection Construction Standard*, 2000
- Green Procurement Program Plan*, 2006
- Landscape Master Plan Brief*, 2002
- Lead Exposure & Lead-based Paint Management Plan*, 2006
- Pollution Prevention Management Action Plan*, 2000
- Resource Management Plan*, 1999
- Stormwater Management Plan*, 1999
- Stormwater Management Procedures Manual*, 1999
- Urban Tree Plan*, 2004

92 Communications Squadron (this document must be obtained from 92 CS)

- Supplement to ETL 02-12*, 2005

Air Force Center for Environmental Excellence (AFCEE), <http://www.afcee.af.mil>

- Design and Construction Website*

Air Force Civil Engineer Support Agency - Engineering Technical Letter (ETL) <http://www.afcesa.af.mil>

- ETL 94-6, *Fire Protection Engineering Criteria and Technical Guidance – Removal of Halogenated Agent Fire Suppression Systems*, 1994
- ETL 99-4, *Fire Protection Engineering Criteria – Emergency Lighting and Marking of Exits*, 1999
- ETL 01-18, *Fire Protection Engineering Criteria – Electronic Equipment Installations*, 2001
- ETL 02-12, *Communications and Information System Criteria for Air Force Facilities*, 2002
- ETL 02-15, *Fire Protection Engineering Criteria – New Aircraft Facilities*, 2002
- ETL 04-3, *Design Criteria for Prevention of Mold in Air Force Facilities*, 2004
- ETL 09-13, *Irrigation of Installation Turfgrass and Landscaping*, 2009

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- AFH 32-1084, *Facility Requirements*, 1996

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AFI 32-7040, *Air Quality Compliance*, 1994

AFI 32-7086, *Hazardous Materials Management*, 2004

AFI 40-201, *Managing Radioactive Materials in the US Air Force*, 2007

CAD-BIM Technology Center, <https://cadbim.usace.army.mil>

ERDC/ITL TR-01-6, *A/E/C CADD Standards, Release 2.0*, 2001

Facility Management Standard for Facilities, Infrastructure, and Environment (FMSFIE) Release 2.40, 2004

Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE) Release 2.31, 2004

Department of Army, U.S. Army Corps of Engineers Manual

EM 385-1-1, *Safety and Health Requirements*, 2008

Department of Defense, <http://www.wbdg.org>

Unified Facilities Criteria (UFC)

UFC 1-200-01, *General Building Requirements*, 2005

UFC 3-120-01, *Air Force Sign Standard*, 2003

UFC 3-210-05FA, *Landscape Design and Planting Criteria*, 2004

UFC 3-301-05A, *Seismic Evaluation and Rehabilitation for Buildings*, 2005

UFC 3-301-01, *Structural Engineering*, 2010

UFC 3-600-01, *Fire Protection Engineering for Facilities*, 2009

UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*, 2012

UFC 4-010-02, *DoD Minimum Standoff Distances for Buildings (FOUO)*, 2012

Fairchild Air Force Base Instruction (FAFBI), (these documents must be obtained from 92CES/CEPM)

FAFBI 32-008, *Fire Protection and Prevention*, 2004

FAFBI 32-015, *Design and Construction Standards (User Groups)*, 2000

FAFBI 32-1001, *Preparing Base Civil Engineer Work Clearance Request (FAFB Form 103)*, 2006

FAFBI 32-7086, *Hazardous Material Management*, 2001

Military Handbook (MIL-HDBK) - Department of Defense, <https://assist.daps.dla.mil/quicksearch/>

MIL-HDBK 1190, *Facility Planning and Design Guide*, 1987

Non-Military References

ACI International, <http://www.aci-int.org>

ACI 305R, *Hot Weather Concreting*, 2000

ACI 306R, *Cold Weather Concreting*, 1988

American Iron And Steel Institute (AISI), <http://www.steel.org>

SG03-2, *Cold-Formed Steel Design Manual*, 2002

American Society Of Civil Engineers, <http://www.asce.org>

ASCE 7, *Minimum Design Loads for Buildings and Other Structures*, 2005

American Woodworker Institute (AWI), <http://www.awinet.org>

AWI P-208, *Quality Standards Illustrated*, 8th Edition

ASTM International, <http://www.astm.org>

A653-06a, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*

A463-06, *Standard Specification for Steel Sheet, Aluminum Coated, by the Hot-Dip Process*

A792-06a, *Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process*

B117-03, *Standard Practice for Operating Salt Spray (Fog) Apparatus*

D4214-98, *Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films*

D714-02e1, *Standard Test Method for Evaluating Degree of Blistering Paints*

D968-05, *Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive*

D522-93a(2001), *Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings*

D2244-05, *Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates*

D2247-02, *Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity*

E96-05, *Standard Test Methods for Water Vapor Transmission of Materials*

Carpet and Rug Institute <http://www.carpet-rug.com>

CRI 104, *Standard for Installation Specification of Commercial Carpet*, 2002

Code of Federal Regulations (CFR), <http://www.gpo.gov>

Title 3 - The President (Executive Orders)

3CFR11593, *Protection and Enhancement of the Cultural Environment*, 1971

3CFR13101, *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*, 1998

Title 36 - Parks, Forests, and Public Property

36CFR800, *Protection of Historical Properties*, 2003

Title 40 - Protection of Environment

40CFR82, *Protection of Stratospheric Zone*, 2004

40CFR122 through 40CFR124, *National Pollutant Discharge Elimination System (NPDES) Requirements*, 2004

40CFR260, *Hazardous Waste Management System: General*, 2004

40CFR761, *Polychlorinated biphenyls (PCBs) manufacturing, processing, distribution in commerce, and use prohibitions*, 2004

Federal Geographic Data Committee, <http://www.fgdc.gov>

FGDC-STD-001, *Content Standards for Digital Geospatial Metadata (CSDGM), Version 2*, 1998

FM Global, <http://www.fmglobal.com>

Approval Guide

Illuminating Engineering Society of North America (IESNA), <http://www.iesna.org>

HB-9, *IESNA Lighting Handbook*, 9th Edition, 2000

- Institute of Electrical and Electronic Engineers (IEEE), <http://www.ieee.org>
C2, National Electrical Safety Code[®], latest edition
- Insulated Cable Engineers Association (ICEA), <http://www.icea.net>
ANSI/ICEA S-80-576, Category 1 & 2 Individually Unshielded Twisted Pair Indoor Cables for Use in Communications Wiring Systems, 2002
- International Code Conference (ICC), <http://www.iccsafe.org>
International Building Code[®], Latest edition adapted by Washington State.
International Fire Code[®], 2006
- National Association of Corrosion Engineers (NACE) International, <http://www.nace.org>
Corrosion Specialist Certification
Cathodic Protection Specialist Certification
- National Electrical Contractors Association (NECA), <http://www.necanet.org>
NECA 1, Good Workmanship in Electrical Contracting,
- National Fire Protection Association (NFPA), <http://www.nfpa.org>
NFPA 10, Standard for Portable Fire Extinguishers, 2007
NFPA 13, Standard for the Installation of Sprinkler Systems
NFPA 17A, Standard for Wet Chemical Extinguishing Systems
NFPA 70, National Electrical Code[®], latest edition
NFPA 72, National Fire Alarm Code[®], 2007
NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilation Systems, 2002
NFPA 90B, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems, 2006
NFPA 101, Life Safety Code[®], 2006
NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations, 2004
- New York City Department of Health & Mental Hygiene, <http://www.nyc.gov>
Guidelines on Assessment and Remediation of Fungi in Indoor Environments, 2002
- Spokane County, <http://www.spokanecounty.org>
Guidelines for Stormwater Management, 2003
- Spokane County Air Pollution Control Authority, www.scapca.org
Regulation I
- Spokane County Regional Health District, www.srhd.org
Solid Waste Handling Standards, 2004
- Structural Engineers Association of Washington, <http://www.seaw.org>
Snow Load Analysis for Washington, Second Edition
- Underwriters Laboratories, <http://www.ul.com>
UL 580, Standard for Tests for Uplift Resistance of Roof Assemblies, 2006
UL 2034, Single and Multiple Station Carbon Monoxide Alarms, 1998
- United States Code, <http://www.gpo.gov/fdsys/browse/collectionUScode.action?collectionCode=USCODE>

Architectural Barriers Act, 2004

Emergency Planning and Community Right-to-Know Act, 1986

Farm Security and Rural Investment Act, 2002

Federal Insecticide, Fungicide and Rodenticide Act, 1996

National Historical Preservation Act, 1966

Resource Conservation and Recovery Act (RCRA), 1976

Toxic Substances Control Act, 1976

Washington Administrative Code, <http://apps.leg.wa.gov/wac>

WAC 173-218, *Underground Injection Control Program*

WAC 173-303, *Dangerous Waste Regulations*

WAC 173-304, *Minimum Functional Standards for Solid Waste Handling*

WAC 173-340, *Model Toxics Control Act - Cleanup*

WAC 173-360, *Underground Storage Tank Regulations*

WAC 173-400 through WAC 173-491 - Air Quality Requirements

WAC 197-11, *SEPA Rules*

WAC 246-290, *Public Water Supplies*

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<https://fortress.wa.gov/doh/eh/dw/publications/publications.cfm>

331-137, *Backflow Prevention Assemblies Approved for Installation in Washington State, 2006*



DIVISION A – DESIGN SPECIFIC REQUIREMENTS

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION A – DESIGN SPECIFIC REQUIREMENTS

SECTION A.1 - SPECIFICATIONS, DRAWINGS, AND MAPPING REQUIREMENTS

DATA SHEET

SECTION A.1 – SPECIFICATIONS, DRAWINGS, AND MAPPING REQUIREMENTS

A. SPECIFICATIONS

1. Format

- a. All specifications shall follow the MASTERSPEC® Format and be organized according to MasterFormat™ 2011, published by the Construction Specifications Institute (CSI) (<http://www.csinet.org>) and available online at <http://www.masterformat.com>.
- b. Specifications shall be produced on a computer system.
 - i. The Designer shall submit one copy of all files with the 100% design submittal.
 - ii. All individual specification section files shall be format-compatible with the most current version of Windows based Microsoft® Word. Additionally, a single .pdf file consisting of the compilation of all specification sections with bookmarks applied on the first page of each section shall be provided.
 - iii. The Designer shall submit all files electronically on CD-ROM, DVD, or equivalent media.

2. Base Design Standards Submittal Checklist

- a. For each design phase (35%, 65%, 95% and Final), the Designer shall attach the *Submittal Checklist* found at the end of this section. The checklist shall be filled out and submitted with all specifications and drawings for each design phase. DWG's will be submitted to CEPT to ensure compliance with AF Standards.

3. Codes

- a. All design and construction work shall be 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*

B. DRAWINGS

1. Responsibilities

- a. The responsibility for developing and maintaining each drawing shall be determined at the outset of each project. This responsibility shall not be changed during the course of the project.
- b. The designer responsible for developing each drawing shall provide electronic copies to other designers when the former's working drawings are referenced by the latter.
- c. Exchange shall take place when the recipient is ready to commence development of referenced drawings, prior to final coordination, and whenever major modifications occur.
- d. At other times for coordination purposes only, prints of plotted drawings are to be furnished instead. These shall be clearly marked to show the occurrence of minor revisions.
- e. Background drawings that require coordination on a regular basis are as follows:
 - i. Background architectural floor plans.
 - ii. Reflected ceiling plan grid.
 - iii. Lighting fixture layouts.

- iv. Diffuser and grille layouts.
2. As-Built/Final Drawings
 - a. Specify that Contractors shall be responsible for gathering as-built information at the job site and conveying it to the as-built drawings.
 - b. As-built drawings of the structure within the structure footprint shall be in AutoCAD format and follow standards listed below.
 - c. Areas outside the bounds of the structure footprint can be submitted in either AutoCAD, shapefiles, or a geodatabase.
 3. Computer Aided Design and Drafting (CADD) Software
 - a. All drawings shall be accomplished and developed using CADD software.
 - i. This software shall be AutoCAD® and shall be compatible with AutoDesk® Map. Verify with 92 CES/CEPT for the current version to utilize.
 4. Drawing Standards
 - a. A “drawing” in context with AutoCAD® software, means a background or overlay (i.e., a layer). This drawing may be included with other referenced drawings to provide a complete plotted drawing.
 - b. All drawings shall be produced in accordance with The CAD/BIM Technology Center’s ERDC/ITL TR-09-2, *A/E/C CAD Standard, Release 4.0* available online at <https://caddim.usace.army.mil/MyFiles/9/3/ERDC-ITL-TR-09-2.pdf> . BIM deliverables can follow the Interim Delivery method for Installations. Guidance is available on the above listed website.
 - c. A-E shall utilize Layout and Model Views for its drawing files. All drawings shall be drawn full size (1 to 1) in Model View. Title sheet and border sheets shall be drawn in Layout View. AutoCAD View Ports shall be used to frame applicable Model Views. The AutoCAD drawing Layout View and printed hard copies shall be identical.
 - d. To minimize design efforts, a master drawing shall be created for each discipline (i.e., floor plans) and externally referenced into individual sheet drawings.
 - e. In order to reduce file sizes and to accommodate plotted sheet sizes, large facility floor plans are usually divided into several areas. To facilitate assembling these areas into a single plot for small-scale orientation plans, roof plans, and the like, each area shall be drawn in its relative position in coordinate space. This permits an entire floor to be correctly displayed and plotted when areas are included as externally referenced drawings inserted at (0,0,0).
 - f. All drawings and external references shall use an origin of 0,0,0.
 - g. Drawing Limits will equal (0,0,0) by necessary final dimensions
 - h. All scales and measurements for facility drawings and details shall be in Architectural units. All scales and measurements for civil drawings shall be in Engineering units.
 - i. American National Standards Institute (ANSI) sized paper shall be used for all plots. Full size drawings shall be on D size paper.
 - j. Layers
 - i. Layers shall conform to the *A/E/C CAD Standard* using the AIA naming convention.
 - ii. If frozen layers are not to be used, they shall be deleted and purged. If they are to be used, they are to be turned on. Layer 0 shall be empty.
 - k. Title blocks shall conform to the Government Furnished Material (GFM). See B.6.a.

- I. All graphic elements that connect shall connect at the same vector coordinates without overlaps or gaps.
- m. Lines
 - i. Straight lines shall be represented by beginning and ending x- and y- coordinate points. Lines shall not cross back on themselves or be of zero length.
 - ii. Polygons shall be closed (i.e., the first x- and y- coordinates shall exactly match the last x- and y- coordinates).
 - iii. Lines that represent the same graphic element shall be continuous (i.e., not broken or segmented).
 - iv. Line weight or widths are specified in the *A/E/C CAD Standard*.
 - v. Drawing Units:
 - a. Format Units (Architectural)
 - i. Unit type... 1 Architectural unit = 1"
 - ii. Precision... 0'-0 1/8"
 - iii. Angle type... Decimal degrees
 - iv. Precision... 0.00degrees
 - v. Insert blocks to inches
 - vi. Direction... East 0, North 90, West 180, South 270
 - b. Format Units (Mapping)
 - i. Unit type... 1 Decimal unit = 1'-0"
 - ii. Precision... 0.00
 - iii. Angle type... Deg/Min/Sec
 - iv. Precision... 0d00'00"
 - v. Insert blocks to inches
 - vi. Direction... East 0d, North 90d, West 180d, South 270d
- n. Fonts
 - i. Only fonts specified in the *A/E/C CAD Standard* shall be used.
- o. Leader lines are required for all dimensions and specific notes. They shall be a blue (AutoCAD color #5) lines with a closed filled arrowhead, no cross hatches or dots shall be used. The arrowhead will be 1/3 the length at the back side, set AutoCAD DIMASZ (dim. Arrowhead size) to 1/8".
- p. Use arrowheads only for dimensions/leaders.
- q. Dimension Lines
 - i. All dimensions will be drawn in blue(AutoCAD color #5) lines, this includes the text. Layer name with comply with *A/E/C CAD Standard* for each discipline.
 - ii. Dimension lines will be thin and unbroken with the text parallel, centered and aligned to the line. All dimensioning variables will be preset in AutoCAD.
 - iii. Dimensions will be placed to the right and above the object when possible. When two objects are the same, but different views, place the dimensions between the views.

- iv. One dimension line will never cross another; when dimension lines are stacked, one above the other, the smaller dimension will be placed closest to the object. Stacked dimension lines will be approximately 3/8" from the smaller dimension.
- v. Extension lines shall be at 90 degrees to and offset approximately 1/16" away from the object being dimensioned and extend 1/8" beyond the dimension line. The dimension line shall be offset 1/2" from the object being.
- vi. All text will be 3/32" and when the dimension is 18" or less it will be written in inches.
- vii. All the variables listed above will be preset within the AutoCAD files to insure quality, standardized work throughout the section.
- r. Notes with leaders pointing toward a specific location will be neat, short and accurate. When more than one note for the same view is required, they will be aligned on the left edge, one above the other with a double space between notes.
- s. Sections are cuts through an object, and are identified with the symbol on the coversheet. The arrow (or hat) points in the direction the drawing represents. The "flag" at the end of a cut line will be 1/2 the height of the arrow. The cut plan, the edges that would show cut marks if cut with a saw, are shown with a heavier line than the rest of the drawing. All sections will be lettered sequentially throughout the project. Be sure that the page numbers referenced are correct.
- t. Elevations are views of a vertical surface. When drafting an elevation of a structure all edges, such as the corner of a building will be heavier than the other details (windows for example). This includes indentations that run from the foundation to the roof. If the floor plan were placed alongside the elevation, all edges on the floor plan will match the heavy lines on the elevation. The elevation symbol is the same as the section except the "hat" isn't filled in and uses numbers, not letters. Elevations will be numbered sequentially throughout the project.
- u. Utilities will be located on all site plans, both existing and proposed. When placing proposed utilities on a site plan they will be heavier than the existing utilities. A site survey shall be done before beginning a drawing.
- v. New and existing buildings shall be distinguished from each other. To do this, all new construction will be heavier than existing. A site survey shall be done before beginning a drawing.
- w. The TRIANGLE symbol is reserved for incorporating change requests and is not to be used within the body of the drawings, such as a keyed note symbol. It may be used as a symbol, such as Telephone, but shall be identified in the legend.
- x. The Keyed Note symbol will be an Octagon with the number centered inside. The symbol will be by the object referenced and along the note.
- y. Demolition and remodeling may require specific notes attached. If so, use a symbol that may be used throughout the project.
- z. Details are enlarged views of a plan, section, or elevation. Detail symbols will be tied into the area they show with either a circle around the blown up area or a leader pointing to it. Details will be numbered sequentially throughout the project.
- aa. A library of standard symbology details can be found in *A/E/C CAD Standards, Appendix D* and can be downloaded at: <https://cadbim.usace.army.mil/MyFiles/9/3/ERDC-ITL-TR-09-2.pdf>. All details not furnished to the A-E as part of the Government Furnished Material (GFM) shall be in accordance with the *A/E/C CAD Standard* and be provided to the Government as part of the electronic digital deliverables. A-E's shall obtain approval before using anything other than the Government's standard fonts and linetypes.
- bb. Detail, Elevation, and Section symbols shall be modified from the *A/E/C CAD Standard* by bisecting the lower half of the circle. The left portion shall be labeled with the sheet from

which the detail, elevation, or section is taken from, and the right portion shall be labeled with the sheet on which the detail, elevation, or section is located on.

5. Project Layout (index)

- a. The drawing index always starts with page one (1) being the title sheet followed by the site plan. The cover sheet will include the project location. Use the Fairchild AFB Standard Title Sheet Layout. The rest of the pages shall be Fairchild AFB Standard Layout and will be in sequence according to the engineering discipline.
- b. Not all the pages listed below will be used in every project, with the exception of the cover sheet. Don't overcrowd a sheet; use as many sheets as required per main title before continuing to the next main title.
- c. Cover sheet (use FAFB Standard Title Sheet Layout): The following items will be on the cover.
 - i. Project Location: the project location or construction site will be circled and the words PROJECT LOCATION with an arrow darkened in pointing to the circle.
 - ii. Contractor storage area if different from the Project Location
 - iii. Haul Route: the haul route will be shown on the cover sheet using the symbol shown on the cover sheet (standard symbols), the thickness of the arrow may vary.
 - iv. Project Title: as assigned by programming personnel.
 - v. Project Number: assigned by programming personnel.
 - vi. Drawing Number: assigned by drafting personnel.
 - vii. Drawing Index: the cover sheet will always be page 1.
 - viii. Signatures: the project technician (draftsperson) will sign his/her name and the project engineer will acquire the remainder of the signatures required. Where no signature is required, N/A (not applicable) will be used.
 - ix. Date: the date will be placed on the cover sheet upon completion of 100% design.
- d. Site Plan (minimum scale of 1" = 50'): Shall correspond to WGS 84, UTM Zone 11N
 - i. Existing site plan will show all buildings, utilities, sidewalks, parking areas, roads and graveled areas within the scope of work.
 - ii. New site plan will show the same as the existing and all new utilities, roads, sidewalks, etc. and those items abandoned or removed.
 - iii. Contour line will be shown on both new and existing site plans.
 - iv. The scale will be large enough to clearly show all the details.
 - v. Building location and orientation.
 - vi. Grading and drainage plan including subsurface.
 - vii. Soil boring plans and logs.
 - viii. Plan and profile sheets where applicable.
 - ix. Details of connection into existing utilities.
- e. Landscape plan and plant schedule (same scale as the site plan)
- f. Architectural.
 - i. Overall key floor plan with room legend.
 - ii. Floor plan.

- iii. Interior color and finish schedules.
- iv. Door and window schedules including hardware schedules.
- v. Elevations.
- vi. Reflected ceiling plan.
- vii. Architectural sections and details.
- viii. Roof framing and Roof Plan.
- ix. Furniture plan and schedule, if applicable.
- g. Structural.
 - i. Footing and foundation plans and details.
 - ii. Roof framing plans and details.
- h. Mechanical.
 - i. Plumbing plans, layouts and riser diagrams.
 - ii. HVAC and duct work, return air, registers and roof vents.
 - iii. Plumbing and HVAC details.
 - iv. Show all cabinets and shelves on the floor plans.
 - v. Fixture and equipment schedules.
 - vi. Control diagrams, EMCS criteria, and locations.
- i. Electrical.
 - i. One-line diagram showing complete existing electrical service entrance from primary feeder including service transformer(s).
 - ii. Primary and/or secondary taps.
 - iii. Primary and/or secondary switchgear.
 - iv. Service entrance.
 - v. Main distribution panel.
 - vi. Step-down transformers (if any) and all panels associated with the construction.
 - vii. Revised one-line diagram showing complete electrical service with changes clearly identified.
 - viii. New and existing material identified accordingly.
 - ix. Switching and controls.
 - x. Fixture schedules.
 - xi. Mounting details.
 - xii. Lighting equipment and schedules.
 - xiii. Floor plans with power, lighting and signal plan for each floor and/or affected area.
 - xiv. Show equipment schedules and identified location of equipment.
 - xv. All outlets for electrical, telephone, television cable, and computer.
 - xvi. Show fire alarm plans, panels, detection and pull stations.
- j. If the project is a remodel or alteration there will be a demolition plan for each discipline. The demolition plan will go before the new plan.

- k. Due to the size of some buildings, the floor plan may have to split to show the required detail. If the floor plan requires splitting because it cannot be fit on one sheet, then the relative sheets shall be sequentially numbered.

6. Government Furnished Material (GFM)

- a. Title block and border sheets templates
- b. Information on existing conditions
- c. Electronic reference files containing the Government’s standard border sheets. Reference files will be provided on CD-ROM

C. MAPPING STANDARDS/SURVEY STANDARDS

- 1. Digital AutoCad/geospatial/mapping data is required to be submitted for all work outside the bounds of footprints of buildings and structures. This includes, but is not limited to, building and structure footprints, utilities, infrastructure, survey data, etc. Format for this data should be either AutoCAD, *.shp file, or a geodatabase.
- 2. Metadata describing spatial features shall be collected and stored within dataset for features using AutoCAD Map3D, a geodatabase or shapefiles. As a last resort, metadata can be organized using an Excel spreadsheet.

Table G.1 Required Geodatabase Fields

Utility	Tab	Data Fields
Potable Water	G-1	Label, Coordinates (Northing and Easting), Nominal Diameter (in), Length (ft), Pipe Material, Depth (ft-in), Valve/Hydrant Number, Valve Size, Valve Type, Installation Year, Condition
Sanitary Sewer	G-2	Label, Coordinates (Northing and Easting), Diameter (in), Length (ft), Pipe Material, Invert Elevation, Manhole Number, Manhole Construction, Installation Year, Condition
Storm Sewer	G-3	Label, Coordinates (Northing and Easting), Diameter (in), Length (ft), Pipe Material, Invert Elevation, Manhole Number, Manhole Construction, Installation Year, Condition
Electrical	G-4	Label, Coordinates (Northing and Easting), Conduit Size, Cable Size, Transformer Size, Transformer Type, Hand Hole Type
Heat Systems	G-5	To be determined
Natural Gas	G-6	Label, Coordinates (Northing and Easting), Diameter (in), Length (ft), Pipe Material, Depth (ft-in), Valve/Meter Type, Installation Year, Condition, Leak Detection Date, Regulator Pressures
Liquid Fuels	G-7	Label, Coordinates (Northing and Easting), Diameter (in), Length (ft), Pipe Material, Depth (ft-in), Valve/Meter Type, Installation Year, Leak Detection Date, Condition
Cathodic Protection	G-8	Label, Coordinates (Northing and Easting), Anodes Size
Navigation Aids	H-1	Label, Coordinates (Northing and Easting)
Communication	H-2	Label, Coordinates (Northing and Easting), Conduit Size, Cable Size?
Traffic	I-2.1	Street (Branch) Name, Branch Number, Section, Pavement Material, Pavement Thickness, Width (ft), Length (ft), Area (sf), Last Construction/Rehab Date, Last PCI, PCI Date, Condition, Recent Maint. and Repair Work/Date, Maint. And Repair Action Required/Date

D. GOVERNMENT-FURNISHED MAPPING, CHARTING, AND GEODESY PROPERTY

1. Definition: "Mapping, charting, and geodesy (MC&G) property" means geodetic, geomagnetic, gravimetric, aeronautical, topographic, hydrographic, cultural, and toponymic data presented in the form of topographic, planimetric, relief, or thematic maps and graphics; nautical and aeronautical charts and publications; and in simulated, photographic, digital, or computerized formats.
2. **The Contractor shall not duplicate, copy, or otherwise reproduce MC&G property for purposes other than those necessary for performance of the contract.**
3. At the completion of performance of the contract, the Contractor, as directed by the Contracting Officer, shall either destroy or return to the Government all Government-furnished MC&G property not consumed in the performance of this contract.

E. SUBMISSION REQUIREMENTS

1. Electronic Digital Media
 - a. Electronic digital media shall be submitted with the first submittal and at 100% design. Digital media submitted at first submittal will allow for testing between A-E and Government computer platforms. All other drawing submittals shall be made with ink on paper.
 - b. Electronic digital media shall be submitted on CD-ROM (CD-R or CD-RW format, 700 MB), and be readable by a WINDOWS Vista compatible system.
 - c. The external label for electronic digital media shall contain the following information:
 - i. Format and version of operating system (e.g., Windows Vista).
 - ii. Utility software and version used for preparing and copying files.
 - iii. Media sequence number.
 - iv. Short description of media content.
 - v. The Contract Number (and Delivery Order Number if applicable) and date.
 - vi. The Project Number and Project Title.
 - d. A transmittal sheet containing the following information shall accompany the media:
 - i. Information included on the external label of the electronic digital media.
 - ii. Total number of disks submitted.
 - iii. List of the names and descriptions of the files on each disk.
 - iv. Instructions for transferring the files from the media.
 - v. Certification that all delivery media are free of known computer viruses.
 - vi. A statement including the name(s) and release date(s) of the virus-scanning software used to analyze the delivery media. The virus-scanning software shall be the current version at the time of delivery of the media.
 - vii. The date the virus scan was performed.
 - viii. The operator's name that performed the virus check.
 - ix. A statement indicating that the A-E will retain a copy of all delivered electronic digital media (with all files included) and will provide additional copies of each to the Government, if requested, at no additional cost for at least 1 year.
 - x. A list of all deviations from the standards (i.e., layer schemes, file-naming convention, hatching, symbols).
 - xi. A list of all database files associated with each drawing, as well as a description.
2. Plotted Drawings

- a. All drawings shall be plotted on good quality white bond paper.. Drawings shall be prepared in accordance with Fairchild AFB’s standards.

3. AutoCAD Files

- a. AutoCAD files shall not include rasters or superhatch.
- b. Drawing File Names:
 - i. The file name for each drawing sheet, along with the date of last revision, will be placed along side the title block. This is an attribute attached to the drawing sheet drawing (DWGSHT.DWG), when the DWGSHT is first inserted you will be asked to fill in this information. For additional drawing session, use the “DDATE” command to change the revision date. File Names for Project Master Files (PMF) will be based on three factors:
 - ii. The first factor is the drawing number that is assigned to the project by 92 CEPT Chief of Technical Support, or CEPM Chief of Construction Management. This four-digit number will be on all sheets, on the coversheet, and each drawing sheet in the lower right corner of the title block, where it says “Drawing Number”.
 - iii. The second factor is the engineering discipline (if required). Common disciplines are as follows, but additional designators are in Chapter 2 of the *A/E/C CAD Standard*.

Title/Cover Sheet	T
Civil/Site Work	C
Hazardous Materials	H
Architectural	A
Structural/Foundation	S
Mechanical (HVAC)	M
Plumbing	P
Electrical	E
Fire Protection	F
Landscape Architecture	L

- iv. The third factor is the page number within the engineering discipline. An example of this would be: the Civil site plan, first Civil sheet for a project with a project number 12-0001. The drawing file name will be 12-0001_C1.DWG. If it is the third Electrical sheet for the same project, the file will be named 12-0001_E3.DWG. The cover sheet will always be named 12-0001_T1.DWG.
- c. Final drawings shall be submitted in AutoCAD. Drawings produced using another software package shall be acceptable provided all drawings are converted to and 100% compatible with AutoCAD drawing files prior to receipt by the government. Any features peculiar to the development software used, such as shape files, menus, blocks, etc., that are not accessible using the basic AutoCAD package are not acceptable and must be modified to ensure the drawing files may be easily edited by government personnel.
- d. Drawing files shall be .DWG format and shall not include back up files or compressed in any way.
- e. Each AutoCAD file shall contain the contents of only one drawing sheet.
- f. Every final plotted drawing sheet shall have its own separate electronic drawing file.
- g. Make sure all reference files are attached without device or directory specifications.

- h. All externally-referenced drawings (xref's) shall accompany each file where it is used; do not bind xref's. All unused blocks, Dimstyles, Layers, linetypes, Shapes and Styles shall be purged from each file.
 - i. Remove all data not needed by that drawing file.
 - j. The designer will verify that a four digit drawing number is assigned to the project based on the criteria specified below, in Paragraph 23, and that all GFM have been provided by the 92 Civil Engineer Squadron, Programs Flight.
 - k. The final AutoCAD drawings shall exhibit good drafting practice to allow for easy changes and minimal storage requirements.
 - l. Drawings shall make use of features to limit drawing size and complexity wherever possible.
 - m. Remove all graphics outside the design and border areas. Erase any information not relevant to the project.
 - n. Compress and reduce all graphic files to allow minimum file size while still displaying information legibly. Purge all AutoCAD files.
 - o. Include all files, both graphic and non-graphic, required for the project.
 - p. Assure all support files such as those listed above are in the same directory and that the references to those files do not include device or directory specifications.
 - q. Include any standard sheets (i.e., abbreviation sheets, standard symbol sheets, etc.) necessary for a complete project.
 - r. Document any fonts, tables, symbols, blocks, reference drawings, etc., developed by the A-E or not provided with the GFM.
 - s. The following information shall accompany each exchange of AutoCAD drawings:
 - i. A list of drawings and their contents, together with uncompressed file sizes.
 - ii. The plotting scale and the plotted size of each drawing.
 - iii. A printed copy of the corresponding file, ACAD.LIN, for line type information whenever a customized ACAD.LIN file is used.
 - iv. A list of sizes and positions of pens on the plotter for plotting the subject drawings. This is necessary to determine line thickness.
 - v. An explanatory list of all layers that do not conform to the standard AIA CAD Layer Guidelines. This includes any user definable fields permitted by the guidelines.
 - vi. A descriptive list of blocks and whether they contain attribute data. Blocks that do not contain attribute data shall be exploded and purged.
 - t. If non-standard fonts are used, .SHX files shall be included.
 - u. Create a folder where all "extra" files are contained for extra fonts, x-refs, and survey data. CD shall contain all DWG's with proper naming convention and a support folder for all ancillary data used for the project.
4. Geospatial/Mapping Data Files
- a. All mapping data will be verified to ensure accuracy and quality of data.
5. Other Computer Files
- a. All design packages shall include a "READ ME FIRST" file that shall illustrate how documents or files are structured in the database.
 - b. Non-graphic information (i.e., databases) associated with AutoCAD drawings shall be submitted in formats compatible with Microsoft® Office 2007.

- i. All master graphics shall be in the following formats only:
 - a. Tag Image File Format (TIFF)
 - b. Joint Photographics Expert Group (JPEG) format
 - c. Graphics Interchange Format (GIF)
 - d. Seamless Image Database (SID) format
- ii. File compression shall be employed to limit the file size of raster graphics.
- iii. All links to external graphics and non-graphic information shall be maintained, or automatically reconstructed, when transferred to the Government.
- c. It is the contractor's responsibility to ensure compatibility.
- d. All design project drawing title blocks shall include a "Drawing Number" issued by the 92CEP/CEPM Project Manager. This applies to all projects solicited through the Fairchild AFB Contracting Office. This four-digit number identifies the entire set of project drawings and facilitates the base drawing filing system.

END OF DATA SHEET

SUBMITTAL CHECKLIST

Section	Para	Requirement	Yes	No	N/A	Comments
DIVISION A – DESIGN SPECIFIC REQUIREMENTS						
A.1		SPECIFICATIONS, DRAWINGS, AND MAPPING REQUIREMENTS				
	B.3.a.	Final drawings submitted in most current version of AutoCAD				
	E.3.s.	Final drawings verified using TSWS Standard Review Program				
	E.4.a.	GIS files verified using Geodatabase Compliance Checker				
A.2		STRUCTURAL AND CIVIL REQUIREMENTS				
	A.1.a.	Roof Live Loads based on ground snow loads of 40, 74, and/or 84 psf				
	A.1.b.	Wind Loads shall be 85 mph basic wind velocity applied per ASCE 7				
	A.2.a.	Design per US Army TI 809-04 and/or TI 809-05				
	A.2.a.	NEHRP ground vel. Coeff = 0.05 and Risk group = C1				
	A.4.a.	Separate access for mechanical, electrical, and communication rooms				
	A.4.b.	Communication equipment is not in same room as mechanical or electrical equipment				
	A.5.a.	Foundations below frost line; minimum of 4 feet below grade				
A.3		ENVIRONMENTAL				
	A.3.	Environmental Impact Analysis prepared				
	D.1.	Use of Recycled Products required				
	E.3.	Base Air Quality Engineer notified as applicable				
	F.6.	Stormwater conveyances designed for 25-yr event (4" per hr for 5 min duration)				
	I.1.	Requirement for asbestos survey				
	I.2.	Requirement for certification of no ACBM for new construction				
	J.1.	Requirement for LBP survey				
A.4		ANTI-TERRORISM/FORCE PROTECTION				
	A.1.	Does the design follow the guidelines in the UFCs				
DIVISION 01 – GENERAL REQUIREMENTS						
011100		SUMMARY OF WORK (Fairchild Specification)				
	all	Fairchild Specification included				
012543		PRODUCT SUBSTITUTION PROCEDURES (Fairchild Specification)				
	all	Fairchild Specification included				
013100		PROJECT MANAGEMENT AND COORDINATION (Fairchild Specification)				
	all	Fairchild Specification included				
	form	RFI form included				
013200		CONSTRUCTION PROGRESS DOCUMENTATION				
	A.1.	Do specs note that work plan is needed 21 days before escorts are available				
013300		SUBMITTAL PROCEDURES (Fairchild Specification)				
	all	Fairchild Specification included				

Section	Para	Requirement	Yes	No	N/A	Comments
013520		SAFETY REQUIREMENTS				
	all	Fairchild Specification included				
013543		ENVIRONMENTAL PROCEDURES (Fairchild Specification)				
	all	Fairchild Specification included				
	form	Solid Waste Disposal Tracking Sheet included				
014000		QUALITY REQUIREMENTS (Fairchild Specification)				
	all	Fairchild Specification included				
	form	Daily Construction Quality Control Report included				
	form	Contractor Test Report included				
015000		TEMPORARY FACILITIES AND CONTROLS (Fairchild Specification)				
	all	Fairchild Specification included				
	B.1.	Project limits identified on drawings				
016000		PRODUCT REQUIREMENTS (Fairchild Specification)				
	all	Fairchild Specification included				
	form	Green Procurement Certification forms included				
017329		CUTTING AND PATCHING (Fairchild Specification)				
	all	Fairchild Specification included				
017836		WARRANTIES (Fairchild Specification)				
	all	Fairchild Specification included				
017700		CLOSEOUT PROCEDURES (Fairchild Specification)				
	all	Fairchild Specification included				
017720		EQUIPMENT-IN-PLACE LIST (Fairchild Specification)				
	all	Fairchild Specification included				
	form	Equipment-in-Place List included				
017823		OPERATION AND MAINTENANCE DATA (Fairchild Specification)				
	all	Fairchild Specification included				
	form	O&M Manual – Review Checklist included				
017839		PROJECT RECORD DOCUMENTS (Fairchild Specification)				
	all	Fairchild Specification included				
017900		DEMONSTRATION AND TRAINING				
	A..	O&M instructions included				
DIVISION 03 – CONCRETE						
030000		GENERAL REQUIREMENTS				
	F.1	Requirements for Hot Weather Concreting Plan				
DIVISION 04 – MASONRY						
042000		UNIT MASONRY				
	A.	Requirement for efflorescence testing of block/brick and for sealing of block/brick				
	B.1.	Face Brick to be Brown Varitone Wirecut or Imperial Red Mission as formerly manufactured by Interpace				
	B.2.	CMU shall be Antique Linen by White Block, Layrite, or approved source. (not integrally colored). Provide mockup for approval by the government.				

Section	Para	Requirement	Yes	No	N/A	Comments
DIVISION 05 – METALS						
050000		GENERAL REQUIREMENTS				
	all	Cold-formed metal framing requirement included				
DIVISION 06 – WOODS, PLASTICS, AND COMPONENTS						
064000		ARCHITECTURAL WOODWORK				
	all	Architectural woodwork requirements included				
DIVISION 07 – THERMAL AND MOISTURE PROTECTION						
074113		METAL ROOF PANELS (Fairchild Specification)				
	all	Fairchild Specification included				
DIVISION 08 – OPENINGS						
080000		GENERAL REQUIREMENTS				
	A.1.	Automatic door openers at entry doors for facilities that serve the public				
	A.2.	Balanced doors a minimum of 48" wide				
	B.2.	Window frames required to be anodized aluminum with dark bronze finish				
087100		DOOR HARDWARE				
	A.1.	Only heavy duty hardware specified				
	A.1.	Key operable locks specified to be compatible with the Best Lock interchangeable cores				
DIVISION 09 – FINISHES						
090000		GENERAL REQUIREMENTS				
	B.1.	Requirement for recycled materials for some finishes incorporated				
	F.3.b.	Main exterior color as approved by Government				
	F.3.b.	Roofing, fascia, and trim Spanish Moss color				
	F.3.c.	Downspouts "open type" with both exterior and interior faces colored				
	F.3.d.	Doors, door trim, and window trim bronze or Spanish Moss color				
	F.3.f.	No exterior graphics and use of signs, markings prohibited unless part of paint scheme				
	F.3.g.(1)	Ext. mech/elec, ducts, pipes, conduit, hydrants, louvers, etc painted to match bldg				
	F.3.g.(2)	Ext. handrails aluminum anodized dark brown				
	F.3.g.(3)	Trash bins required painted Spanish Moss color				
	G.2.	Ceiling Tile 2' x 2' with reveal edges				
	G.4.	All walls with semi-gloss paint shall have Class V finish specified				
	G.5.	All gypboard walls, with recycled content, require sealer before paint				
	G.6.	Penetrating sealer required for all grouted floor tile systems in kitchens and bathroom				
	G.7.	Painted CMU not acceptable as an interior finish except in mechanical rooms				
093010		CERAMIC TILE				
	all	Ceramic tile standards in specifications (these are AMC standards) Provide mockup for approval by Government.				
096800		CARPET (Fairchild Specification)				

Section	Para	Requirement	Yes	No	N/A	Comments
	all	Fairchild Specification included				
DIVISION 10 – SPECIALTIES						
100000		GENERAL REQUIREMENTS				
	A.1.	Requirement for recycled materials for some specialties incorporated				
101400		SIGNAGE				
	all	Signs comply with these requirements				
DIVISION 11 – EQUIPMENT						
110000		GENERAL REQUIREMENTS				
	A.1	Equipment listed in accordance with permitting requirements of A.3				
DIVISION 13 – SPECIAL CONSTRUCTION						
133419		METAL BUILDING SYSTEMS				
	all	Portable metal storage building requirements met				
DIVISION 14 – CONVEYING SYSTEMS						
14000		GENERAL REQUIREMENTS				
	A.1.	Specifications require a one year service and maintenance agreement on elevators				
DIVISION 21 – FIRE SUPPRESSION						
210000		FIRE SUPPRESSION				
	A.2.	Entire facility has automatic fire detection and/or sprinkler fire suppression system				
	A.4.	No gas extinguishing using Halon or similar shall be used				
	D.1.	Kitchen equipment provided with either wet chemical or water fire suppression system?				
	E.1.	Electronic vane paddle type flow switch, with adjustable delay, provided				
	E.2.	No water flow pressure switches or retard switches on the system				
	F.1.	Dry system maintained by air compressor as specified				
	G.1.	Pre-action system maintained by air compressor as specified				
	I.2.	Fire hydrant pressures and flows verified during design				
	J.1.	Fire equipment cabinets keyed alike				
DIVISION 22 – PLUMBING						
220000		GENERAL REQUIREMENTS				
	A	Backflow prevention device requirements included				
	D	Automatic flush valves				
	E	Automated Faucets				
DIVISION 23 – HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)						
230000		HVAC EQUIPMENT				
	B.1.	DDC control provided and required to be interfaced with existing EMCS system				
	C.1.	Designs include a 24 hour heating/cooling profile with energy consumption profile				
	D.1.	Heating systems to be gas except under extreme circumstances				
	D.2.	Boiler piping comply with this standard				

Section	Para	Requirement	Yes	No	N/A	Comments
	E.1.	Air cooled condensing units being used in lieu of cooling towers				
	E.2.	Class II ozone depleting substances specified				
	F.1.	No roof top mechanical installations				
	F.1.	All pad mounted exterior mechanical units screened				
	F.3.	Space provided for tube bundle, fan shaft, air filters, coils, etc removal				
	F.5.	Mechanical rooms have sloped floors & floor drains (not applicable to areas w/ potential fuel spills)				
	F.10.	Ventilation for HVAC systems based upon CO2 demand control				
	G.1.	All piping systems for heating and cooling have reverse return layout				
230900		HVAC INSTRUMENTATION AND CONTROLS				
	A.1.a.	Sequences of Operation provided for all systems				
	A.1.b.	DDC communicates with existing central base wide EMCS system & override allowed				
	A.1.c.	EMCS control of all systems provided and Invensys system (proprietary) required				
	A.3.	All setpoint and similar control parameters capable of being changed from EMCS central				
	A.4.	Specifications for EMCS equipment met				
	A.5.a.	Outside air and humidity sensors sense direct outside air, not air inside ductwork				
DIVISION 26 – ELECTRICAL						
260000		GENERAL REQUIREMENTS				
	B.1.	Electrical meters required, measuring KW hours and demand; tied into EMCS system?				
	C.1.	Electrical outlets provided as required in all mechanical and electrical rooms?				
	D.1.	Bypass switch provided for all generators?				
	E.1.	Are all power panel faces required to be painted to match adjacent wall color?				
	E.2.	Ensure no series rated or plug in circuit breakers are allowed				
	E.2.	Are 25% spare breakers provided?				
	G.1.	Color coding required as noted?				
	H.1.	All conductors required to be copper?				
	I.1.	Motors over 10HP required to have under voltage, phase loss, phase reversal protection?				
	J.2.	Are exit light state of the art with LED indicators (no bulb type)?				
	J.3.	Emergency Lighting - generally no wall mounted battery/lamp type are allowed				
	J.4.	Parking Lighting - shoe box type and on unpainted concrete bases 30" above grade?				
	J.5.	Roadway Lighting - hp sodium lamps, round tapered brushed alum break away poles?				
	K.1.	All electricians or high voltage linesman required to be licensed in Wash state?				
262000		15 KV ELECTRICAL DISTRIBUTION				
	A.2.	All additions to underground system designed as a loop?				
	A.2.	Fused switches provided wherever conductors powered from main trunk lines?				
	B.1.	15KV cables to be copper, URD, 133% EPR insulation, 1/3 concentric neutral for 3 phase				

Section	Para	Requirement	Yes	No	N/A	Comments
	B.1.	full concentric neutral for single phase, full jacket over concentric, 2/0 for main trunk?				
	B.2.	Color coding required for all 13.2 KV lines?				
	B.3.	15KV in concrete encased 4" ductbank, 36" deep, with pull wires in any spare conduit?				
	B.3.	Galvanized rigid elbows at all transformers, junction cabinets, etc?				
	B.5.	All 15KV cable required to have hi-pot test before energization?				
	B.5.	No T-type splices allowed; no dead or load break elbows in manholes?				
	B.6.	Transformers are dead front, loop fed, with load break switches, primary bayonet fusing?				
	B.9.	All 15KV switches provided with type SMU-20 fuses; no key interlocks?				
	B.10.	All pad mounted equipment provided with grounding as noted in this paragraph?				
	C.1.	Lightning arrestors and fused disconnects provided on all aerial-ug transitions?				
264200		CATHODIC PROTECTION				
	A.1.	Cathodic Protection required for all underground metallic objects				
	C.1.	Soil Resistivity tests taken by NACE certified personnel				
	C.2.	Cathodic Protection designed by, installation supervised by,				
	D.1.	NACE certified personnel				
DIVISION 27 – COMMUNICATION						
270000		COMMUNICATIONS				
	all	ETL 02-12 Supplement followed				
275400		KLAXON AND NAOC ALARM SYSTEM				
	A.	Does this facility require an Alert Klaxon or NAOC alarm?				
	C.	If the above are required, does the equipment meet these requirements?				
DIVISION 28 – ELECTRONIC SAFETY AND SECURITY						
283100		CARBON MONOXIDE DETECTION AND ALARM				
	A.1.a.	Permanent hard wired CO detectors w/ min 5 year service life specified where gas used?				
	A.1.b.	CO Detectors listed in 1998 or later editions of UL 2034?				
283110		FIRE-ALARM SYSTEM				
	B.1.	Kitchen equipment fire suppression systems shut off gas and electric to devices				
	C.5.	Smoke detectors in sleeping rooms wired for individual notification only, not to central				
	E.2.	Horns and strobes one unit devices				
	E.3.	Horns, strobes, bells shall be painted to match adjacent color surface with red lettering.				
	F.2.	No glass rod or break glass devices for manual stations				
	G.1.	Batteries gel type				
	H.2.	Panels have two complete spare zones				
	H.3.	All Zones tied into transceiver separately (i.e.--no common zones)				
	I.1.	Graphic annunciator required when panel has 4 or more zones (coordinate location with Base)				
	I.2 to 5.	Graphic annunciator requirements incorporated				

Section	Para	Requirement	Yes	No	N/A	Comments
	J.1. to 18.	Transceiver (transmitter) requirements met				
	K.1.	Requirement for common keying for all panels and devices to match fire alarm master				
	M.1.	Both trouble and alarm indicated on control and annunciator panels for fire detection				
	N.1.	Tamper switches required for all post indicator and OS&Y valves to indicate trouble				
DIVISION 31 – EARTHWORK						
312000		EARTH MOVING				
	B.1	Excess excavated material hauled to approved off-base landfill				
DIVISION 32 – EXTERIOR IMPROVEMENTS						
320000		GENERAL REQUIREMENTS				
	C.4.	New roads have (2) 4" conduit sleeves under them				
323100		SITE IMPROVEMENTS AND AMENITIES				
	C.5.	Appropriate screening Walls provided for all exterior dumpsters, mech/elec equipment				
	C.5.	Screening Wall - 8' clearance on operable sides for electrical, 4' clearance elsewhere, Manufacturer's recommended clearance for all other equipment; but 4' minimum				
	details	Standard Fairchild Details in back of Section 323100 incorporated into the specifications or drawings				
328400		PLANTING IRRIGATION				
	details	Standard Fairchild Details in back of Section 328400 incorporated into the specifications or drawings				
329000		TURF, GRASSES, AND PLANTS				
	I.1.a.	All pesticide applicators certified by the State of Washington				
	form	Contractor Pesticide Documentation Requirements form included				
329300		PLANT3				
	A.1.	Landscaping Master Plan for Fairchild followed				
	details	Standard Fairchild Details in back of Section 329300 incorporated into the specifications or drawings				
DIVISION 33 – UTILITIES						
330000		GENERAL REQUIREMENTS				
	B.1.	Meters for electric, water, natural gas, irrigation, and steam/condensate and tied into EMCS				
	E.1.	All new utility lines have plastic marker tape with integral metallic wires for tracing				
	E.3.	All exterior equipment painted to match base specified colors				
	E.5.	Requirement included for no sawcutting of existing roads for utilities - generally jacking or boring				
	E.6.	All new utilities metered				
	Atch 1	Utility verification process incorporated into specifications				



DIVISION A – DESIGN SPECIFIC REQUIREMENTS
SECTION A.2 – STRUCTURAL AND CIVIL REQUIREMENTS
DATA SHEET

SECTION A.2 – STRUCTURAL AND CIVIL REQUIREMENTS

A. ACCESSIBILITY STANDARDS

- a. All designs shall be in accordance with the *Architectural Barriers Act (ABA) Standards*

B. SNOW AND WIND LOADS

1. Modify *UFC 3-301-01 Structural Engineering*, as follows:

- a. Addition to Table E-1:

State	Base/City	Ground Snow	Wind Speed	Frost Penetration	Frost	Wind Speed	Frost Penetration
		(psf)	(mph)	(inches)	kPa	km/h	mm
Washington	Cusick Command Post	74	85	--	3.54	137	--
	Ruby Creek Command Post	84	85	--	4.02	137	--

2. The ground snow loads for other areas to be determined per the *Snow Load Analysis for Washington* published by the Structural Engineers Association of Washington.

C. SEISMIC LOADS

1. Seismic loads for new building designs are to be per UFC 1-200-01, *General Building Requirements*.
2. Seismic loads for building rehabilitation/renovation designs are to be per *UFC 3-310-04 Seismic Design for Buildings*. National Earthquake Hazard Reduction Program (NEHRP) ground velocity coefficient for Fairchild AFB is 0.05 and risk group assignment of buildings is C1.

D. SOILS AND FOUNDATIONS

1. Modify the *2006 International Building Code*[®] as follows:

- a. Chapter 18, Soils and Foundations:

- i. Delete the first sentence of paragraph 1802.4 and replace with:
- (a) Due to the unpredictable geology in the area, exploratory borings or test pits with accurate soil classification and appropriate soil testing are required for the construction site before foundations are designed.
- ii. Delete paragraph 1805.2, including subparagraphs, and replace with the following:
- (a) 1805.2 Depth of Footings. Exterior foundations and foundations beneath unheated structures shall extend a minimum of four (4) feet below grade unless 92 CES/CEP approval is obtained for shallower foundations. Proposals for shallower foundations will only be considered when substantiated by a certified geotechnical report for the specific project.

2. Soils - Native soils on Fairchild AFB are highly variable and consist mainly of Aeolian and lacustrine, low to medium plasticity, silt and clay; alluvial, very fine to medium, sand; and

considerable amounts of underlying basalt that varies widely in degree of weathering. The contact with the basalt bedrock on the base varies in depth from the surface to tens of feet.

3. Typical building foundations consist of spread footings and a stem wall (either cast-in-place concrete or CMU).

E. WATER TABLE

1. Water table varies throughout the base and throughout the seasons. It can be only 2-3 feet in some areas and up to 10 feet or more below the surface in other areas. Perched water conditions, permanent to temporary, are often found above the basalt bedrock. If no subsurface soil and groundwater data exists for the site, borings or test pits shall be accomplished to determine depth of the water table. The variability of the water table shall be annotated in the drawings and specifications.

F. WETLANDS

1. Any proposed construction activities in designated wetland areas must be approved by 92 CES/CEA prior to construction. Specific activities prohibited in relation to wetlands include dredging, filling, draining and dumping of any material within the boundaries of the wetland. Wetlands generally include swamps, marshes and natural ponds. More than 500 acres of wetlands are located throughout the base and these areas are identified on a map and survey document maintained by 92 CES/CEA.

G. FLOOD PLAINS

1. Flood plains are surface water features with the potential for flooding during a 100 year storm event.

H. STORMWATER RUNOFF

1. Projects that consist of a footprint greater than 5,000 gross s.f. shall maintain predevelopment hydrology and prevent any net increase in stormwater runoff. Reference Under Secretary of Defense's "DoD Implementation of Storm Water Requirements under Section 438 of the Energy Independence and Security Act (EISA)" policy letter dated 19 January 2010.
2. The amount of stormwater originating on any proposed development of land owned or leased by Fairchild AFB shall be estimated according to the rate of precipitation and percentage of runoff outlined in the Fairchild AFB Stormwater Management Plan and Spokane Regional Stormwater Manual.
3. Designs shall take into consideration the increased runoff from development, where grasslands and trees are replaced with impervious surfaces such as buildings, parking areas and roadways, and frozen soil, when the ground becomes an impervious surface and prevents infiltration.
4. Unless specifically approved by 92 CES/CEP, the rate of stormwater runoff from any proposed land development to any natural or manmade point of discharge downstream, such as sewers or ditches, shall not exceed the peak rate of runoff for the 25-year design storm occurring prior to the land development.
5. All stormwater conveyances shall be designed to meet a minimum 25-year storm event. For the Spokane area, this is equivalent to 4 inches per hour for a duration of 5 minutes. The 95th-Percentile Rainfall Event is 0.64 inches.
6. The preferred approach to excess runoff control is infiltration, which disposes of stormwater without the need for extensive conveyance and/or evaporative pond systems. This is especially critical on or near the flightline where birds, attracted to ponds, can interfere with aircraft.
7. Refer to Fairchild AFB Stormwater Management Plan and Stormwater Management Procedures Manual. The Spokane Regional Stormwater Manual shall also be adhered to for additional design standards.
8. Any on-site stormwater retention facilities shall be designed according to the criteria outlined in the above mentioned manuals.

9. See Section A.3, *Environmental*, for construction site stormwater runoff requirements.

I. WATER AND WASTEWATER SYSTEMS

1. All water and wastewater systems shall be designed in accordance with Air Force, Federal, State, and local water quality criteria and standards.
2. For major remodel projects, plumbing lines not replaced shall be cleaned and videotaped.
3. Fairchild AFB is connected to the City of Spokane Advanced Wastewater Treatment Plant. Design capacity of the new line specifies an average daily flow of 1 MGD with a peaking factor of 2.5.
4. See Section A.3, *Environmental*, for permit submission requirements.
5. In accordance with WAC 246-290-120 (5), a **Construction Completion Report** (Form 331-121, available from <http://www.doh.wa.gov/search.htm?query=331-121>) is required for all approved construction projects. Purveyors **must** submit a Construction Completion Report to the State of Washington Department of Health's Office of Drinking Water (ODW) within sixty (60) days of completion and before use of any water system facility. This includes any source, water quality treatment, storage tanks, booster pump facilities, and distribution projects. The contractor's licensed PE shall stamp the completed form 331-121.

J. EQUIPMENT ROOMS

1. Provide separate access for mechanical, electrical and communication rooms.
2. For new construction, communication equipment shall not be located in the same room as either mechanical or electrical equipment.
3. For renovations, whenever possible the equipment shall be located in separate rooms. If separate rooms are not possible due to spatial or other limitations, the designers shall take into consideration the heat given off by mechanical or electrical equipment located in the immediate vicinity.
4. Refer to Section 230000, *HVAC Equipment*, for further information.

END OF DATA SHEET



DIVISION A – DESIGN SPECIFIC REQUIREMENTS
SECTION A.3 – ENVIRONMENTAL
DATA SHEET

SECTION A.3 – ENVIRONMENTAL

A. GENERAL

1. All designs shall comply with all applicable Federal, State, local and Air Force environmental regulations to assure design enhances the natural environment, or as a minimum, has no detrimental effect upon it, while supporting the Fairchild AFB mission.
2. All designs shall address issues identified in this section. This section references applicable regulations and base policy relating to specific environmental issues.
3. Environmental Impact Analysis: An environmental assessment shall be prepared by the 92d Civil Engineer Squadron, Asset Management Flight (92 CES/CEA) for designs at Fairchild AFB.
4. Refer to Section 015720, *Environmental Protection* for additional information.

B. REFERENCES

1. This document references applicable Federal, State, and local laws and regulations, as well as Air Force regulations and positions of the Base Comprehensive Plan (BCP), which relate to specific environmental issues. Work will be accomplished within the guidance and limitations established by, but not limited to, the following:
 - a. Air Force Instruction (AFI)
 - i. AFI 32-7040, *Air Quality Compliance*, 2007
 - b. Army Corps of Engineers Manual
 - i. EM 385-1-1, *Safety and Health Requirements*, 2008
 - c. Code of Federal Regulations (CFR) <http://www.gpoaccess.gov/cfr/index.html>
 - i. 3CFR11593, *Protection and Enhancement of the Cultural Environment*, 1971
 - ii. 3CFR13101, *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*, 1998
 - iii. 36CFR800, *Protection of Historical Properties*, 2003
 - iv. 40CFR260, *Hazardous Waste Management System: General*, 2004
 - v. 40CFR82, *Protection of Stratospheric Zone*, 2004
 - vi. 40CFR122 through 40CFR124, National Pollutant Discharge Elimination System (NPDES) Requirements, 2004
 - vii. 40CFR761, *Polychlorinated biphenyls (PCBs) manufacturing, processing, distribution in commerce, and use prohibitions*, 2004
 - viii. 40CFR763, *Asbestos*, 2006
 - d. Fairchild Air Force Base (FAFB)
 - i. *FAFB Storm Water Pollution Prevention Plan (SWPPP)*, 2008
 - e. New York City Department of Health & Mental Hygiene, <http://www.nyc.gov/html/doh/home.html>

- i. *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*, 2008
- f. Spokane City, www.spokanecity.org
 - i. City of Spokane Municipal Code 13.03A, Pretreatment
- g. Spokane County
 - i. *Spokane Regional Stormwater Manual, 2008*
- h. Spokane Regional Clean Air Agency, www.spokanecleanair.org
 - i. Regulation I
- i. Spokane County Regional Health District, www.srhd.org
 - i. *Solid Waste Handling Standards*, 2004
- j. U.S. Department of Housing and Urban Development
 - i. HUD-2033-OLHC, *Guidelines for the Evaluation and Control of Lead-based Paint Hazards in Housing*, 1995
- k. United States Code (USC) <http://www.gpoaccess.gov/uscode/>
 - i. *Emergency Planning and Community Right-to-Know Act*, 1986
 - ii. *Farm Security and Rural Investment Act*, 2002
 - iii. *Federal Insecticide, Fungicide and Rodenticide Act*, 1996
 - iv. *National Historical Preservation Act*, 1966
 - v. *Resource Conservation and Recovery Act (RCRA)*, 1976
 - vi. *Toxic Substances Control Act*, 1976
- l. Washington Administrative Code, <http://apps.leg.wa.gov/wac>
 - i. WAC 173-218, *Underground Injection Control Program*
 - ii. WAC 173-303, *Dangerous Waste Regulations*
 - iii. WAC 173-304, *Minimum Functional Standards for Solid Waste Handling*
 - iv. WAC 173-340, *Model Toxics Control Act - Cleanup*
 - v. WAC 173-360, *Underground Storage Tank Regulations*
 - vi. WAC 173-400 through WAC 173-491 - Air Quality Requirements
 - vii. WAC 197-11, *SEPA Rules*
 - viii. WAC 246-290, *Public Water Supplies*
 - ix. WAC 365-230, *Lead-based Paint*

C. NATURAL RESOURCES

1. Threatened and Endangered Species
 - a. Fairchild AFB has produced a survey concerning threatened and/or endangered species. The survey is available for review in the Asset Management Flight (CEA) at Fairchild AFB.
 - b. One federally listed plant species has been identified on the base and it shall not be disturbed by construction activities.
2. Archaeological and Historical Sites
 - a. The Base Historic Preservation Officer (92 CES/CEAO) shall be notified of any proposed construction involving historic buildings and structures.

- b. If, during construction, any artifacts or human bones are encountered, work shall be stopped and 92 CES/CEA shall be notified immediately.

D. GREEN PROCUREMENT PROGRAM

1. Fairchild Air Force Base has adopted a Green Procurement Program (GPP) Plan regarding the purchase of environmentally preferable products. The "GPP program elements" include Recovered Materials, Energy and Water Efficient Products, Alternative Fuels and Fuel Efficiency, Biobased Products, Non-Ozone Depleting Substances, Priority Chemicals, and Environmentally Preferable Products. It is therefore mandatory that designers obtain a copy of the GPP Plan from the Contracting Officer in order to familiarize themselves with the requirements related to developing specifications for the particular product, possible exemptions allowed, and required documentation for both the design analysis and the construction phase. Designers shall document which GPP program elements, if any, are applicable to the project using the *GPP Statement* found in the *GPP Plan*, Appendix C, page 3. If the project includes requirements for one or more of the recycled-content products on the Environmental Protection Agency's Comprehensive Procurement Guidelines (CPG) list, the *Recovered Materials Determination Form (RMDF)* found in the *GPP Plan*, Appendix C, page 4 will be used. It documents the CPG items that are required, states whether or not they meet EPA requirements, and provides the justification for any exemptions that are being invoked. Any recommended exemptions shall be approved and/or concurred by the Technical OPR and the Contracting Officer. Both forms become part of the official contract file. The Designer shall reference the EPA's CPG website, and incorporate any applicable products that have been added to the EPA CPG list that are not delineated on the RMDF onto the RMDF and into the project specifications.
2. The *GPP Plan* provides references to legal drivers of the GPP elements and many references and websites for finding appropriate products.
3. When a MACC/MATOC contract is used, the contractor will be required to complete a GPP Statement and, if applicable, the RMDF prior to beginning construction. Contractor submittals will be provided to the CES Project Manager for appropriate distribution.
4. See Fairchild Specification Section 016000, Para. 2.01.M.

E. AIR QUALITY

1. Fairchild AFB has a Synthetic Minor Air Operating Permit.
2. Facilities shall be designed in accordance with Federal, State, and local air quality criteria.
3. The designer shall include a list of equipment being installed and/or modified that requires a Notice of Construction from the Spokane Regional Clean Air Agency (SRCAA) per SRCAA Regulation 1, Article IV or Article V (including, but not limited to: fuel storage tanks, fuel burning equipment, emergency generators, stationary internal combustion engines, baghouses, cyclones, sawdust collectors, paint booths, and abrasive blasters). This list shall be included in the project documents notifying the Contractor of such equipment.
4. The Base air quality engineer (92CES/CEAN) shall be notified at least 6 months prior to starting work on any project that has potential to alter air emissions of the Base. This includes new construction or any modification to existing air emission sources. In addition, 45 days prior to any stationary air emission source being located temporarily on the base, the base air quality engineer shall be notified. Air emission sources include but are not limited to:
 - a. Emergency generators rated at or above five hundred (500) brake horsepower
 - b. Stationary internal combustion engines, other than emergency generators, rated at one hundred horsepower or more, including engines integral to powering a source category like rock crushers or stump grinding.
 - c. Fuel storage tanks

- d. Fuel burning equipment (external combustion) like boilers with per unit heat inputs greater than or equal to 4,000,000 Btu/hr using natural gas only with no back-up. If other fuels are to be used, lower thresholds apply.
 - e. Paint booths
 - f. Abrasive blasters
 - g. Baghouses
 - h. Cyclones
 - i. Sawdust collectors
5. No elbows, tees, or stack caps shall be installed at the end of any stack.

F. STORMWATER RUNOFF

1. Fairchild's primary storm water control objective is to prevent all future development of Base facilities from adding to the present runoff quantity leaving the Base. This means that all future development design greater than 5,000 SF shall provide sufficient controls to ensure there is no increase in storm water runoff at sites that are developed on Fairchild AFB. This is mandated in the Under Secretary of Defense's 19 Jan 2010 policy letter, "DoD Implementation of Storm Water Requirements under Section 438 of the Energy Independence and Security Act (EISA).
2. For any construction site greater than one acre in size, the contractor shall develop a (1) Storm Water Pollution Prevention Plan (SWP3) and submit an (2) EPA Notice of Intent (NOI) form for coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges from Large and Small Construction Activities (Effective 30 June 2008). The SWP3 shall be submitted to 92 CES/CEAN for review prior to NOI submittal to EPA. The requirements for this plan can be obtained at the following address:
http://www.epa.gov/npdes/pubs/cgp2008_finalpermit.pdf, guidance can be found at:
<http://cfpub1.epa.gov/npdes/stormwater/cgp.cfm>. The NOI can be completed electronically at the following address: http://cdx.epa.gov/epa_home.asp. Once submitted, coverage under the permit will become effective in approximately 7 days. The confirmation notice for this coverage shall be submitted to 92 CES/CEAN prior to the beginning of construction.

G. WATER AND WASTEWATER SYSTEMS

1. All permits shall be coordinated through 92 CES/CEAN via the Contracting Officer.

H. SOLID WASTE DISPOSAL

1. All Facilities shall be designed to have an outside commercial dumpster, surrounded by an architecturally compatible screening wall (see Section 320000, Para. D.).

I. POLYCHLORINATED BIPHENYL (PCB)

1. The building or facilities associated with individual Task Orders may contain fluorescent light fixtures and associated ballasts which may or may not contain hazardous materials. The Contractor shall assume that all fluorescent light fixtures and associated ballasts are hazardous (containing PCB's) and prepare the design and subsequent cost proposal accordingly. If upon execution of project, it is determined by the Contractor (through coordination with 92 CES/CEP and Bio-Environmental Engineering) that existing fluorescent ballasts are non-hazardous (officially labeled as "No PCB's"), then disposal shall be as normal ordinary solid waste. Management of spent fluorescent fixture tubes shall be managed as 'Universal Waste' in accordance with WAC 173-303-573, *Standards for Universal Waste Management*, or disposed of at an approved landfill certified for the receipt of such waste.

J. ASBESTOS-CONTAINING MATERIALS (ACM)

1. Ensure that a thorough ACM survey, performed by a certified Asbestos Hazard Emergency Response Act (AHERA) building inspector, with written report, is completed prior to designs for any facility scheduled for remodel or demolition. Surveys and reports shall be in compliance with

the AHERA Act, 40 CFR 763, *Asbestos*, and SRCAA Regulation I, Article IX. See the above regulations for survey procedures and requirements.

K. LEAD-BASED PAINT (LBP)

1. A LBP survey, performed by a certified Lead Inspector, with written report, shall be completed prior to designs for any facility scheduled for remodel or demolition. Conduct survey in accordance with HUD *Guidelines for the Evaluation and Control of Lead-based Paint Hazards in Housing* and WAC 365-230, Lead-based Paint. See the above regulations for survey procedures and requirements. Include representative TCLP samples for each substrate with positive lead results.

L. UNDERGROUND STORAGE TANKS (UST Program)

1. All underground tank installations shall be coordinated through 92 CES/CEAN. The Base 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 data for the completion of this form.
2. All underground tank removals shall be coordinated through 92 CES/CEAN. After tank removal, the contractor will prepare the required closure documents and WDOE permanent tank closure form and submit to WDOE. Copies of all documents shall be forwarded to 92 CES/CEAN.
3. All underground tank projects shall meet the requirements outlined in WAC 173-360, *Underground Storage Tank Regulations*.

M. MOLD

1. At any time that water damage is suspected, the contractor shall perform a mold survey. The survey and any required mold abatement shall be conducted in accordance with the New York City Department of Health and Mental Hygiene *Guidelines on Assessment and Remediation of Fungi in Indoor Environments* and all pertinent OSHA/WISHA standards.
2. Refer to ETL 04-3, *Design Criteria for Prevention of Mold in Air Force Facilities*, for design criteria for preventing mold inside Air Force facilities.

END OF SECTION

Recovered Materials Determination Form (RMDF) User's Guide

1. **PURPOSE OF FORM**. The “Recovered Materials Determination Form” (RMDF) is used to clearly identify items listed in the Comprehensive Procurement Guidelines (CPG) that are included in a procurement action and document the use of applicable exemptions taken for the CPG items identified.

2. **OPR**. Civil Engineer/Environmental and Contracting

3. **OCR**. Civil Engineer/Operations, Civil Engineer/Construction, Civil Engineer/Project Management, Civil Engineer/Materiel Acquisition and other organizations making non-Government-wide Purchase Card (GPC) procurements..

4. **APPLICABILITY**. The RMDF applies to all procurement actions (other than GPC purchases) that include items that are listed in the CPG program.

5. **INTENT FOR USE**.

a. GPC holders will not complete this form and will use the “GPC Program Quick Reference Kit ” instead. The RMDF is included in the Fairchild AFB Environmental Protection specification. The Environmental Protection specification will be included in all service and construction contracts as well as all work orders greater than \$2,500 that will be completed in-house.

b. The requiring organization will be responsible for completing an RMDF if any of the mandatory CPG items are required. For CPG items where exemptions are identified during project/contract performance, an amended RMDF must be completed documenting the exemption. The OCR organizations listed above will be responsible for verifying the completed RMDFs.

6. **FILING PROCEDURE**. If applicable, the RMDF and any amended RMDFs will be included in the purchasing or contracting file. Contracting is responsible for ensuring that a GPP Statement and, if applicable, the RMDF (and any amended RMDFs) is included in contracting files.

Recovered Materials Determination Form

Instructions

This form is to be completed by the procurement originator when EPA-designated items included in the Green Procurement Program for Recovered Materials are being procured from outside vendors. 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 <http://www.epa.gov/cpg/products.htm>. The procurement originator checks off which item(s) apply to the procurement request, signs, and dates the bottom of the form. The completed form becomes part of the contracting office contract file.

Procurement Request / Project No. _____

The EPA-designated items being procured are:

<input type="checkbox"/> Commercial/Industry Sanitary tissue	<input type="checkbox"/> PAPER AND PAPER PRODUCTS	<input type="checkbox"/> PARKS AND RECREATIONAL PRODUCTS
<input type="checkbox"/> Miscellaneous papers	<input type="checkbox"/> Newsprint	<input type="checkbox"/> Park benches and picnic tables
<input type="checkbox"/> Paperboard and packaging	<input type="checkbox"/> Printing and writing papers	<input type="checkbox"/> Plastic fencing
<input type="checkbox"/> Retread Tires	<input type="checkbox"/> VEHICULAR PRODUCTS	<input type="checkbox"/> Playground equipment
<input type="checkbox"/> Engine coolants	<input type="checkbox"/> Re-refined Lubricating Oils	<input type="checkbox"/> Playground surfaces
<input type="checkbox"/> Carpet	<input type="checkbox"/> CONSTRUCTION PRODUCTS	<input type="checkbox"/> Running tracks
<input type="checkbox"/> Carpet cushion	<input type="checkbox"/> Building Insulation	<input type="checkbox"/> LANDSCAPING PRODUCTS
<input type="checkbox"/> Cement and Concrete Containing Fly Ash or	<input type="checkbox"/> Ground Granulated Blast Furnace Slag	<input type="checkbox"/> Garden and soaker hoses
<input type="checkbox"/> Consolidated and reprocessed latex paint	<input type="checkbox"/> Floor tiles	<input type="checkbox"/> Hydraulic mulch
<input type="checkbox"/> Flowable fill	<input type="checkbox"/> Laminated Paperboard	<input type="checkbox"/> Plastic lumber landscaping timbers and posts
<input type="checkbox"/> Patio blocks	<input type="checkbox"/> Railroad grade crossing surfaces	<input type="checkbox"/> Lawn and garden edging
<input type="checkbox"/> Shower and restroom dividers/partitions	<input type="checkbox"/> Structural fiberboard	<input type="checkbox"/> Compost from yard trimmings or food waste
<input type="checkbox"/> Channelizers	<input type="checkbox"/> TRANSPORTATION PRODUCTS	<input type="checkbox"/> NON-PAPER OFFICE PRODUCTS
<input type="checkbox"/> Delineators	<input type="checkbox"/> Flexible delineators	<input type="checkbox"/> Binders, clipboards, file folders, clip port folios, and presentation folders
<input type="checkbox"/> Parking barricades	<input type="checkbox"/> Traffic cones	<input type="checkbox"/> Office recycling containers
<input type="checkbox"/> Traffic cones		<input type="checkbox"/> Office waste receptacles
		<input type="checkbox"/> Plastic desktop accessories
		<input type="checkbox"/> Plastic envelopes
		<input type="checkbox"/> Plastic trash bags
		<input type="checkbox"/> Printer ribbons
		<input type="checkbox"/> Toner cartridges
		<input type="checkbox"/> MISCELLANEOUS PRODUCTS
		<input type="checkbox"/> Awards and plaques
		<input type="checkbox"/> Industrial drums
		<input type="checkbox"/> Mats
		<input type="checkbox"/> Pallets
		<input type="checkbox"/> Signage
		<input type="checkbox"/> Sorbents
		<input type="checkbox"/> Manual-grade strapping

3. ___ No recovered materials listed above or on EPA's website will be procured under this contract.

I hereby certify the Statement of Work/Specifications for the requisition of materials/services listed above complies with applicable FAFB preference standards for recycled/recovered materials.

Procurement Originator's Signature

Date

Recovered Materials Exemption Form

Project/Purchase Request Number: _____

___ EPA recycled-content requirements have been met for this procurement action.

**** OR ****

___ The following EPA designated guideline item is included in the specifications; however, compliance with EPA standards is not attainable.

Item: _____

I have determined that the EPA guidelines were considered and determined inapplicable, based on the following:

___ **Item is not available within a reasonable period of time.**

Need date: _____ Date available: _____

___ **Item fails to meet a performance standard in the specifications.**

Describe the standard and why it is needed: _____

Describe how the guideline item fails to meet the standard: _____

___ **Item is not available from 2 or more sources.**

Market research was performed by calling ___ (insert number) vendors, but only _____ (enter name) was able to supply the item.

___ **Item only available at an unreasonable price (i.e., recycled item is more expensive).**

Price of recycled item: _____

Price of non-recycled item: _____

This determination is made in accordance with FAR 23.405(c).

Technical OPR - Signature and Office Symbol

Date

Concurrence - Contracting Officer

Date

Contractor's Recovered Materials Certification User's Guide

- 1. PURPOSE OF FORM.** Upon completion of a project, contractors will be required to complete this form for the actual types and value of EPA-designated recycled content items used on the project.
- 2. OPR.** Civil Engineer/Environmental and Contracting.
- 3. OCR.** Civil Engineer/Construction, Civil Engineer/Project Management, and Civil Engineer/Operations.
- 4. APPLICABILITY.** Contractor's Recovered Materials Certification Form is used for projects exceeding \$100,000 in value and where FAR 52.223-9 is included, and is completed by the contractor upon contract completion
- 5. INTENT FOR USE.** Contractors will be responsible for completing an RMDF if any of the mandatory CPG items are required. The OCR organizations listed above will be responsible for verifying the completed certification.
- 6. FILING PROCEDURE.** If applicable, the Recovered Materials Certification will be included in the purchasing or contracting file. Contracting is responsible for ensuring that the certification is included in contracting files.

CONTRACTOR'S RECOVERED MATERIALS CERTIFICATION

Project No./Contract No. _____

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.

Comprehensive Procurement Guidelines (CPG)					
Categories and Designated Items					
Fill in all appropriate boxes	Specification Section No.	Percent Recycled Content		Manufacture Name & Address	Approx. Value for this Contract
		Required	Actual		
CONSTRUCTION PRODUCTS					
Building insulation products					
Carpet (polyester)					
Carpet cushion					
Cement and concrete containing: - Coal fly ash - Ground granulated blast furnace slag - Cenospheres - Silica fume					
Consolidated and reprocessed latex paint					
Floor tiles					
Flowable fill					
Laminated paperboard					
Modular threshold ramps					
Nonpressure pipe					

Patio blocks					
Railroad grade crossings/ surfaces					
Roofing materials					
Shower and restroom dividers/partitions					
Structural fiberboard					
<u>LANDSCAPING PRODUCTS</u>					
Compost and fertilizer made from recovered organic materials					
Garden and soaker hoses					
Hydraulic mulch					
Lawn and garden edging					
Plastic lumber landscaping timbers and posts					
<u>NON-PAPER OFFICE PRODUCTS</u>					
Binders, clipboards, file folders, clip portfolios, and presentation folders					
Office furniture					
Office recycling containers					
Office waste receptacles					
Plastic desktop accessories					
Plastic envelopes					
Plastic trash bags					
Printer ribbons					

Toner cartridges					
<u>PAPER AND PAPER PRODUCTS</u>					
Commercial/industrial sanitary tissue products					
Miscellaneous papers					
Newsprint					
Paperboard and packaging products					
Printing and writing papers					
<u>PARK and RECREATION PRODUCTS</u>					
Park benches and picnic tables					
Plastic fencing					
Playground equipment					
Playground surfaces					
Running tracks					
<u>TRANSPORTATION PRODUCTS</u>					
Channelizers					
Delineators					
Flexible delineators					
Parking stops					
Traffic barricades					
Traffic cones					
<u>VEHICULAR PRODUCTS</u>					
Engine coolants					
Rebuilt vehicular parts					
Re-refined lubricating oils					

Retread tires					
MISCELLANEOUS PRODUCTS					
Awards and plaques					
Bike racks					
Blasting grit					
Industrial drums					
Manual-grade strapping					
Mats					
Pallets					
Signage					
Sorbents					
OTHER ITEMS					

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 _____

Date _____



DIVISION A – DESIGN SPECIFIC REQUIREMENTS
SECTION A.4 – ANTITERRORISM / FORCE PROTECTION
DATA SHEET

SECTION A.4 – ANTITERRORISM / FORCE PROTECTION

A. REQUIRED GUIDANCE

1. Design for all new construction and major renovations for inhabited structures shall comply with, but not limited to:
 - a. UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*
 - b. UFC 4-010-02, *DoD Minimum Standoff Distances for Buildings (FOUO)*

The Designer shall confirm that this guidance has not been superseded by any subsequent DoD directives.

END OF DATA SHEET



DIVISION 00 – MISCELLANEOUS REQUIREMENTS

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 00 – MISCELLANEOUS REQUIREMENTS
SECTION 000000 – PROCUREMENT AND CONTRACTING
REQUIREMENTS
DATA SHEET

SECTION 000000 – PROCUREMENT AND CONTRACTING REQUIREMENTS

A. RESERVED

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 011100 – SUMMARY OF WORK
DATA SHEET

SECTION 011100 – SUMMARY OF WORK

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

B. CLIMATE

1. Construction Season
 - a. The normal construction season for exterior work is 15 April through 15 November. Some years are mild and construction can start 30 to 45 days earlier and/or continue 30 to 45 days later.
2. Winter Temperature
 - a. Although the mean winter temperatures are in the mid 20 degrees F, the combination of wind speed (predominantly NE/SW) and temperature gives a mean equivalent chill temperature for January of 14 degrees F (-10 degrees C).

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS

SECTION 011100 – SUMMARY OF WORK

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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 and Submittals, 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/CEP 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 Construction Manager, shall obtain an approved FAFB Form 103, *Base Civil Engineering Work Clearance Request*, in accordance with FAFBI 32-1001, *Preparing 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 prior to beginning physical construction. The Government will require a minimum of ten (10) work days for final processing the FAFB Form 103, therefore, the Contractor shall schedule his 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.
- B. FAA Notification
1. In accordance with FAA and DOD regulations, it is necessary to file FAA Form 7460-1 for any construction or alteration where the proposed construction or associated equipment will exceed greater height than an imaginary surface extending outward and upward at a slope of 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway.
 2. This notice shall be filed with the FAA at least 30 days before the proposed construction or alteration is to begin. However, in the case of an emergency involving essential public services, public health, or public safety, the 30-day requirement does not apply and the notice may be sent by telephone, telegraph, or other expedient means, with an executed FAA Form 7460-1 submitted within 5 days thereafter. The only other exceptions to this rule are as follows:
 - a. When the proposed construction or alteration would be shielded by existing structures of a permanent and substantial character or by natural terrain or topographic features of equal or greater height; when the site is located in the congested area of the base; where it is evident beyond all reasonable doubt that the structure so shielded will not adversely affect safety in air navigation. Buildings, hangars, trees and ramp lighting poles could be considered as shielding.
 - b. Any antenna structure of 20 feet or less in height except one that would increase the height of another antenna structure.
 - c. Any air navigation facility, airport visual approach or landing aid, aircraft arresting device, or meteorological device of a type approved by the Administrator, or any appropriate military service on military airports, the location and height of which is fixed by its functional purpose.
 - d. Any construction or alteration for which notice is required by any other FAA regulation.

3. A copy of this form shall be submitted to the Contracting Officer for forwarding to the Fairchild AFB Community Planner, 92 CES/CEAO, prior to starting work covered by the FAA Notice.
4. For information regarding the FAA Form 7460-1 contact the following address/phone:

FAA Northwest Mountain Region
Air Traffic Division ANM-530
1601 Lind Avenue SW
Renton WA 98055-4056
Tel 425-227.2530
Fax 425-227-1530

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 six 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 flightline Controlled Area, employees will be escorted or be on an entry authority list (EAL) signed by the 92 OSS/CC.

1.11 PHASING

- A. The Contractor shall phase the construction in such a way that limits interruption to airfield operations and shall take into account other planned/ongoing projects.
- 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. Confine all operations and maintenance of tools and equipment, parking of vehicles and storage of items to areas designated on the drawings. ***[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. This area of work shall be a minimum of 100 feet from any active taxiways or runway. If work must be performed within 100 feet of an active taxiway or runway, permission to do so must be requested in writing to the Contracting Officer five (5) working days in advance. The Contracting Officer will coordinate with flight line personnel 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 flight line area, Contractor personnel shall inspect their vehicles (specifically the undercarriage and tires) and equipment for foreign or loose objects and debris, which may cause accidental damage to aircraft or possible injury to flight or ground personnel.
- D. All vehicles, while operating within the flight line area, shall be identified by the Contractor Company name plates or by other means subject to approval of the Contracting Officer.
- E. The Contractor's vehicles, materials and equipment shall not be permitted on the areas of the flight line without approval of the Contracting Officer or designated representative.
- F. 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.
- G. No smoking, open flame or spark producing equipment shall be permitted within 100 feet of aircraft or refueling equipment.
- H. 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.
- I. Fully cooperate with operations and security personnel.
- J. Give right-of-way to aircraft at all times and maintain a minimum of 100 feet clearance from all fixed-wing aircraft and 200 feet clearance from all rotary wing aircraft.
- K. Fire trucks and emergency equipment will have ingress and egress to all areas at all times.
- L. All equipment used on the runway or within 125 feet of the near edge of the runway shall be manned and operational at all times.

1.15 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 Technical Services Section at extension 247-2552. The following criteria shall be adhered to at all times during the contract work.
 - 1. Flammable paints, oils, etc., shall be stored in containers within a controlled area.
 - 2. Temporary wiring shall be in compliance with Article 305 of NFPA 70, *National Electrical Code*[®].
 - 3. 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 Chief 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.

1.16 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 operators, before driving on the Flightline, will be given special instructions on standard Flightline traffic controls and signals, and will be advised of the particular hazards involved. Instruction shall be given by the Airfield Manager or designated representative. The date and time of the instruction shall be coordinated at the pre-construction meeting.
- C. Careful attention and strict adherence to these precautions will prevent accidental damage to aircraft and possible injury to both flight and ground personnel.

1.17 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.

1.18 UTILITY OUTAGES

- A. All outages shall be coordinated with the using agency through the Contracting Officer or his representative. 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.

1.19 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.

1.20 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/S3O 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.

1.21 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.

1.22 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.

1.23 WATER SUPPLY

- A. When required, the Contractor will be furnished a water supply from a fire hydrant selected by the Contracting Officer with the written coordination of the Chief, Fire Technical Services. 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.

1.24 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.

1.25 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.

1.26 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.

1.27 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.

1.28 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.

1.29 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.

1.30 SANITARY FACILITIES

- A. 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.

1.31 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.

1.32 PHYSICAL DATA

- A. Meteorological data furnished from the 92d Operations Support Squadron Weather Flight at Fairchild AFB, WA will be used to determine time extensions due to abnormally severe weather.

1.33 APPROVAL TO USE RADIOACTIVE MATERIALS

At least 30 calendar days prior to bringing radioactive material on Fairchild AFB (contained in monitoring/testing equipment, for example), submit to Bioenvironmental Engineering, 92 AMDS/SGPB, via the Contracting Officer, the dates and times the equipment will be on base. The 92 AMDS/SGPB can be contacted by telephone at (509) 247-2391, or fax at (509) 247-2761. 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.

1.34 IDENTIFICATION CARDS AND VEHICLE PASSES

- A. All security requirements and procedures shall be coordinated with the 92d Security Forces Squadron. Any traffic diversions or road closures will be coordinated with 92 SFS/S3, Bldg 2071, 5 days prior to the diversion or closure. All activities of the contractor and his employees and subcontractors and their employees while on base shall be conducted in strict accordance with all base regulations, including those of the Fire Marshall as well as security directives.
- B. All contractor employees required to enter FAFB in the performance of this contract must first be issued a FAFBI Form 225, Contractor Badge, or Defense Biometrics Identification Card (DBIDS Card) for identification purposes. This identification must be readily accessible at all times within the confines of FAFB. If an employee is dismissed from employment, resigns, or if there is no longer a contractual requirement for the employee to enter FAFB, the contractor's project manager or alternate shall ensure that the FAFBI Form 225/DBIDS Card and any other identification, i.e., vehicle passes, issued to the employee are expeditiously returned to the 92d Contracting Squadron/LGCK prior to final payment. If all identification is not provided, a portion of the final payment (to be determined by the Contracting Officer) shall be withheld pending its submission.
- C. At the Pre-performance Conference, the contractor will be issued sufficient blank applications for issuance of FAFBI Form 225/DBIDS Cards. These applications are to be completed by typewriter or legibly in ink. Attach a front and back copy of your state drivers license to the application. The applications, when completed, shall be hand carried to the Contracting Officer for signature. After signature by the Contracting officer (or representative thereof), the Contractor shall hand carry the applications to the Security Forces Pass and Registration Section (92 SFS/S5B), Bldg. 4325, FAFB. The Pass and Registration Section will process the applications as follows: Non-Flightline Passes, ten (10) workdays; Flightline Passes, ten (10) working days. Upon processing, the Pass and Registration Section will maintain the application for 30 days and then destroy the application.
- D. Contractor identification cards will be issued for the performance period of the contract only, or for 1 year, whichever is the shorter period of time. Passes for contractor personnel where the performance period extends beyond 1 year, or where the contract is extended beyond the original scheduled completion date, will have to be reissued. Procedures for reissue will be the same for the original issue.
- E. Contractor personnel will be made aware by the Contracting Officer and the contractor's project manager of the necessity for safeguarding identification cards issued and the requirement for reporting any identification cards lost.
 1. Temporary passes will be issued for period of up to 6 days for contractor employees when sponsored by the Contracting Officer. In these cases, the Prime Contractor is required to provide the Contracting Officer the Name, Driver's License Number, Social Security Number, duration of temp visit and location of work. The CO will provide these details to the Visitor's Center. Employee will be required to provide the Driver's License or other identification when requesting base access at the Visitor's Center. The Security Forces will conduct a Wants & Warrants check prior to providing a temporary base pass. No escorts are required when the Wants & Warrants system is operational. However, Contractor is required to meet employees at Visitor Center and escort during the period of temporary base access whenever the Security Forces Wants & Warrants check system is not operational and background checks cannot be completed. Security Forces

will not issue a permanent pass until completion of the applicant's background check. Each individual requiring a Contractor Badge must complete a Request for Issuance of Base Pass form. The completed application and a copy of the applicant's picture ID will be hand-carried by the prime contractor's Superintendent (or other person approved by the Contracting Officer) to the appropriate Contracting Office (92 Contracting) for signature. Once signed by the Contracting Office, the application will be hand-carried to the 92 SFS/S5B (Building 4325) where a Wants and Warrants check will be processed on the applicant. Allow up to 10 days for processing by Security Forces.

2. 92 Contracting personnel will verify the need for an immediate pass and mark the application with "Immediate Processing Requested." 92 Contracting will annotate this statement with a signature block stamp. 92 SFS personnel will work these passes as soon as possible depending on current operations.
 3. Personnel requesting passes during a verifiable weekend or after-hours emergency situation will receive a temporary pass for a limited time frame (i.e. 1700/Friday until 0800/Monday). The 92 SFS will issue these passes only after the completion of the required background check.
 4. When processing is completed, the form will be forwarded to Pass and Registration where the applicant will appear, in person, to have the pass issued.
- F. 92 SFS installation entry controllers will check all contractor personnel for their pass during installation entry.
1. If contractor personnel do not have their pass with them, 92 SFS personnel will direct the contractor to the Entry Screening Facility/Pass and Registration in order to verify issuance of a pass. If the contractor has a valid pass issued, they will be issued a 1 day pass and they may proceed onto the installation. Pass and Registration personnel will confirm pass status with the entry controller.
 2. Rambo Road gate entry screening personnel will process contractor personnel without passes.
 3. Personnel who do not have a pass issued will not be allowed to enter the installation until 92 SFS issues a permanent pass.
- G. **Contractors are allowed to identify, in writing to the contracting office, up to 3 on-site superintendents who may vouch 1 day deliveries and services to a job site. The superintendent must proceed to the gate and escort the delivery to and from the work site. All other short duration personnel must be vouched on by the contracting office.** Contractors must provide written notification to the appropriate Contracting Officer of any "temporary" personnel who require access to Fairchild. The notification must include the name, social security number, date of birth, and driver's license or state identification number of the temporary worker. It must also state how long the worker will require access to the base. Contractor personnel are not permitted at anytime to vouch employees on base.
- H. Contractors are reminded that vehicles can not be left parked at the Front (Main) Gate area. This area is 30 minute parking only. If you have employees who can not drive on base (lack of insurance, registration, suspended license, etc.) they must park at an off-base location and ride with another employee. . Violators will be issued a traffic citation or the vehicle will be towed at the owner's expense if the owner cannot be contacted and in higher Force Protection Conditions.
- I. Vendors and delivery vehicles: For vendors and personnel driving delivery vehicles, the contractor shall furnish rosters to the Contracting Officer who will sign and deliver the list to Pass and Registration three duty days in advance of required access to the base if there are no designated superintendents for vouching authority. The roster will include full name, date

of birth, social security number, destination, duration of visit and responsible person and contact information.

- J. When time does not permit, the contractor shall contact the Pass and Registration office at (509) 247-5071 , or Entry Screening Facility (Mon-Fri 0600-2230) at (509) 247-5492, with the name of the delivery vehicle driver, name of company, social security number, date of birth and approximately what time, date, and number of vehicles that require entry to the base. In addition, the contractor shall provide the Pass and Registration office with a telephone call back number for verification of the delivery information provided.
- K. Commercial and company vehicles will be allowed access to the base, provided company emblems are attached to the sides of the vehicles and operators present required identification credentials as described herein. . All contractor vehicles larger than a 15 PAX van must enter FAFB throught the Rambo gate, Mon-Fri, 0600-1800. For access other than these times, call 247-5493 to arrange entry and vehicle searches
- L. Illegal immigrants are not allowed access to Fairchild AFB. Foreign national workers will require additional security processing time, which could take 4 to 6 weeks to complete.

PART 2 PRODUCTS – NOT APPLICABLE

PART 3 EXECUTION – NOT APPLICABLE

END OF SECTION 011100



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 012513 – PRODUCT SUBSTITUTION PROCEDURES
DATA SHEET

SECTION 012513 – PRODUCT SUBSTITUTION PROCEDURES

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 012513 – PRODUCT SUBSTITUTION PROCEDURES
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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.

PART 3 EXECUTION – NOT APPLICABLE

END OF SECTION 012513



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION
DATA SHEET

SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineering Squadron Programs Flight and edit for the specific project.

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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 013200 – CONSTRUCTION PROGRESS
DOCUMENTATION
DATA SHEET

SECTION 013200 – CONSTRUCTION PROGRESS DOCUMENTATION

A. CONSTRUCTION SCHEDULE

1. The Contractor's Construction Schedule shall be submitted at least twenty-one (21) calendar days before work can begin. The schedule shall indicate the critical path.

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 013300 – SUBMITTAL PROCEDURES
DATA SHEET

SECTION 013300 – SUBMITTAL PROCEDURES

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

B. SUBMITTALS

1. The contractor shall prepare a complete and detailed Submittal Register to be submitted to the Contracting Officer using an AF Form 3000, *Material Approval Submittal*. (This applies to all projects solicited through the Fairchild AFB Contracting Office. For CoE projects, use Submittal Register ENG Form 4288). The information shall be developed from the submittal requirements of the contract documents, including the individual specification sections and the drawings.
2. The designer shall make an effort to reduce the number of required submittals.

END OF DATA SHEET



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

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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.
1. Provide a Contractor Submittal Review label or stamp for each Form 3000 , including Shop Drawings, to record the Contractor's review and approval markings.
 2. Include the following information on the label/stamp:
 - a. Name of Contractor
 - b. Submittal Number
 - c. Line Item Number
 - d. Action Taken
 - e. Date of Review
 - f. CQC 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 (eg., 1, 2, 3, 4, etc.). Resubmittals shall retain the original number and add an alphabetic suffix (eg., 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.
- C. 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.
- D. 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 include one (1) completed AF Form 3000 and two (2) copies of all attachments. One (1) completed copy of the AF Form 3000 with attachments will be returned to the contractor for action.

3.02 SUBMITTAL REGISTER

- A. The Contractor shall submit 2 copies 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.

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
DATA SHEET

SECTION 013520 – SAFETY REQUIREMENTS

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

END OF DATA SHEET



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

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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. All other requirements stipulated in the manual are to remain.

1.02 FIRE PREVENTION

- A. Contractors shall follow the requirements outlined in FAFBI 32-008, *Fire Protection and Prevention*.

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. Where pavement markings do not provide adequate definition of hazardous areas in or adjacent to an active pavement that cannot be closed to aircraft traffic, the area is outlined with markers and lights. 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. The markers may be either low- or high-profile barricades as appropriate.
- 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 meter) 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 sand ballast or sand bags. Each barricade has a vertical side projection of 3 square feet (0.27 square meter) 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 light of at least 10 candelas, or a flashing amber-yellow light of at least 5 candelas effective intensity. Frequency of flashing light is between 55 and 75 flashes per minute.

PART 2 MATERIALS – NOT APPLICABLE

PART 3 EXECUTION – NOT APPLICABLE

END OF SECTION 013520



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 013543 – ENVIRONMENTAL PROCEDURES
DATA SHEET

SECTION 013543 – ENVIRONMENTAL PROCEDURES

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

B. TECHNICAL ASSISTANCE

1. Technical assistance for complex environmental problems will be coordinated with:
 - a. Bioenvironmental Engineering
Bldg 9010, 92 ADS/SGGB
Fairchild AFB, WA
Phone: (509) 247 2391
 - b. Natural Resources Management
Bldg 2451, 92 CES/CEAN
Fairchild AFB, WA 99011
Phone: (509) 247 2313

END OF DATA SHEET



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

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. REFERENCES
- E. 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.
- F. Work will be accomplished within the guidance and limitations established by, but not limited to, the following:
 - 1. Air Force Instruction (AFI)
 - a. AFI 32-7040, *Air Quality Compliance*, 2007
 - 2. Army Corps of Engineers Manual
 - a. EM 385-1-1, *Safety and Health Requirements*, 2008
 - 3. Code of Federal Regulations (CFR)
 - a. 3CFR11593, *Protection and Enhancement of the Cultural Environment*, 1971
 - b. 3CFR13101, *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*, 1998
 - c. 36CFR800, *Protection of Historical Properties*, 2003
 - d. 40CFR260, *Hazardous Waste Management System: General*, 2004
 - e. 40CFR82, *Protection of Stratospheric Zone*, 2004
 - f. 40CFR122 through 40CFR124, *National Pollutant Discharge Elimination System (NPDES) Requirements*, 2004
 - g. 40CFR761, *Polychlorinated biphenyls (PCBs) manufacturing, processing, distribution in commerce, and use prohibitions*, 2004

- h. 40CFR763, *Asbestos*, 2006
- 4. Fairchild Air Force Base (FAFB)
 - a. *FAFB Storm Water Pollution Prevention Plan (SWPPP)*, 2008
- 5. New York City Department of Health & Mental Hygiene
 - a. *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*, 2008
- 6. Spokane City
 - a. *City of Spokane Municipal Code 13.03A, Pretreatment*
- 7. Spokane County
 - a. *Spokane Regional Stormwater Manual*, 2008
- 8. Spokane Regional Clean Air Agency, www.spokanecleanair.org
 - a. Regulation I
- 9. Spokane County Regional Health District, www.srhd.org
 - a. *Solid Waste Handling Standards*, 2004
- 10. United States Code (USC)
 - a. *Emergency Planning and Community Right-to-Know Act*, 1986
 - b. *Farm Security and Rural Investment Act*, 2002
 - c. *Federal Insecticide, Fungicide and Rodenticide Act*, 1996
 - d. *National Historical Preservation Act*, 1966
 - e. *Resource Conservation and Recovery Act (RCRA)*, 1976
 - f. *Toxic Substances Control Act*, 1976
 - g. Clean Water Act, National Pollutant Discharge Elimination System General Permit for Discharges from Construction Activities, February 16, 2012
 - g.
- 11. Washington Administrative Code, <http://apps.leg.wa.gov/WAC/>
 - 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 173-360, *Underground Storage Tank Regulations*
 - f. WAC 173-400 through WAC 173-491 - Air Quality Requirements
 - g. WAC 197-11, *SEPA Rules*
 - h. WAC 246-290, *Public Water Supplies*
 - i. WAC 365-230, *Lead-based Paint*

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. Sanitary Sewer Discharge Plan – See paragraph 1.07.B.
 5. Stormwater Pollution Prevention Plan - See paragraph 1.07.C.1.a. *[When the total project site will disturb 1 more acres of land, or will disturb less than 1 acre but is part of a common development that will ultimately disturb 1 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 1 or more acres of land, or will disturb less than 1 acre but is part of a common development that will ultimately disturb 1 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.
- 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) and/or Lead-Based Paint (LBP) Abatement Post Project Record – See paragraph 1.14.B. *[When ACM or LBP 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.]*

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, baghouses, 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 (http://www.spokanecleanair.org/noc_application_forms.asp) with all required supporting documentation and submit it to 92 CES/CEAN via the Contracting Officer for approval. CEAN 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/CEAN 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/CEAN 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/CEAN, 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/CEAN 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. The Plan shall include, at a minimum, types of activities and applicable control measures for each activity; schedules; provisions for monitoring and recordkeeping; and steps to be taken if planned control measures are deemed ineffective.
 - 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 implemented 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 Historic Preservation Officer (92 CES/CEAN) 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/CEAN 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 AND WASTEWATER 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. Sanitary Sewer *[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 Ecology.]*
 1. The Contractor shall not discharge any process water, including but not limited to wastewater from concrete saw cutting operations, wastewater from mechanical floor sweep equipment, groundwater from excavation dewatering, and chlorinated water used for potable water system disinfection, to the sanitary sewer system without specific approval from 92 CES/CEAN via the Contracting Officer. The Contractor shall provide analytical data and a pumping plan that demonstrates any proposed discharge to the sanitary sewer system complies with all requirements contained in City of Spokane Municipal Code 13.03A, Pretreatment. The plan shall address such issues as pump location, discharge location, pumping rate, discharge hose/piping, elimination of sediment from the discharge, etc.

- C. Storm Water Management During Construction: 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/CEAN (Environmental) via the Contracting Officer for government review prior to submission of the EPA Notice of Intent (NOI) and physical work. Guidance for permit requirements, SWPPP development, and Best Management Practices (BMP) can be located on the EPA NPDES website (<http://cfpub.epa.gov/npdes/stormwater/const.cfm>). As a minimum, the site-specific SWPPP shall include the following:

- 1) Storm Water Team
- 2) Nature of Construction Activities
- 3) Emergency-Related Procedures
- 4) Identification of Other Site Operators
- 5) Sequence and Estimated Dates of Construction Activities
- 6) Site Map
- 7) Construction Site Pollutants
- 8) Non-Storm Water Discharges
- 9) Buffer Documentation
- 10) Description of Storm Water Control Measures
- 11) Pollution Prevention Procedures
- 12) Procedure for Inspection, Maintenance, and Corrective Action
- 13) Staff Training to include Certified Erosion and Sediment Control Lead
- 14) Documentation of Compliance with Other Federal Requirements
- 15) SWPPP Certification
- 16) Post-Authorization Additions to the SWPPP

b. BMPs will be developed to address site-specific erosion and sediment controls. Minimum requirements applicable to all sites include:

- 1) Provide Natural Buffers or Equivalent Sediment Controls
- 2) Install Perimeter Controls
- 3) Minimize Sediment Track-Out
- 4) Control Discharges from Stockpiled Sediment or Soil
- 5) Minimize Dust
- 6) Minimize the Disturbance of Steep Slopes
- 7) Preserve Topsoil
- 8) Minimize Soil Compaction
- 9) Protect Storm Drain Inlets

Additional requirements may include:

- 1) Constructed Storm Water Conveyance Channels
- 2) Sediment Basins
- 3) Use of Treatment Chemicals
- 4) Dewatering Practices

c. A current copy of the SWPPP shall be available at the project site or at an easily accessible locations so that it can be made available at the time of an on-

site inspection or upon request by a regulating authority or representative of FAFB.

d. The Notice of Intent (NOI) must be submitted to EPA at least 14 days prior to commencing earth-disturbing activities. The project is considered covered under the CGP 14 days after EPA has acknowledged receipt of the NOI on the Agency's website (www.epa.gov/npdes/stormwater/cgpnosearch). Preparation and submittal must be accomplished through the EPA's eNOI system (<http://cfpub1.epa.gov/npdes/npdesnoi.cfm>). Copies of the NOI submittal and confirmation notice will be submitted to 92 CES/CEAN (Environmental) via the Contracting Officer prior to physical work NTP.

e. A notice of permit coverage must be posted conspicuously at a safe, publicly accessible location in close proximity to the project site. At a minimum, the notice must include the NPDES Permit tracking number and a contact name and phone number for obtaining additional project information. The notice must be located so that it is visible from the public road that is nearest to the active part of the construction site, and it must use a font large enough to be readily viewed from a public right-of-way.

f. 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.

g. Site inspection are required at least once every 7 calendar days; or once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches or greater. Site inspection frequency will increase to at least once every 7 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches or greater for sites discharging to sensitive areas (ex: wetlands).

h. A 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. Preparation and submittal must be accomplished through the EPA's eNOI system (<http://cfpub1.epa.gov/npdes/npdesnoi.cfm>). 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 the permit is terminated. Copies of the NOT will be submitted to 92 CES/CEAN (Environmental) via the Contracting Officer.

2. 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/CEAN (Environmental) 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.

3. Installation of Storm Water Systems: Any storm water collection/treatment facility and/or conveyance structure installed or modified on Fairchild AFB shall be designed in accordance with the standards and requirements of Spokane Regional Stormwater Manual (<http://www.spokanecounty.org/stormwater/content.aspx?c=1759>). At the discretion of 92 CES/CEAN (Environmental), storm water planning and design documents may be submitted to Spokane County for their review.

4. Underground Injection Control (UIC) Wells:

a. Projects shall be designed with the specific goal of managing storm water on-site; however, the use of underground injection control (UIC) wells (drywells, french drains, drain fields, perforated pipe, etc.) to manage storm water are strongly discouraged due to the compliance requirements of the WAC. Prior to the installation of any type of UIC, the designer shall ensure the proposed UIC well(s) meets the new well nonendangerment standards as outlined in WAC 173-218-090, Specific Requirements for Class V Wells (<http://www.ecy.wa.gov/pubs/0510067.pdf>). In addition, a significant portion of Fairchild AFB is located within the High Susceptibility zone of the Critical Aquifer Recharge Zone (CARA). The Department of Ecology website, UIC Well Assessment Information and Timelines, April 2011, instructs the assessor to contact the local authority for UIC requirements within a CARA. The Spokane County critical aquifer section of the Critical Areas Ordinance regulates the use of UICs within Spokane County CARAs. It is the designer's responsibility to ensure compliance with these requirements. Documentation verifying compliance, the proposed location, and design of such structures shall be submitted for review and approval to 92 CES/CEAN (Environmental) through the Contracting Officer prior to acceptance of a final design.

b. Upon approval by the government, the contractor shall submit a completed draft WDOE Underground Injection Control (UIC) Registration Form (<http://www.ecy.wa.gov/programs/wq/grndwtr/uic/index.html>) to 92 CES/CEAN (Environmental) for government submittal to WDOE. The registration form must be submitted prior to design completion and/or construction.

1.08 SOLID WASTE

A. Definitions

1. 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.
2. 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 by the county or state for such recycling.
3. The Base Recycling Center will accept corrugated cardboard (flattened) for recycling. If available, the Recycling Center will provide a receptacle for the cardboard upon request.
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 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 itemize all waste (including waste or material to be salvaged or recycled) expected to be encountered during the construction or demolition process and include proposed disposal/recycle locations and corresponding applicable Solid Waste Permit(s) showing the disposal/recycle facility is licensed.

D. Solid Waste Disposal Tracking

1. All solid waste including salvaged and recycled materials shall be tracked by the type, quantity, 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.

1.09 PETROLEUM-CONTAMINATED SOIL

- A. If petroleum-contaminated or discolored soil is encountered at any time during construction, the Contractor shall cease all operations in the area and immediately notify the Contracting Officer.
- B. All petroleum-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. 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 level for treating or disposing of diesel- and oil-contaminated soil is 2000 mg/kg. Action level for gasoline is 30 mg/kg.
- 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/CEAN 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/CEAN via the Contracting Officer.

1.10 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/CEAN 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/CEAN prior to hazardous waste being removed from a project site. Manifests shall be coordinated through 92 CES/CEAN 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 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.

1.11 HAZARDOUS MATERIAL

- A. Definition
 - 1. Hazardous Material: In accordance with AFI 32-7086, *Hazardous Materials Management*, 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. Any touch-up/repair material to be provided to the user shall have prior item specific approval from the base hazardous material management program.
- C. The Contractor shall submit to 92 CES/CEAN 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 Material Safety Data Sheet (MSDS) for each hazardous material to be brought onto the base during the performance of the contract. This work sheet and MSDS shall be completed for each and every HAZMAT to be used by the General Contractor and all subcontractors.
- D. If during the course of the contract, items not previously identified are to be brought on the base, the Contractor shall submit a Work Sheet and MSDS for approval prior to bringing the HAZMAT onto the base.
- E. At project closeout, the Contractor shall submit to 92 CES/CEAN via the Contracting Officer the quantities of each hazardous material actually used on the base during the contract utilizing and annotating the Government-provided chemical authorization list or the Contractor Hazardous Material Worksheet. The chemical authorization list can be obtained from 92 CES/CEAN via the Contracting Officer. These quantities must be provided not later than 1 December, regardless of when the project concludes. Projects completing on, near, or after 1 December may submit best estimates. If a project covers more than one calendar year, the approximate quantity of each hazardous material used during the calendar year shall be submitted to 92 CES/CEAN via the Contracting Officer at least 30-days prior to the end of the calendar year.

1.12 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.

1.13 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/CEAN) and the Contracting Officer. 92 CES/CEAN (Environmental Element) will accomplish appropriate notifications to regulatory agencies.

1.14 ASBESTOS-CONTAINING MATERIALS (ACM) AND LEAD-BASED PAINT (LBP) ABATEMENT

- A. Abatement Plan: For each task order requiring abatement of asbestos, PCBs, lead-based paint, 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 asbestos survey and addressed the abatement of all asbestos identified within the survey that will be impacted during the course of the project. Prior to submission to the government, any abatement plan shall be reviewed and approved by an individual knowledgeable and experienced in asbestos abatement with a AHERA Supervisor or 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.
- B. ACM and/or LBP Abatement Post Project Report: Any contractor performing ACM work on Fairchild AFB shall submit an ACM Post Project Report to 92 CES/CEAN via the Contracting Officer prior to project close-out. Any contractor performing LBP work on Fairchild AFB shall submit a LBP Post Project Report to 92 CES/CEAN via the Contracting Officer prior to project close-out. All Post Project Reports shall contain the following as a minimum:
1. Regulatory Notification: Copies of all regulatory notifications submitted to regulators.
 2. Daily Project Logs: Detail the ACM or LBP activities performed each day.
 3. Training Records: Copies of training certificates proving the training currency of employees conducting the ACM or LBP work.
 4. Sampling Records: Results of all sampling and testing performed.
 5. Waste Shipment Records
 6. Air Monitoring Records
 7. 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 within this paragraph.
- C. All construction operations shall comply with all applicable Federal, State, local, and Air Force ACM and LBP regulations. Additionally, all work impacting ACM or LBP components shall be performed in accordance with the applicable ACM or LBP abatement specification.
- D. During the course of the project, if previously unidentified ACM or LBP building components are encountered, the contractor shall stop work and notify the Contracting Officer.
- E. No asbestos containing building material nor lead-based paint surface coated building material shall be used or installed during any project performed on FAFB.
- 1.15 ASBESTOS CONTAINING MATERIALS (ACM) AND LEAD-BASED PAINT (LBP) 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 nondetect for asbestos. For lead, these materials shall be <0.01% by weight or <100 ppm when tested by Flame Atomic Absorption (FAA) which is the lowest detection limit of this analytical test.

B. The contractor shall submit a signed, stamped affidavit from a Licensed Architect and an AHERA Certified Building Inspector 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 (ACBM) or Lead-base Paint (LBP) exceeding 100 ppm by weight were used on the project. The signed, stamped affidavit shall include copies of applicable material submittals and associated test reports and be submitted on an AF Form 3000, *Material Approval Submittal*.

1.16 UNDERGROUND STORAGE TANKS (UST Program)

- A. All underground tank installations shall be coordinated through 92 CES/CEAN. The Base 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 data for the completion of this form.
- B. All underground tank removals shall be coordinated through 92 CES/CEAN. After tank removal, the contractor will prepare the required closure documents and WDOE permanent tank closure form and submit to WDOE. Copies of all documents will be forwarded to 92 CES/CEAN.
- C. All underground tank projects shall meet the requirements outlined in WAC 173-360, Underground Storage Tank Regulations

1.17 MOLD

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)

END OF SECTION 013543

CONTRACTOR HAZARDOUS MATERIAL AUTHORIZATION AND USE¹

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 ²	Solid, Liquid or Gas	Amount & Unit of Issue ⁴	Container Type	Max Amount Onsite at any Time ⁵	Est. Amount Used for Project	Actual Amount Used ⁶	Process Type ⁷	Remarks/Notes ⁸

<p>FOOTNOTES:</p> <ol style="list-style-type: none"> 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. Attach copy of MSDS for each line item. Identify National Stock Number if known. If unknown, leave blank, and HMMP will complete. 	<ol style="list-style-type: none"> Identify amount in container & the units item is measured in, i.e. gallon, ounces, lbs, etc. Identify maximum amount present (stored and used) at any one time on Fairchild AFB. 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) See Table 1—Process Types for appropriate codes. 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.
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DIVISION 01-GENERAL REQUIREMENTS SECTION 013543

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FAIRCHILD AIR FORCE BASE DESIGN STANDARDS

30 APRIL 2012

CONTRACTOR HAZARDOUS MATERIAL AUTHORIZATION AND USE¹

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

DIVISION 01-GENERAL REQUIREMENTS
SECTION 013643

FAIRCHILD AIR FORCE BASE DESIGN STANDARDS

28. Usage Reporting Schedule

Monthly End of Contract

COMMENTS:

TABLE 1—PROCESS TYPES

CODE	PROCESS DESCRIPTION	CODE	PROCESS DESCRIPTION
A	Asbestos removal and disposal	R	Fiberglass or composite applications
B	Asphalt paving	S	Renovation, specify process
C	Abrasive blasting; specify substrate, blast media and surface area cleaned	T	Stationary internal combustion engines, gasoline; specify size, gallons of fuel burned, & hours of operation
D	Adhesives	U	Stationary internal combustion engines, diesel; specify size, gallons of fuel burned, & hours of operation
E	Brazing	V	Sanding, specify substrate and surface area sanded
F	Chemical or physical analysis	W	Surface coating, brush or roller applications
G	Cutting, oxy-fuel; specify substrate	X	Surface coating, spray applications in filtered enclosures
H	Cutting, plasma arc; specify substrate	Y	Surface coating, HVLP spray applications in filtered enclosures
I	Cutting, mechanical process, specify substrate	Z	Surface coating, airless spray applications in filtered enclosures
J	Construction, specify process	AA	Surface coating, electrostatic spray applications in filtered enclosures
K	Demolition, specify process	BB	Surface coating, thermal spray applications in filtered enclosures
L	Degreasing operations using solvents	CC	Surface coating, spray applications outdoors
M	Fuel combustion	DD	Surface coating, HVLP spray applications outdoors
N	Grinding, specify substrate and surface area	EE	Surface coating, airless spray applications outdoors
O	Industrial boiler operations	FF	Welding, oxy-fuel; specify substrate and filler material
P	Natural gas combustion	GG	Welding, electric arc; specify substrate and filler material
Q	Paint stripping, chemical	HH	Soldering, specify substrate and filler material

ATTACHMENT
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30 APRIL 2012



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 014000 – QUALITY REQUIREMENTS
DATA SHEET

SECTION 014000 – QUALITY REQUIREMENTS

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 014000 – QUALITY PROCEDURES
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

SECTION 014000 – QUALITY REQUIREMENTS

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.. Responsibility for accomplishing QC is the Contractor's. Specific QC requirements are as 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 all construction operations, both on and off-site, and shall be keyed to the proposed construction sequence.
- 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 five 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 to the Contractor. Discrepancies noted in the prefinal inspection(s) shall be corrected by the Contractor and re-inspected by the Government prior to final inspection of the work.

1.04 QUALITY ASSURANCE (QA)

- 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) 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 QA 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 assure 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 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.
 - 2. To accomplish this, the Contractor 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.
- B. Before actual work begins, the Contractor shall:
 - 1. Read and review the specifications and the drawings.
 - 2. Visit the construction site and become familiar with its layout.
 - 3. Attend the preconstruction conference.
 - 4. A check to assure that all materials and/or equipment have been tested, submitted and approved.
 - 5. A check to assure that provisions have been made to provide required control inspection and testing.
 - 6. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
 - 7. 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.
 - 8. A review of the appropriate activity hazard analysis to assure safety requirements is met.

9. Discussion of procedures for constructing the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that phase of work.
 10. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
 11. 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.
- C. Initial Phase: This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:
1. A check of preliminary work to ensure that it is in compliance with contract requirements. Review minutes of the preparatory meeting.
 2. Verification of full contract compliance. Verify required control inspection and testing.
 3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards.
 4. Resolve all differences.
 5. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
 6. 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.
 7. 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.
- D. 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.
- E. 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.
- F. QC Record: Complete, daily as follows:
1. Items of Work:
 - a. Insert date and record number.
 - b. Insert weather description and temperature.

- c. Indicate crew start and stop times.
 - d. Indicate your start and stop times.
 - e. Indicate exact location of work performed.
 - f. Indicate exact location of work previously completed.
2. Products.
- a. Examine each material.
 - b. 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.
3. Variances:
- a. 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.
 - b. 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 include, as a minimum, the following to cover all construction operations, both on-site and off-site, including work by subcontractors, fabricators, suppliers and purchasing agents:
- B. Procedures for scheduling, reviewing, certifying and managing submittals, including those of subcontractors, off-site fabricators, suppliers and purchasing agents. These procedures shall be in accordance with Section 013300 SUBMITTAL PROCEDURES.
- C. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
- D. Reporting procedures, including proposed reporting formats. This shall include a copy of the Daily QC report form.

3.02 ACCEPTANCE OF PLAN

- A. Acceptance of the Contractor's plan by the Contracting Officer is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to

make changes in his QC plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.03 NOTIFICATION OF CHANGES

- A. After acceptance of the QC plan, the Contractor shall notify the Contracting Officer, in writing, a minimum of seven calendar days prior to any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.04 COORDINATION MEETING

- A. After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the QC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's QC system. During the meeting, a mutual understanding of the system details shall be discussed, including the forms for recording the QC operations, control activities, testing, administration of the system for both on-site and off-site work, and the interrelationship of Contractor's Management and control with the Government's QA. Minutes of the meeting shall be prepared by the Contractor and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.05 QUALITY CONTROL ORGANIZATION

- A. The Contractor shall identify an individual within his organization at the site of the work who shall be responsible for overall management of QC and have the authority to act on all QC matters for the Contractor. 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 will 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 resume and QC certification of the individual assigned as a submittal under Phase I.
- C. The QC shall be an individual with a minimum of 5 years combined experience as a superintendent, inspector, QC Manager, or Construction Manager on similar size and type construction contracts which included the major trades that are part of this contract. The individual must have experience in the areas of hazard identification and safety compliance.

3.06 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.

3.07 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.
- 3.08 SAMPLE FORMS
- A. Sample Contractor QC Report forms are included at the end of this section.

END OF SECTION 014000

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)		

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: _____



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS
DATA SHEET

SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

B. HAUL/ACCESS ROUTES

1. Show contractor 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.).

C. PROJECT LIMITS

1. Show project limit lines 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.

D. STORAGE AREAS

1. Location
 - a. Show 'approved' storage area(s) on project drawings no later than the 35% submittal. Approval must be obtained in writing from 92 CES/CEP for all storage areas. Storage area(s) must be limited to a specific size. Ensure Specification Section 015000 clearly identifies whether or not a storage area is provided.
2. Special Rules for Housing Areas
 - a. Storage areas are not permitted at the entrances to housing areas. If the project does not lend itself to 'just-in-time' delivery or storage 'down town' 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/CEP.

E. AIRFIELD PROJECTS

1. Coordinate with 92CES/CEPM and Fairchild Airfield Manager for Foreign Object Debris (FOD) barrier requirements to include whether they are necessary, where to install, and their specific construction.
 - a. 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.
 - b. 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.

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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

- 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 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, Fire Department and Rescue Squad 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 dryland 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). 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.
 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. 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.

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 duct, 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.
- 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. 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.

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

[Include this for work on/near the airfield and/or security sensitive areas. Coordinate with 92 CES/CEP and Airfield Management about Temporary Construction Waivers and coordinate with 92 CES/CEPM and Security Forces about Security Free Zones.]

- A. 92 CES/CEP will process a Temporary Construction Waiver for work on or near the airfield. 92 CES/CEP will also process a Security Free Zone waiver for work on or near the airfield or in security sensitive areas. 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 has been approved. The waivers 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 months 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.
- 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), applicable only to paved areas. The FOD barrier will suffice if a FOD barrier is required. Otherwise, the contractor shall provide weighted, stanchions every 25' to include yellow

flashers. 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, *The Air Force Installation Security Program*.

1.10 SUBMITTALS

- A. Site Plan: Prior to starting the work, submit site plan(s) to the 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.

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.

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 like-new 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; however, if they are not located behind the construction fence they shall be skirting, with skirting color matching body color.

- 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 "A" 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. Comply with NFPA 10, *Standard for Portable Fire Extinguishers*, and NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*, for classification, extinguishing agent and size required by location and class of fire exposure.

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, 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.
- 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 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Temporary Fire Protection: Provide and maintain temporary fire protection facilities of the types needed to protect against reasonable predictable and controllable fire losses. Comply with NFPA 10 and NFPA 241. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher in each building.
- B. Store combustible materials in containers in fire-safe locations.
- C. Maintain unobstructed access to fire extinguishers, fire hydrants, and access routes for fighting fires. Prohibit smoking in all areas.

3.03 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
DATA SHEET

SECTION 016000 – PRODUCT REQUIREMENTS

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

B. GREEN PROCUREMENT PROGRAM

1. Fairchild Air Force Base has adopted the *Green Procurement Program Plan* implementing the purchase of environmentally preferable products and services which conserve resources, create less pollution and waste, or eliminate health and safety risks. The Plan requires that some construction materials be composed of a minimum percentage of recycled products, are made of biobased products, or are some other type of environmentally preferable product.
2. The Designer shall obtain a copy of the *Green Procurement Program Plan* in order to familiarize themselves with the requirements related to developing specifications for the particular product, possible exemptions allowed, and required documentation for both the design analysis and the construction phase.
3. Contractor requirements are included in Fairchild Specification Section 016000, Paragraph 2.01.M.

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 016000 – PRODUCT REQUIREMENTS
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

SECTION 016000 – PRODUCT REQUIREMENTS

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 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.
- 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's 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
 - 1. The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:
- F. Proprietary Specification Requirements
 - 1. 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
 - 1. 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
 - 1. 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

1. 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.

M. Green Procurement - Recycled Products

1. Fairchild Air Force Base has adopted a Green Procurement Program (GPP) regarding the purchase of environmentally preferable products in accordance with Federally-mandated 'green' procurement preference programs. The specifications may include products that must meet the requirements of the various elements of the GPP including Recovered Materials, Energy and Water Efficient Products, Alternative Fuels and Fuel Efficiency, Biobased Products, Non-Ozone Depleting Substances, Priority Chemicals, and Environmentally Preferable Products. 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. Upon contract completion, the Contractor shall complete the *Contractor's Recovered Materials Certification* form, listing the actual types and value of EPA-designated recycled content items used on the project. The form is included at the end of this section. The completed form shall be submitted to 92 CES/CEAN via the Contracting Officer. If the contract covers more than one calendar year, a report summarizing the information for the previous calendar year must be submitted within 30 days of the end of the calendar year.
3. Upon contract completion a summary of this information shall be provided to 92 CES/CEAN via the Contracting Officer. In addition, if the contract covers more than one calendar year, then a report summarizing the information for the previous calendar year must be submitted within 30 days of the end of the calendar year.

PART 3 EXECUTION

3.01 HAZARDOUS MATERIAL

- A. 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

- A. 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.

END OF SECTION 016000

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 Green Procurement Program for Recovered Materials are being procured from outside vendors. 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 <http://www.epa.gov/cpg>. 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 \$100,000 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. _____

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

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

Comprehensive Procurement Guidelines (CPG) Categories and Designated Items					
Fill in all appropriate boxes	Specification Section No.	Percent Recycled Content		Manufacture Name & Address	Approx. Value for this Contract
		Required	Actual		
CONSTRUCTION PRODUCTS					
Building insulation products					
Carpet					
Carpet cushion					
Cement and concrete containing: - Coal fly ash - Ground granulated blast furnace slag - Cenospheres - Silica fume					
Consolidated and reprocessed latex paint					
Floor tiles					
Flowable fill					
Laminated paperboard					
Modular threshold ramps					
Nonpressure pipe					
Patio blocks					
Railroad grade crossings/ surfaces					
Roofing materials					
Shower and restroom dividers/partitions					
Structural fiberboard					
LANDSCAPING PRODUCTS					

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

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

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: _____

Date: _____



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017329 – CUTTING AND PATCHING
DATA SHEET

SECTION 017329 – CUTTING AND PATCHING

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

END OF SECTION



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017329 – CUTTING AND PATCHING
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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.

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. Firestopping.
 - 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
- A. 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
- A. 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

- A. 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
DATA SHEET

SECTION 017700 – CLOSEOUT PROCEDURES

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

B. INSPECTION PROCEDURES

1. Inspection procedures vary for phased projects; designers must select the appropriate inspection procedures for the specific type of contract.

C. CLOSEOUT DOCUMENTS

1. The Designer shall incorporate appropriate specifications for closeout documents to include:
 - a. Section 013543, Environmental Procedures
 - b. Section 016000, Product Requirements
 - c. Section 017720, Equipment-in-Place
 - d. Section 017823, Operation and Maintenance Data
 - e. Section 017836, Warranties
 - f. Section 017839, Project Record Documents

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017700 – CLOSEOUT PROCEDURES
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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 10% of the contract value from the contractor pending receipt and approval of all required documentation.

1.01 SUBSTANTIAL COMPLETION

A. General

1. 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 instruction of 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.

1.02 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. Reinspection 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 reinspection, 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, reinspection will be repeated.
- 1.03 Real Property Records
- A. Draft, Interim, and Final DD 1354 Form, Transfer and Acceptance of Military Real Property will be required for each project. Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete and submit Final DD 1354 Form, Transfer and Acceptance of Military Real Property. Exceptions will be made for projects shorter than 60 days. 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>.
 - B. Submit the completed *Checklist for Form DD1354* of Government-Furnished and Contractor-Furnished/Contractor Installed items. Attach this list to the DD Form 1354. Instructions for completing the form and a blank checklist (fill-able) in ADOBE (PDF) may be obtained at the following web site: http://www.wbdg.org/ccb/DOD/UFC/ufc_1_300_08.pdf. See Appendix D of this pdf for the checklist.

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
1. Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.
- D. Removal of Protection
1. 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
DATA SHEET

SECTION 017720 – EQUIPMENT-IN-PLACE LIST

A. REQUIREMENTS

1. When the project provides equipment as part of the construction of a project, the designer shall include Section 017720 in the project specifications. This section is required to ensure the Contractor provides a list of equipment-in-place. This list is required for contract close-out and updating of real property records.

B. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017720 – EQUIPMENT-IN-PLACE LIST
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

SECTION 017720 – EQUIPMENT-IN-PLACE LIST

PART 1 GENERAL

1.01 SUBMITTAL

- A. 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

- A. 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 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

- A. 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.

END OF SECTION 017720

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: _____



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017823 – OPERATION AND MAINTENANCE DATA
DATA SHEET

SECTION 017823 – OPERATION AND MAINTENANCE DATA

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017823 – OPERATION AND MAINTENANCE DATA
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

SECTION 017823 – OPERATION AND MAINTENANCE DATA

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.

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for Operations and Maintenance Manuals including information on, but not limited to the following:
1. Contractor furnished and installed equipment.
 2. Contractor furnished and installed systems and materials.
 3. Government furnished-Contractor installed equipment.
 4. Government furnished-Contractor installed systems and materials.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Section 013300, *Submittal Procedures*, for submitting the Contractor's Construction Schedule and Submittal Register.

PART 2 PRODUCTS – NOT APPLICABLE

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall provide Operation and Maintenance (O&M) manuals for the complete project as applicable under this contract, including all Contractor furnished and installed equipment, systems and materials, and all Government furnished-Contractor installed equipment, systems and materials. 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. Included herein are requirements for compiling and submitting the O&M data. Additional O&M data requirements are specified in the individual sections of the technical specifications. O&M Manual requirements shall be coordinated with the requirements as stated in the other technical specification sections and shall include listings for spare parts, framed instructions, etc.

3.02 FORMAT

- A. O&M data shall be separated into distinct systems. O&M manuals for any particular system shall include narrative and technical descriptions of the interrelations with other systems. This narrative shall include a description on how the system works with notable features of the system, including normal and abnormal operating conditions. The explanation of the system is to be short and concise with reference to specific manufacturer's equipment

manuals for details (see paragraph CONTENT, subparagraph b). If the quantity of material is such that it will not fit within one binder then it shall be divided into volumes, as required (see paragraph in Binders).

- 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.
- C. One (1) complete bound copies and two (2) digital Adobe.pdf format of the final O&M data as approved by Contracting Officer for each building or facility shall be required. The requirement for one bound and two (2) digital Adobe.pdf format copies of the O&M manual shall supersede and replace any requirements for a lesser amount of manuals which may be indicated in some specifications. Each set of manuals shall be tailored for its respective building or facility.

3.03 PRELIMINARY O&M MANUAL AND DATA SUBMITTAL

- A. To establish and assure uniform O&M manual format, the Contractor shall submit and receive Contracting Officer approval on one (1) complete sets of preliminary O&M data, one with original manufacturer's literature. This preliminary submittal for each set of O&M data, without binder(s), shall also include two typewritten pages representing the proposed binder marking format as required under Paragraph Marking and Binding. One page(s) will represent the front cover(s) and the other page(s) will represent the spine(s).
- B. Data submitted for each manual shall only be for the specific equipment furnished. All data shall be in addition to that furnished as shop drawings and construction submittals.
- C. The Contracting Officer may require up to thirty (30) days for review of submitted O&M manual(s) or data, therefore the contractor will submit O&M manuals in sufficient time to allow for government review prior to training. The Contracting Officer will retain the copy of submitted O&M manual(s) and return the one containing the original manufacturer's literature. The returned submittal will be marked either "Approved" or "Disapproved - see remarks". If "Disapproved" the Contractor shall resubmit the required number of copies of the manual(s) incorporating all previous comments until an "Approved" submittal is received.
- D. 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. O&M data on equipment or systems not requiring training or testing shall be submitted so all data will be approved and bound in the O&M manuals in the required quantity by the time the project reaches the Contract Closeout Completion date. Failure to furnish approved, bound manuals in the required quantity by the time the Contract Closeout Completion date will be cause for the Contracting Officer to hold or adjust the retained percentage in accordance with CONTRACT CLAUSE, PAYMENTS UNDER FIXED PRICE CONSTRUCTION CONTRACTS.
- E. 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.

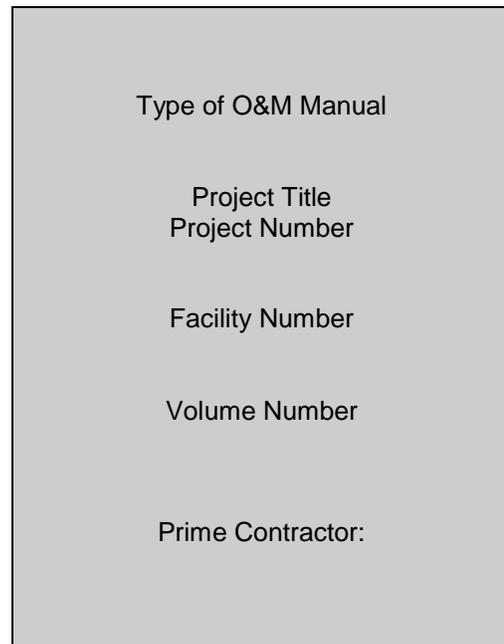


Figure 1. O&M Manual Cover

3.04 BINDER

A. Construction and Assembly

1. Construction: Manuals shall be sliding posts or screw-type aluminum binding posts (three screws) 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. The hard cover shall be of minimum stiffness equal to 0.080 inch display board or double weight illustration board.
2. Marking: Each binder shall have the following information inscribed on the cover using an offset of silk screen printing process: 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).
3. Color
 - a. Color of binder shall be black and printing shall be gold.
4. Contents
 - a. Architectural/General, Mechanical, Electrical, Fire Protection and Detection, Security, and Irrigation O&M Manuals shall be structured to address each of the following topics in the order listed.
 - (1) Warning Page: A warning page shall be provided to warn of 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 tile, project number, contract number, warranty inclusion 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 an index of its enclosures 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:

(a) 15500	15500	15500	15500
(b) AHU-1	AHU-2	AHU-3	AHU-4
 - (4) Description: Narrative and technical descriptions of the system and of the interrelations with other systems shall be provided.
 - (5) Check List Prior to Start Up: Precaution and pre-check prior to start up of equipment and/or system, including safety devices, monitoring devices and control sequence shall be provided.
 - (6) Start Up and Operation: Step-by-step sequential procedures for start up and normal operation checks for satisfactory operation shall be provided. Safety

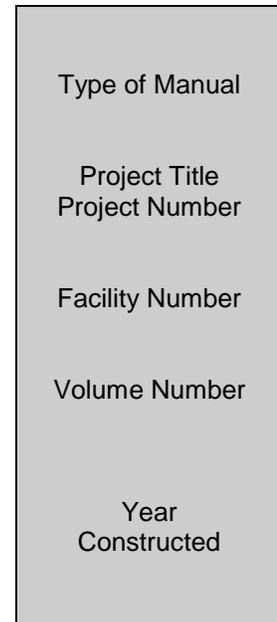


Figure 2. O&M Manual Spine

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.

- (7) 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 start up at a later time. Procedures shall include test, manual/normal, and automatic modes.
- (8) Trouble Shooting and Maintenance Procedures: The contractor shall provide a "Trouble Shooting" guide for all installed equipment or systems. This trouble shooting guide shall cover both preventive maintenance and repair.
 - (a) Preventative maintenance trouble shooting instructions shall include recommended operator preventive maintenance which would normally be performed by operating personnel and adjustment procedures necessary for normal operations. Maintenance Procedures shall also indicate preventive maintenance, lubrication, and good house keeping 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. Safety precautions and instructions that should be followed during these 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. 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. Emergency adjustments shall also be included and flagged for operator's attention. These instructions shall also include procedures for emergency repairs that may be performed by operating personnel. These emergency repairs or "trouble-shooting guides" shall be outlined in three columns with the following headings:
 - Column 1 – Trouble
 - Column 2 – Probable Cause(s)
 - Column 3 – Correction
 - (b) Repairs: 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. The procedures shall also clearly indicate the limit of repair work that may be performed by Government personnel during the warranty period without voiding warranty provisions. Safety precautions and instructions that should be followed during these procedures shall be incorporated into the repair procedures and flagged for the attention of

personnel. Repair procedures shall be keyed to a troubleshooting guide outlined in three columns with the following headings:

Column 1 – Trouble

Column 2 – Probable Cause(s)

Column 3 – Correction

- (9) 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:
- (a) A fully labeled control schematic which details all set points, throttling ranges, actions, spans, proportional bands, and any other adjustment.
 - (b) A fully labeled elementary diagram (ladder diagram).
 - (c) A sequence of control on the diagrams cross- referenced to the control schematic and elementary diagram.
 - (d) A generic, functional description of each control component shown on the drawings.
 - (e) Catalog data of all control devices.
- (10) 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 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.
- (11) 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 sublisted with each instruction.
- (a) Availability: The Contractor shall list the sources of supply for all parts and supplies, including name of supplier/manufacturer, address, and telephone number. If the parts and supplies are not normally stocked locally, (within 6 hours travel time, round trip by surface transportation) necessary procurement time shall also be a part of the listing.
 - (b) 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.

- (12) Maintenance Schedule: A separate 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 also be specified. The Contractor shall verify that the furnished maintenance schedule agrees with the published manufacturer's data.
- b. Architectural/General O&M Manuals
 - (1) 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.
 - (2) 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.
 - (3) 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.
 - c. Warranties: In addition to the general warranty required by the contract, all O&M manuals shall include any specific warranties required by other sections of the TECHNICAL SPECIFICATIONS and other warranties normally provided with the particular piece of equipment or system. Extended warranties normally provided by manufacturers that are beyond the warranty of construction shall be specifically noted. The O&M manuals shall also include a specific warranty section itemizing all standard and extended warranty items. The warranty list shall include: item warranted; Contractor's name and Contract Number; Warrantor's name, address and phone number; Warranty period or manufacturer's extended warranty period, and material warranted in the contract. A copy of all warranties shall be included in the manual.
 - d. 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*.
 - e. Data Layout
 - (1) Data Identification: Catalog data shall be marked to clearly identify pertinent data by highlighting the data with pointers.
 - (2) 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 shall be of microfilm quality.

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 PAYMENT

- A. No separate payment will be made for the preparation and submittal of O&M manuals. All costs incurred by the Contractor in the preparation and submittal of O&M manuals shall be considered as part of the price for the equipment and included in the contract price.

3.07 WARRANTIES

- A. In addition to the general warranty required by the contract, the O&M manuals shall include any specific warranties required by other sections of the TECHNICAL SPECIFICATIONS and other warranties normally provided with the particular piece of equipment or system. Extended warranties normally provided by manufacturers that are beyond the warranty of construction shall be specifically noted. The O&M manuals shall also include a specific warranty section itemizing all standard and extended warranty items. The warranty list shall be as indicated below. Warranties will not begin until the facility is accepted by the Contracting Officer. Copy of warranty shall be included in the manual.

WARRANTY INFORMATION

Project Title

Contract Number

General Contractors Name, Phone Number

<u>ITEM DESCRIPTION</u>	<u>START DATE</u>	<u>END DATE</u>	<u>O&M REFERENCE</u>	<u>LOCATION</u>
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(in alphabetical order)

(Item Description includes: Descriptive Name and Manufacturers/Warrantors Name, Address and Phone Number)

3.08 CHECKLIST

- A. 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.

END OF SECTION 017823

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, start up procedures, sequences of operation, precautions.)
- ___ Does the manual contain operations data for the equipment? (Lubrication, dismantling, assembly, adjustment, troubleshooting, etc.)
- ___ Does the manual contain a separate maintenance schedule listed by frequency of occurrence?
- ___ Does the manual contain parts lists or parts catalogs for the equipment? Parts catalog or list shall contain identification, part numbers, 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 (non-flexible) with the facility name, identification number, location, and system embossed on both the spine and cover? Is the Contractor's name and address, and the contract title and contract number embossed on the inside of the manual cover?
- ___ Is the binding screw posts or sliding post?
- ___ Is any of the data in the manual under the binding where it cannot be seen?
- ___ Do three sets of 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?

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



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017836 – WARRANTIES
DATA SHEET

SECTION 017836 - WARRANTIES

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineering Squadron Programs Flight and edit for the specific project.

END OF DATA SHEET



DIVISION 01 – GENERAL REQUIREMENTS
SECTION 017836 – WARRANTIES
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

SECTION 017836 – WARRANTIES

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 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

- A. 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
DATA SHEET

SECTION 017839 – PROJECT RECORD DOCUMENTS

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

B. AS-BUILT DRAWINGS

1. The Contractor shall keep at the construction site a complete set of full size prints of the contract drawings, reproduced at the contractor's expense. 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.

END OF DATA SHEET



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

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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
 - 1. 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
 - 1. 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
 - 1. 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
 - 1. The final as-built record drawings on computer disc 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 review 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.
- 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. 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 WGS 1984 UTM Zone 11N, meters; 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.
- I. 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.
- J. Mark all changes or modifications from the original design and the final inspection.
- K. 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.
- L. The contractor shall supplement the as-built field data with the as-built shop drawings for all HVAC, irrigation, structural steel, etc.
- M. 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. 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. 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 01 – GENERAL REQUIREMENTS
SECTION 017900 – DEMONSTRATION AND TRAINING
DATA SHEET

SECTION 017900 – DEMONSTRATION AND TRAINING

A. OPERATION AND MAINTENANCE INSTRUCTIONS

1. Arrange for each Installer of equipment that requires regular maintenance to meet with the Government's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
 - a. Maintenance manuals.
 - b. Record documents.
 - c. Spare parts and materials.
 - d. Tools.
 - e. Lubricants.
 - f. Fuels.
 - g. Identification systems.
 - h. Control sequences.
 - i. Hazards.
 - j. Cleaning.
 - k. Warranties and bonds.
 - l. Maintenance agreements and similar continuing commitments.
2. As part of instruction for operating equipment, demonstrate the following procedures:
 - a. Startup.
 - b. Shutdown.
 - c. Emergency operations.
 - d. Noise and vibration adjustments.
 - e. Safety procedures.
 - f. Economy and efficiency adjustments.
 - g. Effective energy utilization.
3. Also provide the Government's personnel with instructions for operating and maintaining equipment recorded on DVD media.

END OF DATA SHEET



DIVISION 02 – EXISTING CONDITIONS

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 02 – EXISTING CONDITIONS
SECTION 020000 – EXISTING CONDITIONS
DATA SHEET

SECTION 020000 – EXISTING CONDITIONS

A. RESERVED

END OF DATA SHEET



DIVISION 03 – CONCRETE

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 03 – CONCRETE
SECTION 030000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 030000 – GENERAL REQUIREMENTS

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 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.

END OF DATA SHEET



DIVISION 04 – MASONRY

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 04 – MASONRY
SECTION 040000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 040000 – GENERAL REQUIREMENTS

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 Section 016000, *Product Requirements*, for details.

B. UNIT MASONRY

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

END OF DATA SHEET



DIVISION 04 – MASONRY
SECTION 042000 – UNIT MASONRY
DATA SHEET

SECTION 042000 – UNIT MASONRY

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

B. GENERAL

1. Brick and block shall be tested for limited efflorescence.
2. Upon completion 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 Wirecut 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 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 masonry construction for evaluation and establishing workmanship expectations. Panel shall be used to evaluate subsequent masonry work for the specific project. Panel shall be removed upon direction of the Government.

END OF DATA SHEET



DIVISION 05 – METALS

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 05 – METALS
SECTION 050000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 050000 – GENERAL REQUIREMENTS

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 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 Division 09, Section 090000, Paragraph C for non-structural wall requirements.

C. Metal Roofing

1. See Division 07 – Moisture and thermal protection

END OF DATA SHEET



DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES
SECTION 060000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 060000 – GENERAL REQUIREMENTS

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 Section 016000, *Product Requirements*, for details.

B. ARCHITECTURAL WOODWORK

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

END OF DATA SHEET



DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES
SECTION 064000 – ARCHITECTURAL WOODWORK
DATA SHEET

SECTION 064000 – ARCHITECTURAL WOODWORK

A. 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

END OF DATA SHEET



DIVISION 07 – THERMAL AND MOISTURE PROTECTION

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 07 – THERMAL AND MOISTURE PROTECTION
SECTION 070000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 070000 – GENERAL REQUIREMENTS

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 Section 016000, *Product Requirements*, for details.

END OF DATA SHEET



DIVISION 07 – THERMAL AND MOISTURE PROTECTION
SECTION 074113 – METAL ROOF PANELS
DATA SHEET

SECTION 074113 – METAL ROOF PANELS

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

END OF DATA SHEET



DIVISION 07 – THERMAL AND MOISTURE PROTECTION
SECTION 074113 – METAL ROOF PANELS
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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

1.01 RELATED DOCUMENTS

- A. 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

- A. 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.
- B. See Section 072000, *Thermal Protection*. **[Designer must develop this section]**
- C. See Section 099000, *Painting and Coating*. **[Designer must develop this section]**

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.
- 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. SG03-2, Cold-Formed Steel Design Manual, 2002 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, 1994

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide preformed metal roofing having as a minimum, the following characteristics:
 - 1. Gauge: 24 steel conforming to ASTM A653, minimum yield 33,000 psi.
 - 2. Pattern: Ribbed with configuration for overlapping adjacent sheets or interlocking ribs for securing adjacent sheets. Provide panels with three ribs: two outboard and one intermediate.
 - 3. Rib Depth: 1½", snap locked. Mechanically field crimped is not acceptable.
 - 4. Panel Width: 16"
 - 5. 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. 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 premolded 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"; Provide a complete and waterproof installation. Provide attachment hardware as necessary.
- N. Snowguards: Provide 24-gauge (minimum) continuous sheet metal snowguard at roof eaves above (at a minimum) all walkways, entries, exits, etc. Extend snowguard at least 3 feet beyond each edge of walking surface. Match finish and color of roof panels. Provide all hardware necessary for attachment to roof surface.
- 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: Refer to Section 07200, INSULATION, for specific requirements.
- R. Felt/Paper: Provide 30 lb asphalt saturated felts conforming to ASTM D226-77 and rosin sheathing paper.

PART 3 EXECUTION

3.01 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 weathertight condition.

3.02 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.

3.03 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.

3.04 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).

END OF SECTION 074113

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 SIGNATURE: _____

OFFICER'S: PRINTED/TYPED: _____

DATE: _____



DIVISION 08 – OPENINGS

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 08 – OPENINGS
SECTION 080000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 080000 – GENERAL REQUIREMENTS

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. At restricted area access points, cipher locks shall be used for entry security. Time interval shall be adjustable. Manual operation of vehicle doors shall still be possible in case of emergency or malfunction.
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.

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.

C. DOOR HARDWARE

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

END OF DATA SHEET



DIVISION 08 – OPENINGS
SECTION 087100 – DOOR HARDWARE
DATA SHEET

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 in-place prior to Substantial Completion. The CoE shall MIPR funds to the base a minimum of 90 days prior to Substantial Completion so that the base can purchase "BEST" cores. 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 Government".

END OF DATA SHEET



DIVISION 09 – FINISHES

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 09 – FINISHES
SECTION 090000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 090000 – GENERAL REQUIREMENTS

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 Programs Flight, 92 CES/CEP.

B. 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 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 Division 05, Section 05000 for load bearing wall requirements.

D. CERAMIC TILE

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

E. CARPET

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

F. SUSPENDED CEILINGS

1. Ceiling grid shall be 2' x 2' accepting tiles with "tegular" type reveal edges.

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. Sherwin-Williams' color: "Spanish Moss" #SW2070.
 - ii. AEP Span – Kynar 500 metal finish color: "Sierra Tan".
 - iii. Citadel Architectural Products – Kynar 500 metal finish color: "Bone White".
 - iv. Fed Standard color 595a, X03578, Antique Linen.
 - b. Metal roofing shall match AEP Span – Kynar 500 metal finish color "Cool Weathered Copper"; 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, fire hydrants 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.
3. Specify Class V dry wall finish for all walls with semi-gloss paint.
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 (horn/strobe units, fire extinguisher cabinets, 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.
6. Painted CMU is not acceptable as an interior finish except inside utility rooms, such as storage, mechanical, electrical, communications, etc.

END OF DATA SHEET



DIVISION 09 – FINISHES
SECTION 093010 – CERAMIC TILE
DATA SHEET

SECTION 093010 – CERAMIC TILE

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 Maintenance Engineering Flight 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.

END OF DATA SHEET



DIVISION 09 – FINISHES
SECTION 096800 – CARPET
DATA SHEET

SECTION 096800 – CARPET

A. FAIRCHILD SPECIFICATION

1. When developing specifications for this section, use the following Fairchild Specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

END OF DATA SHEET



DIVISION 09 – FINISHES
SECTION 096800 – CARPET
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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

- A. 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
- A. General: Comply with CRI 104, Section 5, "Storage and Handling."
- 1.06 PROJECT CONDITIONS
- A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."
 - 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

- A. 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, CUT PILE, CUT-AND-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 - Loop Pile, as applicable.
 - a. Color: As selected by Contracting Officer from manufacturer's full range.
 2. Tufted Carpet – Cut Pile, as applicable.
 - a. Color: s selected by Contracting Officer from manufacturer's full range.
 3. Tufted Carpet - Cut-and-Loop Pile, as applicable.
 - a. Color: s selected by Contracting Officer from manufacturer's full range.
- B. 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.
- C. Surface Pile Weight: 28 oz./sq. yd.³, minimum
- D. Gauge: 1/8 inch, minimum
- E. Density: 8,000 oz./yd.³, minimum
- F. 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

- G. 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, Section 11.3.
- 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, Section 6.2, "Site Conditions; Floor Preparation," 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, Section 8, "Direct Glue-Down Installation."

- B. Double-Glue-Down Installation: Comply with CRI 104, Section 9, "Double Glue-Down Installation."
- C. Carpet with Attached-Cushion Installation: Comply with CRI 104, Section 10, "Attached Cushion."
- D. Stretch-in Installation: Comply with CRI 104, Section 11, "Stretch-in Installation."
- 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.
- 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.
- 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, Section 15, "Protection of Indoor Installations."
- 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 09680



DIVISION 10 – SPECIALTIES

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 10 – SPECIALTIES
SECTION 100000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 100000 – GENERAL REQUIREMENTS

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 Section 016000, *Product Requirements*, for details.

B. SIGNAGE

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

END OF DATA SHEET



DIVISION 10 – SPECIALTIES
SECTION 101400 – SIGNAGE
DATA SHEET

SECTION 101400 – SIGNAGE

A. OVERVIEW

1. **When developing specifications for signage, use UFC 3-120-01, Air Force Sign Standard 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, Air Force Sign Standard.
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, 08 Aug 00
2. AMC Services Signage Policy Supplement, 07 Nov 06
3. ASTM D4956, Standard Specification for Retroreflective Sheeting for Traffic Control, <http://www.astm.org/Standards/D4956.htm>
4. Fairchild Air Force Base Architectural Compatibility Plan, http://www.wbdg.org/ccb/AF/AFDG/fairchild_acp.pdf
5. Manual on Uniform Traffic Control Devices (MUTCD), Federal Highway Administration <http://mutcd.fhwa.dot.gov/>
6. UFC 3-120-01, Air Force Sign Standard, 06 Feb 03 http://www.wbdg.org/ccb/DOD/UFC/ufc_3_120_01.pdf

C. TYPOGRAPHY, GRAPHICS, AND SIGN PLACEMENT (UFC 3-120-01 Chapter 2)

1. Graphics (Section 2B)
 - 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 (UFC 3-120-01 Chapter 3)

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 (UFC 3-120-01 Chapter 4)

1. Military Identification Signs (UFC 3-120-01 Section 4C):
 - a. Military (Building) Identification Sign Type B2 (UFC 3-120-01 Paragraph 4.16)

- i. All building identification signs shall be free standing Type B2.
 - 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. See UFC 3-120-01, Paragraph 2.21 and Figures 2.37 and 2.38.
 - 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. See UFC 3-120-01 Paragraphs 2.18 and 4.16.2.
 - vii. Posts shall be 2-1/2" x 3-1/4" with 3' buried in a 12" diameter by 3'-6" deep concrete footing (see UFC 3-120-01 Figure 12.2).
 - 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 B5 (UFC 3-120-01 Paragraph 4.19)
 - i. Only show the building number without displaying "Building Number" wordage.
 - ii. Locate sign on side elevation as shown on UFC 3-120-01 Figure 2.41, 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" background. See UFC 3-120-01 Paragraphs 2.18 and 4.19.2.
2. Community Identification Signs (UFC 3-120-01 Section 4D):
 - a. Use Military (Building) Identification Sign Type B2 when identifying community facilities as opposed to the Community Facilities Signs shown in UFC 3-120-01 Section 4D.
 - 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 (Type B2).
 - 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 (UFC 3-120-01 Chapter 5)
1. Do not attach additional signs, such as the "H" for "Hospital" or "Tree City USA" to posts supporting another sign.
 2. Direction Signs Type D1 and D2 (UFC 3-120-01 Paragraphs 5.18 and 5.19)
 - a. Sign colors shall be white letters, arrows, rules and borders (reflectivity mandatory) on "National Park Service Brown" background. See UFC 3-120-01 Paragraphs 2.18, 5.18.4 and 5.19.7.
 3. Street Name Sign Type D3 (UFC 3-120-01 Paragraph 5.20)
 - 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 shall be white letters, arrows, rules and borders (reflectivity mandatory) on "National Park Service Brown" background. See UFC 3-120-01 Paragraphs 2.18 and 5.20.2.
4. Direction Signs Type D4 (UFC 3-120-01 Paragraph 5.21)
- a. Sign colors shall be white symbol, arrow, and text on "National Park Service Brown" background. See UFC 3-120-01 Paragraphs 2.18 and 5.21.4.
- G. REGULATORY SIGNS (UFC 3-120-01 Chapter 6)
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 Retroreflectivity 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 - UFC 3-120-01 Paragraph 12.11.1 requires 6061-T6 alloy.
 - 3 - 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 (UFC 3-120-01 Paragraph 6.15):
- a. Handicapped Parking Signs shall be freestanding unless approved by the ACRB.
 - b. Use Parking Regulation Sign Type E1 for designation of handicapped parking stalls.
 - c. Use Panel 'J' as shown in figure 6.12.
 - d. Do not display any "Fines" wordage or panels to handicapped signs.
 - e. Sign face colors shall be white symbol, letters, and border on "National Park Service Brown" background. Background color is different than UFC 3-120-01 Paragraph 6.15.5. See also UFC 3-120-01 Paragraph 2.18.
 - f. Sign back and post color shall be painted to match Sherwin Williams SW #2070 "Spanish Moss."
 - g. For van accessible spaces, provide the same Panel 'J,' but substitute the wording "Van Accessible" for "Reserved Parking."

- 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.

END OF DATA SHEET



DIVISION 11 – EQUIPMENT

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 11 – EQUIPMENT
SECTION 110000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 11000 – GENERAL REQUIREMENTS

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, baghouses, 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.

END OF DATA SHEET



DIVISION 12 – FURNISHINGS

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 12 – FURNISHINGS
SECTION 120000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 12000 – GENERAL REQUIREMENTS

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 Section 016000, *Product Requirements*, for details.

END OF DATA SHEET



DIVISION 13 – SPECIAL CONSTRUCTION

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 13 – SPECIAL CONSTRUCTION
SECTION 130000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 130000 – GENERAL REQUIREMENTS

A. SECTIONAL INFORMATION

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

END OF DATA SHEET



DIVISION 13 – SPECIAL CONSTRUCTION
SECTION 133419 – METAL BUILDING SYSTEMS
DATA SHEET

SECTION 133419 – METAL BUILDING SYSTEMS

A. PORTABLE METAL STORAGE BUILDINGS (PMSB)

1. PMSBs will only be permitted in industrial and outlying areas and adjacent to painted facilities. No PMSBs will be permitted adjacent to or in the proximity of brick buildings.
2. PMSBs will be permitted only with prior approval of BCE.
3. Design Specifications are as follows: Provide a [indicate size] portable metal storage building with [indicate height] eaves similar to STG Steel Buildings model STG I. Framing to be light gauge galvanized steel for floors, walls and roof construction. Floor shall be $\frac{3}{4}$ " tongue and groove pressure-treated plywood. Provide a lockable [list door size and requirements] door [list location] in [list which wall] wall. Roof to have 1' overhang on each side with enclosed soffits. Roof, fascia and soffit colors to be weathered copper. Walls, trim and doors to be federal standard "antique linen" or close proximity. Roof construction shall be adequate to carry local snow loads.
4. PMSB size will be limited to a maximum of 10'-0" by 12'-0".

END OF DATA SHEET



DIVISION 14 – CONVEYING SYSTEMS

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 14 – CONVEYING SYSTEMS
SECTION 140000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 140000 – GENERAL REQUIREMENTS

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).

END OF DATA SHEET



DIVISION 21 – FIRE SUPPRESSION

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 21 – FIRE SUPPRESSION
SECTION 210000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 210000 – GENERAL REQUIREMENTS

A. GENERAL DESIGN REQUIREMENTS

1. Water for fire protection shall be taken from the base water distribution system.
2. Sprinkler fire suppression shall be provided where required by the National Fire Protection Association (NFPA) or UFC 3-600-01 *Fire Protection Engineering for Facilities*.
3. 92d Civil Engineer Squadron Project Management (92 CES/CEPM) requires submittal of the sprinkler and fire alarm systems and shop drawings proposed by the designer and contractor for approval prior to installation.
4. No gas extinguishing systems using Halon or similar CFC materials shall be used.
5. **Fire suppression outages:** refer to section 330000 Attach 2 for BDS requirements and policy for outages impacting fire suppression or fire alarm systems.

B. APPLICABLE PUBLICATIONS

1. FM Global (<http://www.fmglobal.com/>)
 - a. *Approval Guide*
2. International Code Council (ICC) (<http://www.iccsafe.org/>)
 - a. *International Building Code®*
 - b. *International Fire Code®*
3. National Fire Protection Association (NFPA) (<http://www.nfpa.org/>)
 - a. NFPA 10, *Standard for Portable Fire Extinguishers*
 - b. NFPA 13, *Standard for the Installation of Sprinkler Systems*
 - c. NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*
 - d. NFPA 70, *National Electrical Code®*
 - e. NFPA 72, *National Fire Alarm Code®*
 - f. NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilation Systems*
 - g. NFPA 90B, *Standard for the Installation of Warm Air Heating and Air-Conditioning Systems*
 - h. NFPA 101, *Life Safety Code®*
4. Military Standards:
 - a. AFH 32-1084, *Facility Requirements*
 - b. MIL-HDBK 1190, *Facility Planning and Design Guide*
 - c. UFC 1-200-01, *General Building Requirements*
 - d. UFC 3-600-01, *Fire Protection Engineering for Facilities*
 - e. ETL 94-6, *Fire Protection Engineering Criteria and Technical Guidance – Removal of Halogenated Agent Fire Suppression Systems*
 - f. ETL 99-4, *Fire Protection Engineering Criteria – Emergency Lighting and Marking of Exits*

g. ETL 01-18, *Fire Protection Engineering Criteria – Electronic Equipment Installations*

h. ETL 02-15, *Fire Protection Engineering Criteria – New Aircraft Facilities*

C. LABORATORY CERTIFICATION

1. All equipment and devices shall be in accordance with federal specifications and be tested by one of the following:
 - a. Underwriters Laboratories (UL) (<http://www.ul.com/>)
 - b. FM Global (<http://www.fmglobal.com/>)
 - c. National Electric Manufacturer's Association (NEMA) (<http://www.nema.org/>)
 - d. Institute of Electrical and Electronic Engineers (IEEE) (<http://www.ieee.org>)
 - e. American National Standards Institute (ANSI) (<http://www.ansi.org>)

D. KITCHEN EQUIPMENT

1. Kitchen equipment shall be provided with either wet chemical extinguishing or Gaylord (or equal) water fire suppression system interconnected to shut down the gas and/or electrical power to griddles and deep fat fryers and provide exhaust fans.

E. 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.

F. 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.

G. PREACTION SYSTEMS

1. Same air system requirements as for the Dry Pipe System. The air system shall be maintained at 24 ounces of pressure.
2. The chamber, valves and assembly shall be a Gem Multimatic, Model A-4; a Grinnell Duomatic, or approved equivalent.

H. PIPING

1. A one-inch inspection test shall be located at the most remote branch line and easily accessible.
2. The 2-inch (50 mm) drain shall be at the riser and piped to the outside.
3. Sprinkler heads shall be flush-mounted and inconspicuous. Hose connections (FDC's) outside buildings are required.

I. FIRE HYDRANTS

1. Fire hydrants shall be located according to codes, but designer shall avoid locating near any Fairchild AFB main facility entrance.
2. A/E shall verify fire hydrant pressures and flows prior to design of facilities' protection system. This data shall be included in the RD (Requirements Document) submittal.
3. Bollards shall be installed to protect fire hydrants when it is necessary to provide fire hydrants in parking lots. However, the preferred location is adjacent to the facility.

J. KEYS

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

END OF DATA SHEET



DIVISION 22 – PLUMBING

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 22 – PLUMBING
SECTION 220000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 220000 – GENERAL REQUIREMENTS

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 Section 264200 for cathodic protection Requirements.

C. WELDING

1. See Section 013520, Paragraph B.2 for welding requirements.

D. PIPING

1. Do not specify grooved pipe and fittings for domestic water systems.

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. 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.

I. 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.

J. 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 61.

END OF DATA SHEET



DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING
SECTION 230000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 230000 – GENERAL REQUIREMENTS

A. SECTIONAL INFORMATION

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

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 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, heat recovery units, and automatic flow control valves on hydronic systems.:

E. NATURAL GAS

1. Natural gas is supplied by Avista Utilities and DESC under firm and interruptible rate schedules. 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 for water, irrigation (as applicable), natural gas, and power and insure compatibility and connection with the base EMCS. See Sections 230900, 262713.10 30,,331233.00 30, and 335113.00 30.

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 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 or steam converters. Where boilers are used, maximize the burner turndown ratio as allowed by minimum life cycle cost.

2. Boiler Piping: Heating hot water set points shall be capable of being reset based on outside air temperature.
3. Removal of a component of equipment shall not require the removal of other equipment items or more than two fittings.

H. COOLING SYSTEMS

1. Air cooled condensing units, evaporative coolers, and evaporative coolers with heat exchange shall be considered (as a minimum and as appropriate) on the basis of lowest life cycle cost analysis.
2. All new equipment may employ Class II ODS refrigerants where the equipment is not expected to be in service after the year 2020. All new equipment that is expected to remain in service after the year 2020 will be selected jointly by the designer and Fairchild AFB on a case by case basis to assure the use of the best available technology, which may include Class II ODS or HFC refrigerants. HFC refrigerants are preferred.

I. MECHANICAL SYSTEM SITING AND ROOM LAYOUT

1. All mechanical equipment shall be sited within the mechanical room or on-grade outside the facility (no rooftop installations). 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.
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. 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.
4. 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.
5. 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.
6. All thermometers and other gauges shall be mounted to provide unobstructed view of dial face.
7. Condensate overflows and pressure reliefs shall be piped to within two (2) inches of floor drains and directed to allow any flows to dispose properly without creating excess liquid ponding.
8. A copy of the mechanical and HVAC schematics shall be provided in booklet form and placed in the mechanical room.
9. All conduit and/or piping shall be fed to equipment from overhead.
10. The ventilation for HVAC systems serving conference rooms, training rooms and other spaces with variable occupancy shall be based on CO₂ demand control, unless special circumstances require additional methods of control. Locate CO₂ sensors in room return ducts when feasible. Similarly, ventilation control using CO and/or N₂ sensors is preferred over constant rate ventilation for indoor vehicle areas.

J. DISTRIBUTION SYSTEM

1. All heating and cooling piping systems shall employ reverse return layout. Do not specify grooved pipe and fittings for heating and cooling systems.
2. Propylene glycol (40 percent) is preferred over nitrates for heating and cooling systems.

3. Diaphragm type expansion tanks are preferred over the bladder or compression type expansion tanks.
4. Spiro-vent air/dirt separators with flanged cleanout are preferred.
5. Bell and Gossett pumps are preferred.
6. Provide reheat coils on all VAVs. Do not specify fan-powered VAVs. Reheat coils shall have a minimum of 2 rows.
7. Provide sealed bearings for all fractional horsepower motors.
8. 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 automatic balancing valves over manual balancing.
9. 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
10. 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.
11. Special consideration shall be given to ease of service of distributed equipment. 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.
12. 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.

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 experience in 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.

END OF DATA SHEET



DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING
SECTION 230900 – INSTRUMENTATION AND CONTROL FOR HVAC
ENERGY MANAGEMENT AND CONTROL SYSTEM (EMCS)
DATA SHEET

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 Programs Flight approval.

3. Setpoints

- a. Specifications shall require that all setpoints and similar control parameters be capable of being changed or altered from the EMCS central computer to facilitate troubleshooting. Do not install setpoint values in permanent memory that require a site visit by maintenance personnel for alteration.

4. Graphics

- a. All graphics will display real time readings. Web based access using Internet Explorer from any computer located on the Fairchild intranet is required.
- b. Provide a graphic that shows the floor plan of the building. The floor plan graphic will be the home page for each building and will display the temperature and set point for each control zone. There will be a link to the appropriate equipment page from each temperature/set point display on the floor plan. There will also be a link to all other mechanical equipment graphics

- from the home page. There will 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 will 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, setpoints, flow setpoints, flow, discharge air temperature, and re-heat valve position. Each VAV page will link to the VAV status page. The VAV status page will also have links to each VAV page.
 - d. Provide graphics that shows a quickview 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 quickview status pages shall be linked to the EMCS home page and there shall be links between all of the quickview 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 will 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 100 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 in lieu of mechanical vanes. 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 shutdown buttons are required for all air handlers. The button(s) will be hard wired to shutdown the applicable air handler when pushed. The button(s) will also have an additional set of contacts that are wired into the EMCS system as an input. The EMCS system will shutdown all additional fans (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.
- g. Air quality sensors are preferred for ventilation control in vehicle bays.
- h. VAV Wall Sensors – Wall sensors shall have occupant set point control ability for possible future use. Zone temperature set points will be set in software. Wall sensors will have an override button to place the system in occupied mode.
- i. VAV's will have discharge air sensors installed.
- j. System actuators will be 2-10 VDC analog. This includes VAV dampers and reheat valves. Floating point actuators will not be used.
- k. 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.
- l. 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 setpoint 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.
- m. 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 setpoint 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.

7. Submittals

- a. Coordinate with Fairchild AFB 92 Civil Engineer Squadron Programs Flight (CEPM) Mechanical Engineering section 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 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).

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.

END OF DATA SHEET



DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING
SECTION 230900 – INSTRUMENTATION AND CONTROL FOR HVAC
ENERGY MANAGEMENT AND CONTROL SYSTEM (EMCS)
FAIRCHILD SPECIFICATION

NOTE: When developing specifications for this section, use this specification developed by the 92d Civil Engineer Squadron Programs Flight and edit for the specific project.

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 owner. All software passwords required to program and make future changes to the system will also become the property of the owner. All software required to make any program changes anywhere in the system along with scheduling, and trending applications will be left with the owner. All software passwords required to program and make future changes to schedules, trends and related program changes will also become the property of the owner. All software required for all field engineering tools including graphical programming and applications will be left with the owner. All software passwords required to program and make future changes to field engineering tools including graphical programming and applications will be left with the owner.
- 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 setpoint 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 setpoint.]***

1.03 APPROVED MANUFACTURERS

- A. The base bid shall be the BACtalk system from Alerton.

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 owner and consulting engineer during the submittal process. The plan must be approved by the owner and consulting engineer prior to implementation. It is the responsibility of the BAS contractor to coordinate the DONCP with the owner 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 owner 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 owner's 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 23000 for General Mechanical Provisions
- C. Refer to Section 26000 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 setpoints, 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 customized text. Default "ACTIVE/INACTIVE/NULL" commands are specifically prohibited. Physical field controller and graphic binary operators shall display HAND, OFF and AUTO. Graphic binary outputs shall display STOP or START. Graphic binary inputs shall display OFF or ON. 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 setpoint. 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 setpoint. 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 setpoints, 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 setpoint is to be attained. Optimum start feature shall calculate the startup time needed to match zone temperature to setpoint. 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 setpoints 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 computers 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. Workstation Hardware ***[Note: Increase these hardware requirements as desired for the latest PC equipment.]***
1. Provide a field service laptop computer.
 2. Laptop Computer Minimum Requirements
 - a. Intel or AMD Dual Core Processor, 2.0 Ghz or better
 - b. 1024 MB RAM or better
 - c. 160GB hard disk or better
 - d. 14.1" widescreen display or better
 - e. High-performance graphics adapter
 - f. Ethernet 10/100 network interface with port
 - g. CD-RW/DVD Combo Drive
 - h. 802.11 b/g/n Wireless LAN
 - i. Applicable Windows Operating System
 - j. 2 USB Ports Minimum
 - k. Battery and power cord
 - l. Carrying case
- O. Software
1. At the conclusion of project, contractor shall leave with owner a CD ROM that includes the complete system installation and project graphics, setpoints, system parameters, etc. This backup shall allow the owner 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 of modular construction such that various modules may be selected to fit the specific requirements of a given project. Modules shall consist of a power supply module and a BACnet Ethernet-MS/TP module, at a minimum. Those projects that require special interfaces may use Modbus modules as needed. However,

all Ethernet communications and all controllers including central plant controllers, advanced application controllers and unitary controllers supplied by BMS manufacturer shall utilize the BACnet protocol standard.

2. Modules shall be selected to fit the particular project application. Up to 7 modules shall be powered by a single power supply module. All modules shall be panel mounted on DIN rail for ease of addition and shall be interconnected via simple plug in cable. A module in the middle shall be replaceable without removing any other modules.
3. All modules 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. The software program implementing these 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, via a wide area network or downloaded via remote communications are not acceptable. Changing global strategies via firmware changes is also unacceptable.
4. Programming shall be object-oriented using control function blocks, supporting DDC functions, 1000 Analog Values and 1000 Binary Values. 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.
5. 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 workstation or field computer.
6. Controller shall have a memory needed to ensure high performance and data reliability. Battery shall provide power for orderly shutdown of controller and storage of data in nonvolatile flash memory. Battery back up shall maintain real-time clock functions for a minimum of 20 days.
7. Global control algorithms and automated control functions shall execute via 32-bit processor.
8. Schedules
 - a. Each building controller module shall support a minimum of 80 BACnet Schedule Objects and 80 BACnet Calendar Objects.
 - b. Building controller modules shall provide normal 7 day scheduling, holiday scheduling and event scheduling.
9. Logging Capabilities
 - a. Each building controller shall log as minimum 320 values. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
 - b. Logs may be viewed both on-site or off-site via WAN or remote communication.
 - c. Building controller shall periodically upload trended data to networked operator's workstation for long term archiving if desired.
 - d. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.
10. Alarm Generation
 - a. 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.

- b. Each alarm may be dialed out as noted elsewhere.
- c. 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.
- d. Controller must be able to handle up to 320 alarm setups stored as BACnet event enrollment objects – system destination and actions individually configurable.

11. Demand Limiting

- a. Demand limiting of energy shall be a built in function that shall be user configurable. Each controller module shall support shedding of up to 200 loads using a minimum of two types of shed programs.
- b. Load shedding programs in Building Controller Modules shall operate as defined in section 2.1.J of this specification.

12. Tenant Activity Logging

- a. Tenant Activity logging shall be supported by Building Controller Module. Each independent module shall support a minimum of 80 zones.
- b. Tenant Activity logging shall function as defined in section 2.1.K of this specification.

B. Ethernet – MS/TP Module

1. Ethernet – MS/TP Module shall support every function as listed under paragraph A, General Requirements, of this section and the following.
2. All communication with operator workstation and all application controllers shall be via BACnet. Building controller Ethernet – MS/TP module shall incorporate as a minimum, the functions of a 2-way BACnet router. Controller shall route BACnet messages between the high-speed LAN (Ethernet 10/100MHz) and master slave token passing (MS/TP) LAN. Ethernet – MS/TP module shall also route messages from all other Building Controller modules onto the BACnet Ethernet network.
 - a. MS/TP LAN must be software configurable from 9.6 to 76.8Kbps.
 - b. The RJ-45 Ethernet connection must accept either 10Base-T or 100Base-TX BACnet over twisted pair cable (UTP).
3. BACnet Conformance
 - a. Ethernet – MS/TP module shall as a minimum support 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. Global controller shall be a BACnet conformance class 3 device and support all BACnet services necessary to provide the following BACnet functional groups:
 - i. Clock Functional Group
 - ii. Files Functional Group
 - iii. Reinitialize Functional Group
 - iv. Device Communications Functional Group
 - v. Event Initiation Functional Group
 - b. 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.

- c. Standard BACnet object types supported shall include as a minimum: Analog Value, Binary Value, Calendar, Device, File, Group, 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.
- d. The Building Controller shall comply with Annex J of the BACnet specification for IP connections. Must support interoperability on wide area networks (WANs), metropolitan area networks (MANs), and campus area networks (CANs) and function as a BACnet Broadcast Management Device (BBMD).

C. MS/TP Module

1. MS/TP Module shall support every function as listed under paragraph A, General Requirements, of this section and the following.
2. Building Controller MS/TP module communications shall be via BACnet master slave token passing (MS/TP) LAN to all advanced application and application specific controllers. MS/TP module shall also route messages to Ethernet-MS/TP module for communication over WAN.
 - a. MS/TP LAN must be software configurable from 9.6 to 76.8Kbps
 - b. Configuration shall be via RS-232 connection.
3. BACnet Conformance
 - a. MS/TP module shall as a minimum support MS/TP BACnet LAN type. It shall communicate directly via this BACnet LAN as a native BACnet device and shall support simultaneous routing functions between all supported LAN types. Controller shall be a BACnet conformance class 3 device and support all BACnet services necessary to provide the following BACnet functional groups:
 - i. Clock Functional Group
 - ii. Files Functional Group
 - iii. Reinitialize Functional Group
 - iv. Device Communications Functional Group
 - v. Event Initiation Functional Group
 - b. 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.
 - c. Standard BACnet object types supported shall include as a minimum: Analog Value, Binary Value, Calendar, Device, File, Group, 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.

D. Power Supply Module

1. Power supply module shall power up to 7 Building Controller Modules. Input for power shall accept between 17 and 30 VAC, 47 to 65 Hz.
2. Power supply module shall include rechargeable battery for orderly shutdown of controller modules including storage of all data in flash memory and for continuous operation of real time clocks for minimum of 20 days.

E. Modbus Module

1. Modbus Module shall support every function as listed under paragraph A, General Requirements, of this section and the following.
 2. Building Controller Modbus module communications shall be via one of three types of ports: EIA-485, EIA-422 or RS-232 connection. Modbus module shall convert Modbus data into BACnet objects. Modbus module shall also route messages to Ethernet-MS/TP module for BACnet Ethernet communication over WAN.
 - a. Modbus Module shall support ASCII or RTU Modbus communication at 9600 or 4800 baud.
 - b. EIA-422 and EIA-232 connection shall support one connection of Modbus unit.
 - c. EIA-485 connection shall support connection of up to 247 Modbus units.
 - d. Configuration shall be via RS-232 connection.
 3. BACnet Translation
 - a. All Modbus data shall be translated into BACnet objects by the Modbus module. All configuration tools shall be supplied to assure data is translated as necessary to the correct format and value.
 - b. Standard BACnet object types supported shall include as a minimum: Analog Value, Binary Value, Calendar, Device, File, Group, 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.
- 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 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 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
 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 native BACnet devices. 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 accept 3K and 10K thermistors, 0–10VDC, 0–5 VDC, 4–20 mA and dry contact signals. Any input on a controller may be either analog or digital with a minimum of 3 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 shall be switch selectable as either 0–10VDC or 0–20mA. Software shall include scaling features for analog outputs. Application controller shall include 24VDC voltage supply for use as power supply to external sensors.
- 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 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. 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 programming tools as described in operator's terminal section.
- E. Application controller shall include support for intelligent room sensor (see section 2.9.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.

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 precalibrated at the factory. Precalibration 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, factory-calibrated to within 0.5°F, totally interchangeable with housing appropriate for application. Wall sensors to be installed as indicated on drawings. Mount 48 inches about 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 LCD Readout

1. Sensor shall contain a backlit LCD digital display and user function keys along with temperature sensor. Controller shall function as room control unit, and shall allow occupant to raise and lower setpoint, and activate terminal unit for override use—all within limits as programmed by building operator. Initial setpoint shall be pre-determined by FAFB with field adjustment initially disabled. Sensor shall also allow service technician access to hidden functions as described in sequence of operation.
2. The Intelligent Room Sensor shall simultaneously display room setpoint, room temperature, outside temperature, and fan status (if applicable) at each controller. This unit shall be programmable, allowing site developers the flexibility to configure the display to match their application. The site developer should be able to program the unit to display time-of-day, room humidity and outdoor humidity. Unit must have the capability to show temperatures in Fahrenheit or Centigrade.
3. Override time may be set and viewed in half-hour increments. Override time count down 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.
4. See sequence of operation for specific operation of LCD displays and function keys in field service mode and in normal occupant mode. Provide intelligent room sensors as specified in point list.

5. Field service mode shall be customizable to fit different applications. If intelligent room sensor is connected to VAV controller, VAV box shall be balanced and all air flow parameters shall be viewed and set from the intelligent room sensor with no computer or other field service tool needed.
- C. Wall Sensor
1. Standard wall sensor shall use solid-state sensor identical to intelligent room sensor and shall be packaged in aesthetically pleasing enclosure. Sensor shall provide override function and warmer/cooler lever for set point adjustment. Override time shall be stored in controller and be adjustable on a zone-by-zone basis. Adjustment range for warmer/cooler lever shall also be stored in EEPROM on controller..
- D. 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 manufacturers 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 Floating type or Analog (2-10vdc, 4-20ma).
 4. Re-heat valve actuation shall be Floating type or 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 Manufacturers 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 blow out 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 it's 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, floating, 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 ½ 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 2½ 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

3.01 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 owners' 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.

3.02 INSTALLATION (GENERAL)

- A. Install in accordance with manufacturer's instructions.
- B. 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.

3.03 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 owner's 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.
- 3.04 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 owner's 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).
- 3.05 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 owner. 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 owner's requirements.
 - F. Database Save
 - 1. Provide back-up database for all stand-alone application controllers on disk.

3.06 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 Owner's Representative with spare parts list. Identify equipment critical to maintaining the integrity of the operating system.

3.07 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.

3.08 TRAINING

- A. Provide application engineer to instruct owner 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 Owner.

3.09 DEMONSTRATION

- A. Provide systems demonstration.
- B. Demonstrate complete operating system to owner's 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

4.01 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 per 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, 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.

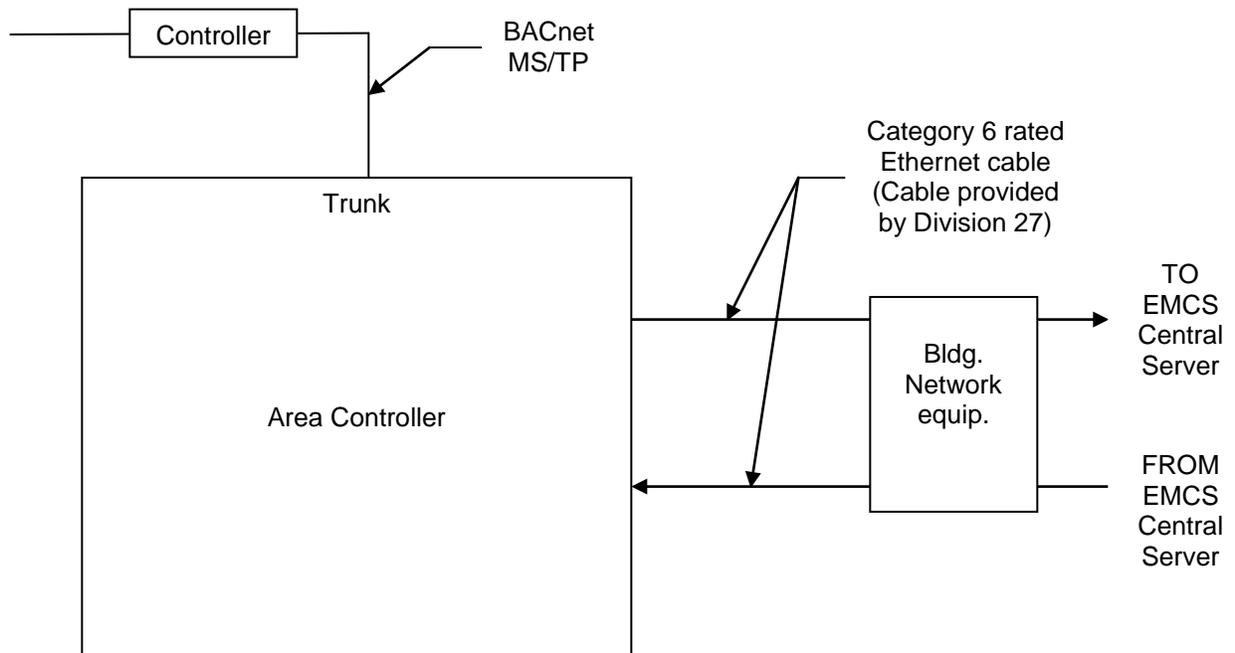
4. Password Security and Activity Log
 - a. Access via Web browser shall utilize the same hierarchical security scheme as BAS system. User shall be asked to log in once the browser makes connection to Web-page host. Once the user logs in, any and all changes that are made shall be tracked by the BAS 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



DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING
SECTION 230900 – INSTRUMENTATION AND CONTROL FOR HVAC
ENERGY MANAGEMENT AND CONTROL SYSTEM (EMCS)
DETAIL SHEET

SECTION 230900 – INSTRUMENTATION AND CONTROL FOR HVAC EMCS
DETAIL: EMCS BLOCK DIAGRAM





DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING
SECTION 235200 – HEATING BOILERS
DATA SHEET

SECTION 235200 – HEATING BOILERS

A. BOILERS

1. Hot water boilers are preferred over steam. 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.

END OF DATA SHEET



DIVISION 26 – ELECTRICAL

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 26 – ELECTRICAL
SECTION 260000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 260000 – GENERAL REQUIREMENTS

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. 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.

C. 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.

D. GENERATORS: reference Section 263213 for generator requirements.

E. PANELS AND BREAKERS

1. All panel faces shall be painted to match adjacent wall color.
2. 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.
3. All circuits shall be marked at the panel identifying what each circuit goes to.

F. 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.

G. 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

H. CONDUCTORS

1. All conductors shall be copper.

I. MOTORS AND CONTROLLERS

1. Motors: Motors shall be high efficiency types and use de-rated values for supply voltages, i.e. for a 480 volt service, provide a 460 volt motor. For a 208 volt service, provide a 200 volt motor. In addition, 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. Specify ABB (Asea Brown Boveri) brand VFD's.

J. LIGHTING

1. Design: Illuminating Engineering Society of North America's (IESNA) HB-9, *IESNA Lighting Handbook*, shall be referenced for lighting design.
2. Exit Lights: Exit lights shall be provided in accordance with NFPA 101, Life Safety Code® (LSC). Exit lights shall be state of the art type with LED indicators (no bulb-type).
3. Emergency Lighting: Emergency lighting shall be provided in accordance with LSC and ETL 99-4. Down lighting built into EXIT lights is acceptable if it meets the footcandle illumination requirements as a means of egress. Generally provide egress lighting by ceiling fluorescent fixtures with emergency ballasts. Wall mounted battery/lamp type units shall be installed only with special permission from the Government.
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 induction fluorescent lamps of a wattage to provide the footcandle 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.
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 Cobrahead with full cutoff flat lens style or approved equal. Provide induction fluorescent lamps of a wattage to provide the footcandles 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.
6. Exterior lights shall be photocell controlled.

K. 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.

END OF DATA SHEET



DIVISION 26 – ELECTRICAL
SECTION 262000 – 15 KV ELECTRICAL DISTRIBUTION
DATA SHEET

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 neutral. The system is 4 wire, 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/CEPM. 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®*, 2007
2. National Fire Protection Association (NFPA) <http://www.nfpa.org>
 - a. NFPA 70, *National Electrical Code®*, latest edition

C. UNDERGROUND DISTRIBUTION SYSTEM

1. 15KV Cable shall be copper conductors, 15 KV, URD construction, 133% EPR insulation, 1/3 concentric neutral for 3 phase circuits, full concentric neutral for single phase circuits, full PVC or polyurethane jacket over the concentric neutral, 2/0 conductor for main trunk line feeders, #2 AWG conductor for loop feeders.
2. Corona 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 ductbanks. Provide 4 inch PVC or EB conduit. Provide spare conduit with pull wire for future use. Place ductbank 36 inches below grade. Provide rigid galvanized steel elbows 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 Division 09, Section 09000.
5. 15 KV splices and terminations shall be rated for the full ampacity of the cables being connected. All 15KV cable shall be hipot tested before energization. "T" type splices shall not be used. Dead break or Load break elbows shall not be installed in manholes.
6. Transformers for the underground distribution system shall be oil filled, pad mounted, dead front, loop feed (plug unused bushings). Three phase transformer primary windings shall be rated 13.2 KV phase to phase, Delta connected primary (3 phase), grounded wye secondary. Single phase transformers shall be rated 7620 volts phase to neutral primary, grounded secondary. All transformers shall be provided with 95 BIL, gang operated load break switch, 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 8' clearance on operable sides for "hot stick" work and 4' clearance on all other sides when installing block/brick walls around pad mounted transformers. See Section 320000, Paragraph D 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, 600 amps for 2/0 cable, 200 amps (load break) for #2AWG cable. Equipment shall be padmounted type. Provide minimum 8' 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 for screening wall requirements.
8. Oil switches shall not be used.
9. All 15 KV switches shall be provided with type SMU-20 fuses. Key interlocks are not allowed. S&C manufacture most base switches. Other brands are allowed but must accept the SMU-20 fuses.
10. All pad-mounted equipment (transformers, switches and junction enclosures) shall be mounted on a reinforced concrete pad (or approved equal). 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.
11. Electrical distribution manholes shall be concrete, rated H20, have round manhole covers, minimum size 6 ft long, 4 ft wide, 6 ft high. Shall come complete with pulling irons, and ground rods.

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 lightning arrestors and fused disconnects on all aerial-underground 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.

END OF DATA SHEET



DIVISION 26 – ELECTRICAL
SECTION 262713.10 30 – ELECTRIC METERS
FAIRCHILD SPECIFICATION

USACE / NAVFAC / AFCEA / NASA UFGS-26 27 13.10 30 (October 2007)

Preparing Activity: AFCEA

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2010

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NOTE: This guide specification covers the requirements for the installation of poly-phase electricity meters suitable for billing, allocation of costs, and recording of data for energy management and control applications and is intended to comply with the metering requirements of EPACT05.

NOTE: Since metering for energy management and costs allocation varies widely, it is expected that the designer will make significant adjustments and additions to this guide specification.

- NOTE: Use the following related guide specifications for power distribution equipment:**
- Section 26 12 19.10 THREE-PHASE PAD-MOUNTED TRANSFORMERS
 - Section 26 11 14.00 10 MAIN ELECTRIC SUPPLY STATION AND SUBSTATION
 - Section 26 22 00.00 10 480-VOLT STATION SERVICE SWITCHBOARD AND TRANSFORMERS
 - Section 26 23 00 SWITCHBOARDS AND SWITCHGEAR

NOTE: This specification provides guidance for the facility energy manager or design engineer after determining what data will be gathered and what analysis procedures will be used.

PART 1 GENERAL
1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the

basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100 (2000; Archived) The Authoritative Dictionary of IEEE Standards Terms

IEEE C2 (2007; TIA 2007-1; TIA 2007-2; TIA 2007-3; TIA 2007-4; TIA 2007-5; Errata 2006-1; Errata 2007-2; Errata 2009-3) National Electrical Safety Code

IEEE C37.90.1 (2002) Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus

IEEE C57.13 (2008) Standard Requirements for Instrument Transformers

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

IEC 61000-4-5 (2005; Corr 2009) Electromagnetic Compatibility (EMC) - Part 4-5: Testing and Measurement Techniques; Surge Immunity Test; Ed 2.0

IEC 62053-22 (2003) Electricity Metering Equipment (a.c.) - Particular Requirements - Part 22: Static Meters for Active Energy (Classes 0,2 S and 0,5 S); Ed 1.0

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C12.18 (2006) Protocol Specification for ANSI Type 2 Optical Port

ANSI C12.20 (2002) Electricity Meters - 0.2 and 0.5 Accuracy Classes

ANSI C62.61 (1993) American National Standard for Gas Tube Surge Arresters on Wire Line Telephone Circuits

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; TIA 08-1) National Electrical Code 1.2 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in this specification and on the drawings shall be as defined in **IEEE 100**.

1.3 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G." Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in the context of the project.

For submittals requiring Government approval on Air Force projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority.

Recommended codes for Air Force projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. Submittal items not designated with a "G" are considered as being for information only for Air Force projects.

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

- a. Maintenance manual shall provide:
1. Condensed description of how the equipment operates.
 2. Block diagram indicating major assemblies.
 3. Troubleshooting information
 4. Preventive maintenance.
 5. Spare parts information.
- b. Provide operation and maintenance manuals required by submittal item "SD-10 Operation and Maintenance Data."

SD-02 Shop Drawings

SD-03 Product Data

Power meters[; G][; G, [_____]]

Current transformers[; G][; G, [_____]]

Potential transformer[; G][; G, [_____]]

Communications module[; G][; G, [_____]]

Protocol modules[; G][; G, [_____]]

Data recorder[; G][; G, [_____]]

Modem[; G][; G, [_____]]

Submittals shall include manufacturer's information for each component, device, and accessory provided with the meter, protocol module or communications module.

SD-06 Test Reports

Acceptance checks and tests[; G][; G, [_____]]

SD-10 Operation and Maintenance Data

Power meters[; G][; G, [_____]]

Communications module[; G][; G, [_____]]

Protocol modules[; G][; G, [_____]]

Data recorder[; G][; G, [_____]]

Modem[; G][; G, [_____]]

SD-11 Closeout Submittals

System function verification[; G][; G, [_____]]

1.4 QUALITY ASSURANCE

1.4.1 Installation Drawings

Drawings shall indicate but not be limited to the following:

- a. Elementary diagrams and wiring diagrams with terminals identified of[kilowatt][advanced] meter,[current transformers,][potential transformers,][protocol modules,][communications modules,][Ethernet connections,][telephone lines]. [For each meter installation, provide a diagram identified by the building number.]
- b. One-line diagram, including meters,[switch(es),][current transformers,][potential transformers,][protocol modules,][communications modules,][Ethernet connections,][telephone outlets,][and fuses]. [For each meter installation, provide a diagram identified by the building number.]

1.4.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory

commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.4.3 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.4 Material and Equipment Manufacturing Data

Products manufactured more than 2 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.5 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.6 SYSTEM DESCRIPTION

1.6.1 System Requirements

The metering and reading system, consisting of commercial, off-the-shelf meters, [protocol modules](#), communications modules, and communication channels, will be used to record the electricity consumption and other values as described in the sections that follow and as shown on the drawings.

1.6.2 Selection Criteria

Metering components are part of a system that includes the physical meter, [data recorder](#) function and communications ([modem](#)) method. Every building site identified shall include sufficient metering components to measure the electrical parameters identified and to store and communicate the values as required in the following sections. Contractor shall verify that the metering system installed on any building site is compatible with the facility-wide communication and meter-reading protocol system.

PART 2 PRODUCTS

2.1 [POWER METERS](#)

NOTE: This specification is designed for projects where multiple metering systems will be installed on the same project. It is expected that different buildings may have different metering systems depending on the metering system that can be installed economically for any specific building and that meets the needs of the facility analysis and billing system.

Metering features that are unique to a building should be listed in a schedule either in this specification or on accompanying drawings.

2.1.1 Physical and Common Requirements

NOTE: Meters will generally be installed outside the building in a readily accessible location. In

that case, use the socket-mount design. In the situations where panel-mounting is required, add the panel-mounting section.

a. Metering system components shall be installed according to the Metering System Schedule shown [in this specification] [on the drawings].

[b. Power meter shall be socket-mount design.]

[c. Power meter shall be panel-mounted design. Meters shall be semi-flush, back-connected, dustproof, draw-out switchboard type. Cases shall have window removable covers capable of being sealed against tampering. Meters shall be of a type that can be withdrawn through approved sliding contacts from fronts of panels or doors without opening current-transformer secondary circuits, disturbing external circuits, or requiring disconnection of any meter leads. Necessary test devices shall be incorporated within each meter and shall provide means for testing either from an external source of electric power or from associated instrument transformers or bus voltage.]

d. If existing meter base is usable, the meter base determines meter form factor. If a new meter is being installed, use meter and base form factor of 9S.

NOTE: If the measured load is less than 220 amps, use Class 200 meters for direct current reading without current transformers.

[e. Use Class 200 meters for direct current reading without current transformers.]

f. Meter shall be a Class 20, transformer rated design.

g. Meter shall be rated for use at temperature from -40 [_____] degrees Centigrade to +70 [_____] degrees Centigrade.

h. Meter shall have NEMA 3R enclosure for surface mounting.

NOTE: Select if the recorded data will be in a module inside the meter or external in a data logger. The preferred method is to install the recording module inside the meter case. Some retrofit applications may require an external data logger.

i. Surge withstand shall conform to IEEE C37.90.1.

j. Meter shall have a standard [4] [_____]-year warranty.

k. Meter shall comply with IEC 62053-22 (Part 21: Static Meter for Active Energy, classes 0.2S and 0.5S), certified by a qualified third party test laboratory.

2.1.2 Voltage Requirements

a. Meter shall be capable of connection to the service voltage phases and magnitude being monitored. If the meter is not rated for the service voltage, provide suitable potential transformers to send an acceptable voltage to the meter.

b. Meter shall be capable of connection to the service voltage indicated in the Metering System Schedule:

c. Meter shall accept independent voltage inputs from each phase. Meter shall be auto-ranging over the full range of input voltages.

d. Voltage input shall be optically isolated to 2500 volts DC from signal and communications outputs. Components shall meet or exceed

IEEE C37.90.1 (Surge Withstand Capability).

e. The Contractor shall be responsible for determining the actual voltage ratio of each **potential transformer**. Transformer shall conform to **IEEE C57.13** and the following requirements.

1. Type: Dry type, of two-winding construction.
2. Weather: Outdoor or Indoor rated for the application.
3. Frequency: Nominal 60Hz, 50Hz for those bases that operate on 50Hz.
4. Accuracy: Plus or minus 0.3% at 60Hz or 0.3% for those systems that operate at 50Hz.

2.1.3 **Current** Requirements

a. Meter shall accept independent current inputs from each phase. Current transformer shall be installed with a full load rating as shown in the schedule.

b. Single ratio current transformer shall have an Accuracy Class of [0.3][0.6] [1.2] with a maximum error of +/- [0.3%][0.6%][1.2%] at 5.0 amps.

c. Current transformer shall have:

1. Insulation Class: All 600 volt and below current transformers shall be rated 10 KV BIL. Current transformers for 2400 and 4160 volt service shall be rated 25 KV BIL.
2. Frequency: Nominal 60Hz, 50Hz for bases that operate on 50Hz.
3. Burden: Burden class shall be selected for the load.
4. Phase Angle Range: 0 to 60 degrees.

d. Meter shall accept current input from standard instrument transformers (5A secondary current transformers.)

e. Current inputs shall have a continuous rating in accordance with **IEEE C57.13**.

NOTE: Since loads in building can vary over time, multi-ratio current transformers allow the flexibility to change the ratio of the current transformer to match the load. The accuracy of current transformer performance decreases when the actual current is in the lower band of its measuring range.

f. Multi-ratio current transformer where indicated shall have a top range equal to or greater than the actual load. The Contractor shall be responsible for determining the actual ratio of each transformer. Current transformer shall conform to **IEEE C57.13**.

2.1.4 Electrical Measurements

Power meter shall measure and report the following quantities:

NOTE: Select each of the following measuring capabilities that are required and include the abbreviation in the Metering System Schedule for each building. Since power meters have a service life greater than 10 years, include optional features that are expected to be used and analyzed over the life of the meter.

a. Kilowatt-hours ("kWh" in Metering Systems Schedule) of consumption. Cumulative.

b. Kilowatts of demand ("kW" in Metering Systems Schedule). Peak average over a selectable demand interval between 5 and 60 minutes (typically 15 minutes).

- c. Reactive power ("kVAR" in Metering Systems Schedule). Measured over the same interval as the peak kW reading.
- d. Power factor ("PF" in Metering Systems Schedule). Measured over the same interval as the peak kW reading.

NOTE: At locations where time of use (TOU) billing is required by the electric company, this specification provides that all TOD meters cover the same periods as defined in the next section.

e. Time of use consumption ("TOU" in Metering Systems Schedule). Kilowatt-hours recorded separately for each period set by programming into the meter. Time periods shall be capable of being changed without removal from service. The meter shall internally record and store Time of Use data.

- 1. [Four (4)] minimum [_____] TOU Rates (Registers)
- 2. [Twenty (20)][_____] Year Calendar
- 3. [Two (2)] minimum [_____] seasons per year

NOTE: Interval recording is an important tool for analyzing energy consumption within a building. For billing purposes, real-time reporting is not required. For non EPACT05 meters, the meter can be read nominally once per month with all recorded interval data captured at that time. Where real-time data is needed by an energy management control system (EMCS) or other system, the systems may have their own connection to the meter or its own current and potential transformers.

f. Interval recording ("IR" in Metering Systems Schedule). Kilowatt-hours shall be recorded for each[15][_____] minute interval and shall accumulate for[30][_____] days. Memory for recording the interval readings shall be internal to the meter and ANSI C12.19 compliant. Meter shall provide time-stamped readings for every measured parameter.

g. Meter readings shall be true RMS.

2.1.5 Meter Accuracy

NOTE: Meters used for billing purposes should generally be held to the same metering accuracies as established standards by utility companies.

Power meter shall provide the following accuracies. Accuracies shall be measured as percent of reading at standard meter test points.

- a. Power meter shall meet [ANSI C12.20](#) for Class 0.2 and [IEC 62053-22](#) accuracy requirements.

2.1.6 An on the Meter Display, Output and Reading Capabilities
 Meter shall include the following output signals.

- a. The meter will have a face display plate and shall display every electrical parameter indicated to be recorded. Meters shall not be required to indicate interval data collected in a data logger with a communications output feature. Peak values, instantaneous and cumulative values shall be displayed.
- [b. Meter shall include optical output port capable of 9600 bps communication with a hand-held reading device. Optical device shall be compatible with [ANSI C12.18](#)]

NOTE: The following optional features will usually be deleted. These features could be used for connection to an Energy Management and Control System.

- [c. Meter shall include output options for analog milliamp signals.]
- [d. Meter shall have two channels of analog output, 0-1mA or 4-20mA, for positive[and negative] watt/hour readings.]
- [e. Meter shall include output option for pulse output. KYZ pulse output related to kWatts/HR.]
- [f. Meter shall have two form C, dry contact relay outputs for alarm or control.]

2.1.7 Installation Methods

NOTE: Pad-mounted transformers have proven to be very reliable over a long life span. Installing the meters on the outside of the secondary wiring compartment has become somewhat a standard installation for military facilities, resulting in minimal maintenance. However, meters may be installed on the sides of buildings or within buildings.

a. Transformer mounted (XFMR)

- 1. Meter base shall be located outside on the secondary side of the pad-mounted transformer.

NOTE: Do not use the stand-mounted method unless the transformer pad is being poured and the instrumentation conduit can be installed before the pour. Provide a drawing to show details for mounting and routing conduit and wires.

b. Stand-mounted adjacent to transformer ("STAND" in Metering Systems Schedule)

- 1. Meter base shall be mounted on a structural steel pole approximately 4 feet from the transformer pad. See detail on the drawings.

NOTE: Provide a drawing to show details for building mounting and routing conduit and wires.

c. Building mounted ("BLDG" in Metering Systems Schedule)

- 1. Meter base shall be mounted on the side of the existing building near the service entrance. See detail on the drawings.

d. Panel mounted. ("PNL" in Metering Systems Schedule)

- 1. Meter shall be mounted where directed. See detail on the drawings.

e. Common features.

- 1. PTs (if required for proper voltage range) and CTs shall be physically connected to the service entrance cables inside the service entrance disconnect enclosure.

2.1.8 Disconnecting Switches

NOTE: Shorting-type wiring blocks are recommended to allow connections to be corrected and changed

without the necessity of disconnecting power to the transformer, resulting in another power outage to the building being served.

- a. Disconnecting wiring blocks shall be provided between the current transformer and the meter. A shorting mechanism shall be built into the wiring block to allow the current transformer wiring to be changed without removing power to the transformer. The wiring blocks shall be located where they are accessible without the necessity of disconnecting power to the transformer. For multi-ratio current transformers, provide a shorting block from each tap to the common lead.
- b. Voltage-monitoring circuits shall be equipped with disconnect switches to isolate the meter base or socket from the voltage source.

NOTE: If programming capability is not required, omit the following section.

2.1.9 Meter Programming

- a. Power meter shall be programmable by software supplied by the meter manufacturer.
- b. Software shall have a user-friendly, Windows-compatible interface.
- c. Software shall operate on [Windows][_____] operating systems.
- d. Software shall allow the user to configure the meter, troubleshoot meter, query and display meter parameters and configuration data and stored values.
- e. Meter firmware shall be upgradeable through one of the communications ports without removing the unit from service.

2.2 COMMUNICATIONS

NOTE: Communications features may not be needed. Data logging of one month of data may be recorded inside the meter. Recorded data may be read simply by a handheld instrument, if read daily.

2.2.1 Communications Methods

2.2.1.1 Optical Port

The optical port shall communicate with a hand-held reading device according to the following requirements.

a. Communications standards

- 1. ANSI C12.18
- 2. MV90 protocol
- 3. ANSI C12.20

b. Read operations

- 1. Current kWh values
- 2. Demand (kW) values since last reset
- 3. Last reset value
- 4. Meter status
- [5. Load profile]

c. Write operations

- 1. Meter setup

2.2.1.2 Serial Port

Provide serial port for connection to modem module where required in this specification.

[a. On-Board serial port types]

[1. RS232]

[2. \[RS485]]

2.2.1.3 Ethernet

For those meters using the Ethernet, logged information shall be sent using open standard Internet Protocols.

a. On-board Ethernet port support

1. HTTP

2. SMTP

(a) Modbus

b. Distribute stored data by

1. FTP

[2. E-Mail]

[(a) On-board web server]

2.2.2 Communications Protocols and Methods

Communications protocols and methods shall be native to the meter. Provide communications module(s) as required to accomplish the following.

a. Meter shall include an IR port ("IR" in Metering Systems Schedule) for communication to external devices such as handheld readers that support a minimum speed of 9600 baud.

b. [Meter shall include[one][RS-232 ("RS232" in Metering Systems Schedule)] or[one][RS-485 ("RS485" in Metering Systems Schedule)] digital communication port. Each port shall be user configurable with regard to speed, protocol, address, and other communications parameters. Ports shall support a minimum communication speed of 9600 baud for the RS232 port.]

[c. Meter shall have a port that can be configured as a[10/100 Base-T Ethernet port ("BaseT" in Metering Systems Schedule)]]

[1. A communication module that converts serial RS232 or RS485 to Ethernet will be acceptable.]

[d. Auto Answer minimum 1200 baud internal modem ("A56K" in Metering Systems Schedule). Internal modem shall include automatic data buffering to provide faster, more reliable communications and the ability to automatically answer on a connected line.]

[e. Meter shall be equipped with one pulse output channel ("Pulse" in Metering Systems Schedule) that can be configured for operation as KYZ pulse output.]

2.2.3 Communications Channels Surge Protection

Communications equipment shall be protected against surges induced on its communications channels. Communication interfaces to all field equipment shall be protected to meet the requirements of IEEE C37.90.1 or the requirements of IEC 61000-4-5, test level 4, while the equipment is operating. Fuses shall not be used for surge protection. Metallic cables and conductors which serve as communications channels between buildings shall have surge protection installed at equipment rated for the application installed at each end, within 3 feet 0.9 meters of the building cable entrance. Surge protectors shall meet the requirements of the applicable extension of ANSI C62 (for example, ANSI C62.61).

NOTE: Communication methods, modules and software can be used for automatic meter reading (AMR). AMR may not be needed. If automatic meter reading (AMR) is to be implemented, considerable coordination of the communications sending, receiving and protocols will be required.

2.3 METER DATA PROTOCOL

Power meters shall have communicating data protocols native or provided in supplemental modules to communicate with the communications methods that

follow.

2.3.1 Open Protocol

NOTE: This section should be modified to be facility specific.

Power meter shall support the following open protocols. Contractor shall verify that the meter native protocol is consistent with the facility data recording and communication and data storage system. Contractor shall provide additional converters and modules as required for a complete measurement, recording, communicating and data storage system.
a. Meter shall be fully supported by MV-90 software system or existing AMR software that is MV-90 compatible.
b. For systems that use proprietary software, an alternative, competitive software system must be available.
Systems capable of using more than one brand of commercially available meters are expected. In addition, if proprietary meter reading software is used, meters are to be capable of being read by more than one manufacturer's software.

2.4 SPARE PARTS

2.4.1 Parts List

Provide spare parts as follows:

- a. Power meter - two for each type used.
- b. Current transformer - three for each type used.
- c. Potential transformer - three for each type used.
- d. Communications module - one for each type used.
- e. Protocol module - one for each type used.
- f. Other electronic and power components - one for each type used.

2.5 METERING SYSTEM SCHEDULE

NOTE: Each building should be listed on a separate row. Identify the characteristics for the specific meter and communications method for each building. The following completed data is an example only. Delete existing values.

Metering System Schedule is available at <http://www.wbdg.org/ccb/NAVGRAPH/graphtoc.pdf>

NOTE: Provide a drawing to show locations and details for mounting and routing conduit and wires. Identify CT ratio and multi-tap ratios if known.

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations shall conform to **IEEE C2, NFPA 70**, and to the requirements specified herein. Provide new equipment and materials unless indicated or specified otherwise.

[3.1.1 Existing Condition Survey

NOTE: Remove the following section if existing condition surveys are not required.

The Contractor shall perform a field survey, including inspection of all existing equipment, resulting clearances, and new equipment locations intended to be incorporated into the system, and furnish an existing

conditions report to the Government. The report shall identify those items that are non-workable as defined in the contract documents. The Contractor shall be held responsible for repairs of modifications necessary to make the system perform as required.

3.1.2 Scheduling of Work and Outages

NOTE: Installation of current transformers and potential transformers will require that power be disconnected from the transformer and/or building. Provide coordination steps for the work and require Contractor to perform the work after normal hours.

The Contract Clauses shall govern regarding permission for power outages, scheduling of work, coordination with Government personnel, and special working conditions.

3.2 FIELD APPLIED PAINTING

Where field painting of enclosures is required to correct damage to the manufacturer's factory-applied coatings, provide manufacturer's recommended coatings and apply in accordance with manufacturer's instructions.

3.3 FIELD QUALITY CONTROL

3.3.1 Performance of [Acceptance Checks and Tests](#)

3.3.1.1 Meter Assembly

a. Visual and mechanical inspection

1. Compare equipment nameplate data with specification and approved shop drawings.
2. Inspect physical and mechanical condition.
3. Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method.
4. Verify grounding of metering enclosure.
5. Verify the presence of surge arresters.
6. Verify that the CT ratio and the PT ratio are properly included in the meter multiplier or the programming of the meter.

b. Electrical tests

- [1. Calibrate watt-hour meters according to manufacturer's published data.]
2. Verify that correct multiplier has been placed on face or meter where applicable.
3. Prior to system acceptance, the Contractor will demonstrate and confirm the meter is properly wired and is displaying correct and accurate electrical information.

3.3.1.2 Current Transformers

a. Visual and mechanical inspection

1. Compare equipment nameplate data with specification and approved shop drawings.
2. Inspect physical and mechanical condition.
3. Verify correct connection.
4. Inspect all bolted electrical connections for high resistance using low-resistance ohmmeter, verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method.
5. Verify that required grounding and shorting connections provide good contact.

b. Electrical tests

1. Perform resistance measurements through all bolted connections with low-resistance ohmmeter, if applicable.
2. Perform insulation-resistance test.

3. Perform a polarity test.
4. Perform a ratio-verification test.
- 3.3.1.3 Potential Transformers
 - a. Visual and mechanical inspection
 1. PT's are rigidly mounted.
 2. PT's are correct voltage.
 3. Verify that adequate clearances exist between primary and secondary circuit.
 - b. Electrical tests
 1. Perform a ratio-verification test.

3.3.2 Follow-Up [System Function Verification](#)

Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the contract, the Contracting Officer shall be given 5 working days' advance notice of the dates and times of checking and testing.

3.3.3 Training

The Contractor shall conduct a training course for meter configuration, operation, and maintenance of the system as specified. The training shall be oriented for all components and systems installed under this contract. Training manuals shall be delivered for [_____] trainees with two additional copies delivered for archiving at the project site. The Contractor shall furnish all audiovisual equipment and all other training materials and supplies. A training day is defined as eight hours of classroom instruction, including two 15-minute breaks and excluding lunchtime, Monday through Friday, during the daytime shift in effect at the training facility. For guidance in planning the required instruction, the Contractor shall assume that attendees have a high school education or equivalent, and are familiar with utility systems. Approval of the planned training schedule shall be obtained from the Government at least 30 days prior to the training.

- a. Training: The course shall be taught at the project site within thirty days after completion of the installation for a period of one [_____] day(s). A maximum of [6][_____] personnel will attend the course. The training shall include:
 1. Physical layout of each piece of hardware.
 2. Meter configuration, troubleshooting and diagnostics procedures.
 3. Repair instructions.
 4. Preventive maintenance procedures and schedules.
 5. Testing and calibration procedures.

-- End of Section --



DIVISION 26 – ELECTRICAL
SECTION 263213 – ENGINE GENERATORS
DATA SHEET

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. AFCESA approval shall be required for all projects providing new or replacement generators. Approval shall be required at the programming stage, and the 65% and 95% design stages.
2. All generators shall be capable of dual fuel operation. The two fuels shall be diesel fuel and Jet fuel.
3. All generators shall be specified with a factory installed Exhaust Gas Temperature (EGT) probe.
4. Generators 250 KVA or larger shall be specified with integral load banks.
5. Generator fuel tanks shall be provided. The size of the full tanks shall be determined by the base Power production shop. At a minimum the generators shall be provided with day tanks capable of providing 24 hours of run time at generator full loading.
6. The sizing of all generators shall be in accordance with Air Force Engineering Technical Letter (ETL) 11-21.

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. 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. 1. Existing auto transfer switches are Lakeshore, Westinghouse and Onan.

D. GENERATOR ROOMS

1. 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.

END OF DATA SHEET



DIVISION 26 – ELECTRICAL
SECTION 264200 – CATHODIC PROTECTION
DATA SHEET

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.
 - 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.

END OF DATA SHEET



DIVISION 27 – COMMUNICATIONS

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 27 – COMMUNICATIONS
SECTION 270000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 270000 – COMMUNICATIONS

A. ETL 02-12 FAIRCHILD SUPPLEMENT

1. When developing specifications for this section, use the 92d Communications Squadron's Supplement to ETL 02-12 to clarify ETL 02-12, *Communications and Information System Criteria for Air Force Facilities*. Any deviations will require approval from the 92d Communications Squadron.

END OF DATA SHEET



DIVISION 27 – COMMUNICATIONS
SECTION 275400 – KLAXON AND NAOC ALARM SYSTEMS
DATA SHEET

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.

END OF DATA SHEET



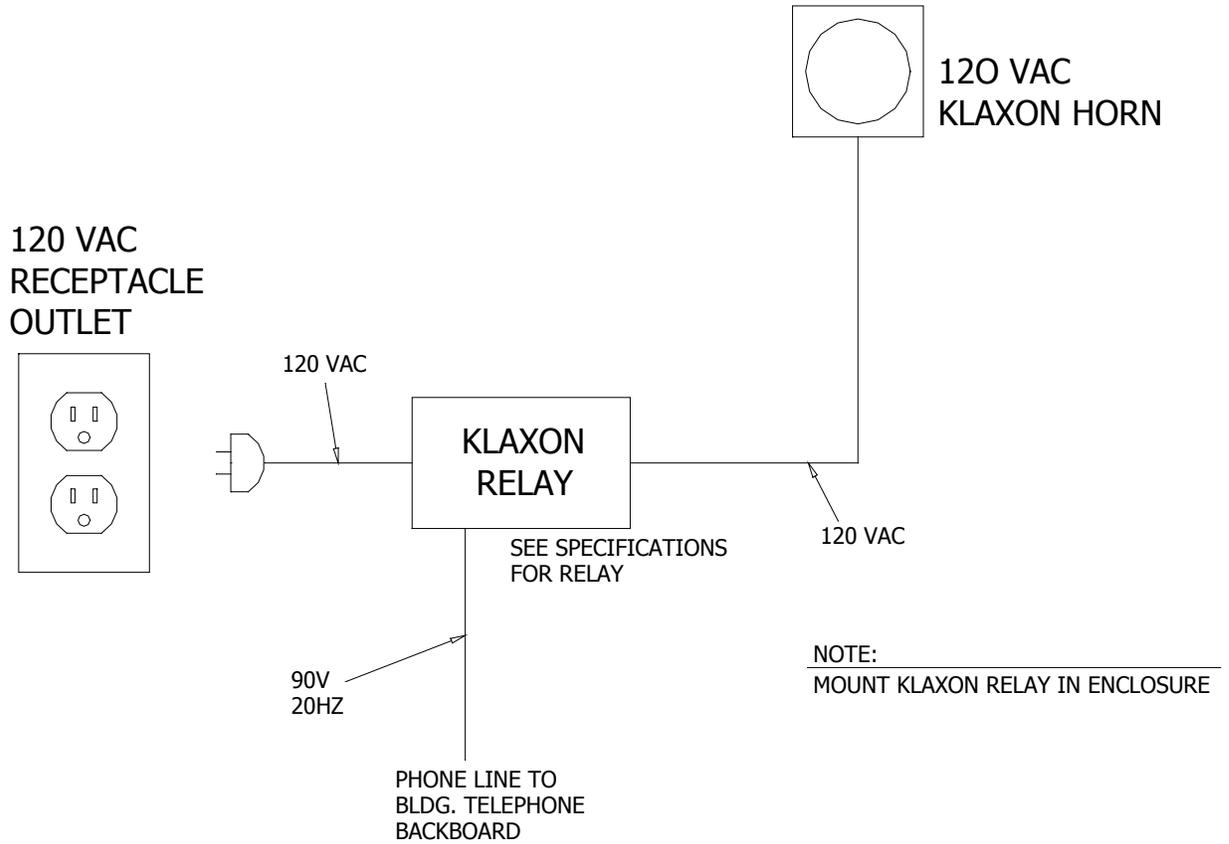
DIVISION 27 – COMMUNICATIONS
SECTION 275400 – KLAXON AND NAOC ALARM SYSTEMS
DETAIL SHEET

SECTION 275400 – KLAXON AND NAOC ALARM SYSTEMS

A. DETAILS

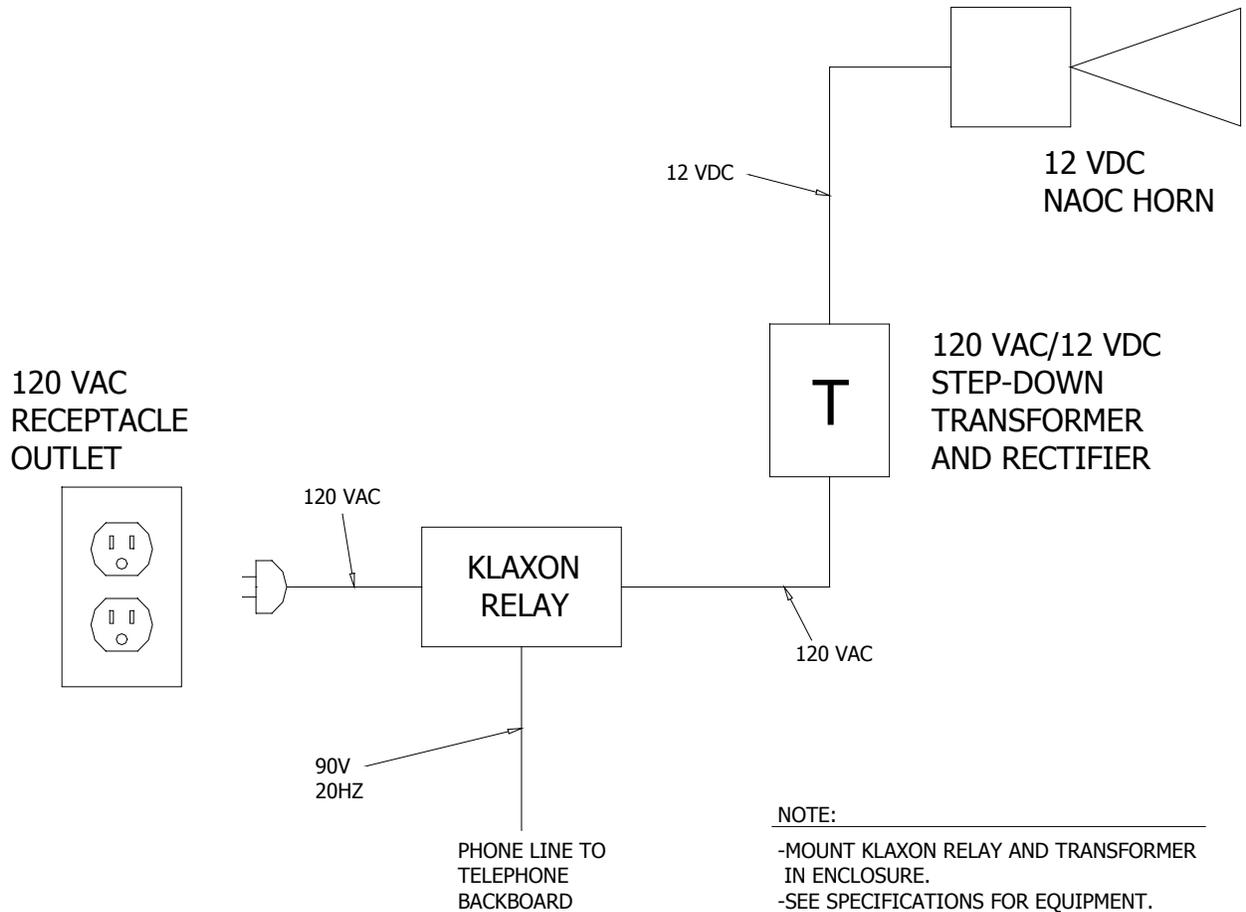
1. Klaxon System at Facility
2. NAOC System at Facility

DETAIL 1 – KLAXON SYSTEM AT FACILITY



NOT TO SCALE

DETAIL 2 – NAOC SYSTEM AT FACILITY



NOT TO SCALE



DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 28 – ELECTRONIC SAFETY AND SECURITY
SECTION 283100 – CARBON MONOXIDE DETECTION AND ALARM
DATA SHEET

SECTION 283100 – 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.

3. Instructions

- a. Contractor shall include the manufacturer's instructions regarding operation and proper maintenance of the detectors in the Operations and Maintenance Manuals.

END OF DATA SHEET



DIVISION 28 – ELECTRONIC SAFETY AND SECURITY
SECTION 283110 – FIRE-ALARM SYSTEM
DATA SHEET

SECTION 283110 – FIRE-ALARM SYSTEM

A. GENERAL

1. Fire detection shall be provided where required by the National Fire Protection Association (NFPA).
2. 92d Civil Engineer Squadron Project Management (92 CES/CEPM) requires submittal of the sprinkler and fire alarm/mass notification systems and shop drawings proposed by the designer and contractor for approval prior to installation.
3. The fire alarm/mass notification system shall come complete with all the software, circuit diagrams, passwords, and documentation necessary to allow government fire alarm technicians to troubleshoot, maintain, and adjust the completed system.
4. Provide a Mass Notification System in accordance with UFC 4-021-01 (latest edition).
5. Provide addressable fire alarm panel.
6. Fire Alarm outages: Refer to BDS section 330000 Utilities for BDS requirements and guidance on outages which impact building fire alarm systems.

B. KITCHEN EQUIPMENT

1. Kitchen equipment fire suppression systems shall be interconnected to shut down the gas and/or electrical power to griddles and deep fat fryers and provide exhaust fans. Interconnect the suppression system into the fire alarm panel to sound alarm.

C. FIRE DETECTION/LOCATIONS

1. Detectors shall be provided in all areas, including below suspended ceilings, occupied and unoccupied spaces, attics, rooms, halls, sleeping rooms, stairways, storage areas, closets, basements, lofts, chutes, and subdivisions.
2. Fixed temperature heat detectors shall be provided in areas below the ceiling where a rapid change in temperature would cause fixed temperature/rate of rise detectors to falsely activate.

Temperature (degrees F)

<u>Ambient</u>	<u>Detection (Approx.)</u>
< 100	135
> 100	190

3. Fixed temperature heat detectors shall be required above the ceilings (that are accessible) in areas that construction is combustible; and mechanical, utility, and electrical rooms.
4. If above-ceiling areas are used for storage, detection is required.
5. Smoke detectors shall be hard wired in sleeping rooms for individual occupant notification. Detectors shall be provided in hallways outside sleeping rooms and rooms housing large electronic equipment and areas where smoke development is possible, (example: paper storage).
6. Detection throughout the facility is required for pre-action sprinkler systems.

D. FIRE ALARM SYSTEM STYLE

1. Fire alarm system components and wiring shall meet specification, and performance and capabilities of initiating device and signaling line circuits of Style "B".

E. HORNS AND STROBES

1. Fire alarm strobes shall produce 60-100 flashes per minute and lenses shall clear and indicate "FIRE".
2. Mass Notification System strobes shall produce 60-100 flashes per minute and the lenses shall be amber.
3. Horn and strobe devices shall be one unit.
4. Specifications shall call for horns and strobes to be painted to match adjacent wall surface/color with red lettering. Horns and strobes shall not be painted.

F. MANUAL STATIONS

1. Shall be noncoded located.
2. Devices shall be red, single action pull stations with keylock for reset and testing WITH NO GLASS RODS OR BREAK GLASS DEVICES.

G. BATTERIES

1. All batteries necessary to maintain the fire alarm control panel and transmitter shall be gel-type.

H. FIRE ALARM/MASS NOTIFICATION SYSTEM CONTROL PANEL

1. Provide a combined fire alarm/mass notification system (MNS) control panel.
2. The fire alarm panel shall meet the requirements of NFPA 72 and NFPA 70. The Mass Notification System shall meet the requirement of UFC 4-021-01.
3. The panel shall include AC primary power and 24V DC battery back-up with a charger.
4. The panel shall be zoned to accommodate all fire areas with two complete spare zones.
5. All zones shall be tied into the BT-XF transceiver separately. The fire department shall provide the number of Zone Identifier Unit numbers.
6. The fire alarm and transmitter/transceiver panels shall be located in the electrical room, or (secondary) the mechanical room, unless otherwise indicated and approved on submittals.
7. An M-2 Integrated Radio Transceiver and fire alarm control panel may be installed in place of a separate fire alarm and transceiver panels. If so, it shall be a 4 class B or 2 Class A zones, expandable, in enclosure, 32 class B or 16 class A zones.
8. All zones shall be marked at the panel identifying locations.
9. Reset control panel passwords to the default passwords.
10. Submit manufacturer's documents including operators, users, and programming manuals. These documents shall be submitted through the contracting officer to 92 CES/CEOIE.

I. ANNUNCIATOR PANEL

When a building is divided into four or more zones, provide an annunciator panel with digital read out at a location determined by 92d Civil Engineer Squadron Project Management (92CES/CEPM).

Annunciator panels shall be located to allow easy access yet shall not be located so as to detract from the aesthetic appear. Adjacent to the annunciator panel shall be a graphic floor plan.

The graphic floor plan shall be designed to the layout of the facility, including each floor if it is multi story, and be situated in a manner so that when observed, the actual building configuration is seen with a "You are Here" arrow. A submittal of the proposed graphic floor plan be submitted for review and approval.

1. The annunciator panel shall clearly indicate the location of the area that is in alarm or trouble.

2. The panel shall not have silence or reset capability.
3. Annunciator panels shall be recessed into the wall. Both the annunciator panels and graphic floor plan shall have a dark bronze-anodized aluminum face panel with a dark bronze-anodized aluminum frame.

J. TRANSCEIVER (TRANSMITTER)

1. The transceiver shall be a Monaco Radio Alarm System Transceiver or approved equivalent and be capable of transmitting a Zone Identification (ZID) to the Monaco D-700 VHF Radio Alarm System located in the fire stations (FM frequency 138.925 MHz).
2. With the following applicable hardware or equal:
 - a. Antenna, ground plane, fixed station, cut to frequency.
 - b. Antenna Bracket (depending on preferred mounting):
 - (1) Lightning arrester kit.
 - (2) Raintight 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).
 - (5) If the existing or new fire alarm panel (FAP) does not have Class -C (dry) contacts, an interface is needed between the FAP and the building transceiver.
3. Remote radio transceivers shall include a radio receiver and transmitter to allow an interrogation/reply technique in which the transceivers are interrogated at regular time intervals automatically, as well as manually by the operator from the central supervising radio equipment, and replies are returned by the transceivers indicating transceiver status. Transceivers shall be crystal controlled for operation on any selected frequency in the 132 to 174 MHz band. Transceivers shall be operable within a 12.5 KHz channel. Radio alarm transceivers shall, without exception, meet or exceed the following requirements.
4. Each radio transceiver shall provide electrically supervised connections to local fire alarm control panels, sprinkler system flow devices and such other alarm and supervisory devices as indicated herein or on the drawings. Each transceiver shall provide electrical supervision for both open and ground conditions on interconnection wiring between the transceiver and local fire alarm control panel, interface panel or other alarm supervisory device. Where existing local control panels or devices do not provide isolated contact arrangements for transmission of alarm and trouble signals, an appropriate interface device will be provided to maintain system supervision in accordance with NFPA requirements. Where local fire alarm control panels do not provide a supervised alarm output for operation of interface panels, interface panels shall be located within three (3) feet (900 mm) of the fire alarm control panel and all interconnecting wire shall be in conduit.
5. Environmental Operating Requirements: Transceivers shall be designed for reliable operation in an ambient temperature range of minus 22 to plus 140 degrees Fahrenheit (minus 30 to plus 60 degrees Celsius) and under adverse climatic conditions including 100 mph (160 km/h) winds, high humidity, rain, ice and snow storms.
6. RE Power Output: Transceiver output shall be 4 watts with no more than a 1.4 to 1 standing wave ratio (SWR).
7. The restoration of zone alarm or trouble signal to normal condition shall result in a restoration signal being transmitted by the transceiver which indicates the return of the zone to normal supervisory condition. Restoration of the alarm or trouble signals shall extinguish the associated zone indicator.
8. Memory: Transceivers shall have full memory capability. Simultaneous or subsequent actuation of any individual message (from zones not initially in alarm) including those actuated during "off

air" periods, shall not result in the loss of any message. All such messages shall be stored until they are transmitted.

9. Transmission Confirmation: Each transceiver shall produce an audible or visual indication that the transceiver is operating and signal is being sent.
10. Automatic Transceiver Test: Radio transceivers shall respond to test interrogation from the central supervising station. Upon receiving an interrogation signal, the radio transceiver shall return a message to the central supervising station indicating transceiver status. Any off normal conditions of the transceiver including AC power failure, low battery, tamper (if utilized), zone alarm or zone trouble shall be displayed at the central supervising station as a result of the test interrogation.
11. Battery Supervision: Each transceiver shall constantly monitor and supervise its battery power supply. A low battery message shall be transmitted when battery voltage under load falls below 85 percent of the rated battery voltage, but in any case prior to the point at which the battery will fail to operate the transceiver. This message shall be included as part of every subsequent interrogation reply until the problem is corrected.
12. Trouble Supervision: Disarrangement of the transceiver wiring which prevents proper operation of the transceiver, or the abnormal position of any switch shall cause transmission of a trouble message identifying the trouble condition.
13. Transceiver Power Supply: Each transceiver shall be powered by locally available 120 VAC power. Upon loss of AC power, the transceiver shall automatically and instantaneously switch to standby battery power, without loss of any alarm signal. Loss of AC power shall also activate an indicator and cause an AC failure message to be transmitted if power is not restored within 1 minute. Upon restoration of AC power, transfer back to AC operation shall also be automatic. Power supply filtering shall prevent false message transmissions caused by transient or steady-state electrical disturbances. Transceiver shall be labeled as to the panel and breaker number.
14. Battery Power Supply: Batteries shall be spillproof, sealed lead acid or lead calcium. The battery package shall be capable of supplying all power requirements of the transceiver. Transceiver standby battery capability shall provide sufficient power to operate the transceiver in a normal standby status for a minimum of 24 hours and be capable to transmitting an alarm signal at the end of the period. Batteries shall be located within the transceiver housing.
15. Converter/Float Charger: Under presence of 120 VAC power, transceiver batteries shall be charged through a Converter/Float charge. Charger shall recharge a fully discharged battery in no more than 48 hours while the transceiver is operating under normal conditions (presence of 120 VAC power).
16. Transceiver Housing: Housing shall be corrosion resistant metal, conforming, as a minimum, to NEMA 12. Provision shall be made for conduit (minimum 3/4 inch I.D. or 20 mm) entry and attachment at no less than two places on the housing. Switches and any other controls shall not be accessible without the use of a key. Housing shall be factory painted with a priming coat and not less than two coats of durable weatherproof enamel. The finish color shall be manufacturer's standard. Repaint all surfaces damages during installation to match existing paint.
17. Lock: Internal components shall be protected from vandalism by a lock on the transceiver housing door. Locks for all transceivers provided shall be keyed alike, see paragraph on keys.
18. Antennas and Cables: Building mounted antennas may be omnidirectional or directional (as appropriate) with a driving point impedance of 50 ohms. All antennas shall be installed external to buildings and shall be located in accordance with manufacture recommendations. Antenna and antenna mounts shall be designed to withstand wind velocities of up to 100 mph (160 km/h). Each transceiver shall have its own antenna. Antennas shall be of non-corrosive materials and of strengths suitable to withstand ice and wind loading conditions and shall be located well away from overhead power circuits. Coaxial cables shall be RG type (or equivalent) and shall include

PL and BNC type fittings or connectors as appropriate. Antenna installation shall be tested for no more than 1.4 to 1 standing wave ratio (SWR).

19. 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.
20. Moisture Protection: Printed circuit boards in transceivers and interface panels (if provided), shall be coated with a coating for the climate in which the equipment is to operate and shall be applied in accordance with the coating manufacturer's specifications.
21. Location: Radio transceivers shall be installed in locations easily accessible for maintenance.
22. Input/Connections: Each transceiver shall provide a minimum of 4 alarm circuit inputs (zones) for the purpose of connection to the local fire alarm control panels, sprinkler water flow detectors, manual pull stations and extinguishing system control panels, utilizing Form A dry contacts. The specific zone qualifies for each building shall be as shown and where additional zones are required they shall be provided.
23. 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.
24. Electrical Supervision: Each transceiver shall electrically supervise all wiring between the transceiver and local fire alarm control panel. Transceivers shall also supervise the wiring to initiating devices where such devices are connected directly to the transceiver in lieu of being connected to a local fire alarm control panel. A ground fault condition which prevents transmission of an alarm or a break or open condition in any of the above circuits shall cause a trouble condition which shall initiate transmission of a trouble message identifying the affected zone.
25. Message Designation: In addition to test replies and zone alarm, trouble and restoration transmissions, each transceiver shall provide a separate identifiable transmission for the following conditions: AC FAILURE; LOW BATTERY; and TAMPER (TAMPER not required for transceiver enclosures). Each transmission shall be coded to indicate the transceiver identification.
26. AC Power Source: AC power shall be obtained from a single connection into the line side of the building's regular 60 Hz AC service, through a lockable fused disconnect switch. Where a local energy fire alarm control panel is fed by the same arrangement, a common feed to both the local panel and the transceiver is permitted.
27. Interface Device/Panel: At the manufacturer's option, all circuitry, and controls necessary for the functions required for Radio Transceivers may be contained in one housing or in two separate housings. If two separate housing are utilized, all requirements for radio transceivers as stated herein remain in effect.

K. KEYS

1. All panels and device locks will be keyed alike. They shall be either a Corbin B or a C-415A key to match Fairchild AFB fire alarm system Master Plan. Copies of these keys will be made available by the Fire Prevention section to meet this requirement upon request of the contractor. Two keys will be provided for each individual locking device.

L. FIRE ALARM POWER

1. Power for the fire alarm control panel shall be connected to the main electrical service ahead of the distribution panel. Connections to the power service shall be on a dedicated circuit with circuit and connections mechanically protected. The circuit disconnect shall be accessible only to authorized personnel and shall be clearly marked FIRE ALARM CONTROL CIRCUIT. Ref: NFPA 70, para 230-82 and 230-94; NFPA 72, para 5-4.2

M. SPRINKLER SYSTEM INTERCONNECTION

1. The sprinkler systems shall indicate an alarm and trouble condition on both the fire alarm control and annunciator panels.

N. 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.

O. TESTING AND ACCEPTANCE

1. During acceptance testing, all individual devices shall be tested, eg. manual pull station, heat/smoke detectors, etc.. Each zone shall be tested in a separate trouble and ground fault condition. Exception: One (1) fixed temperature detector per zone shall be tested for an actual activation.

END OF DATA SHEET



DIVISION 31 – EARTHWORK

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 31 – EARTHWORK
SECTION 312000 – EARTH MOVING
DATA SHEET

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 Specification Section 013543, Paragraph 1.10.

END OF DATA SHEET



DIVISION 32 – EXTERIOR IMPROVEMENTS

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 320000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 320000 – GENERAL REQUIREMENTS

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 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.
4. At all projects calling for the installation of new paved roads or the resurfacing of existing paved roads, designer shall specify the installation of two 4"-diameter conduit, 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 masonry materials compatible with the surrounding architecture are frequently utilized on base and their use is encouraged. (See Section 323100).
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, Section 323100.
 - b. Screening walls located next to bricked facilities shall be bricked per Detail 3, Section 323100.
 - c. Walls located next to facilities that are antique linen in color but not of brick or block construction shall be constructed per Allen Block Corporation's mortar-less concrete block wall system. Block shall be standard gray color to be painted with color as approved and selected by government. Plans and specifications can be obtained by contacting the Allen Block Corporation at 1-800-899-5309.
7. See Section 042000, *Unit Masonry*, for Fairchild AFB standard colors.
8. See *Architectural Compatibility Plan* section "Screens and Enclosures."

END OF DATA SHEET



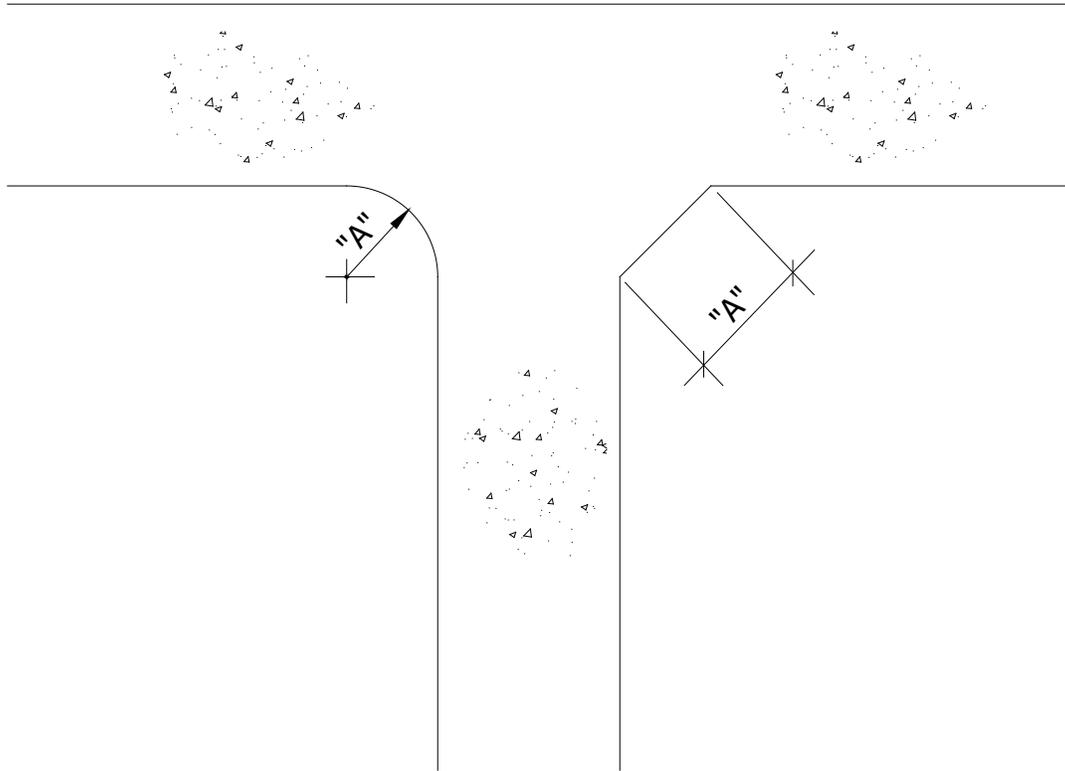
DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 320000 – MISCELLANEOUS DETAILS
DETAIL SHEET

SECTION 320000 – MISCELLANEOUS DETAILS

A. DETAILS

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

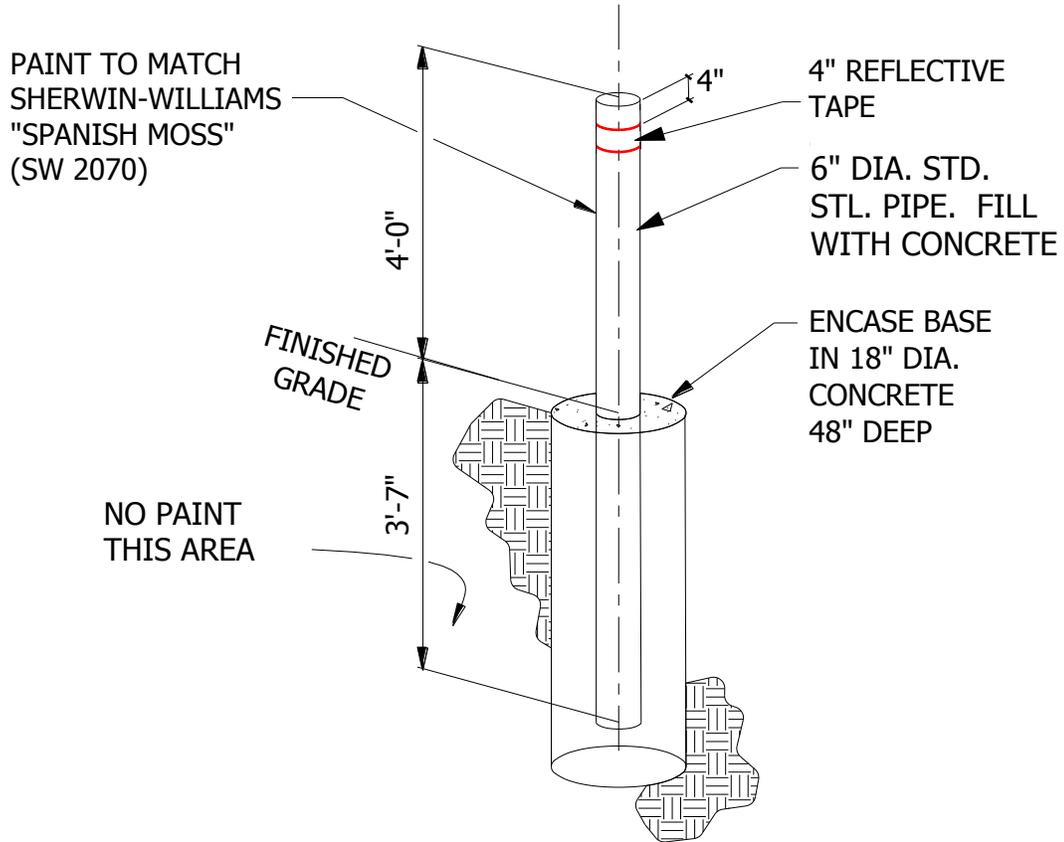
DETAIL 1 – SIDEWALK INTERSECTION



"A" = 3'-0" MINIMUM

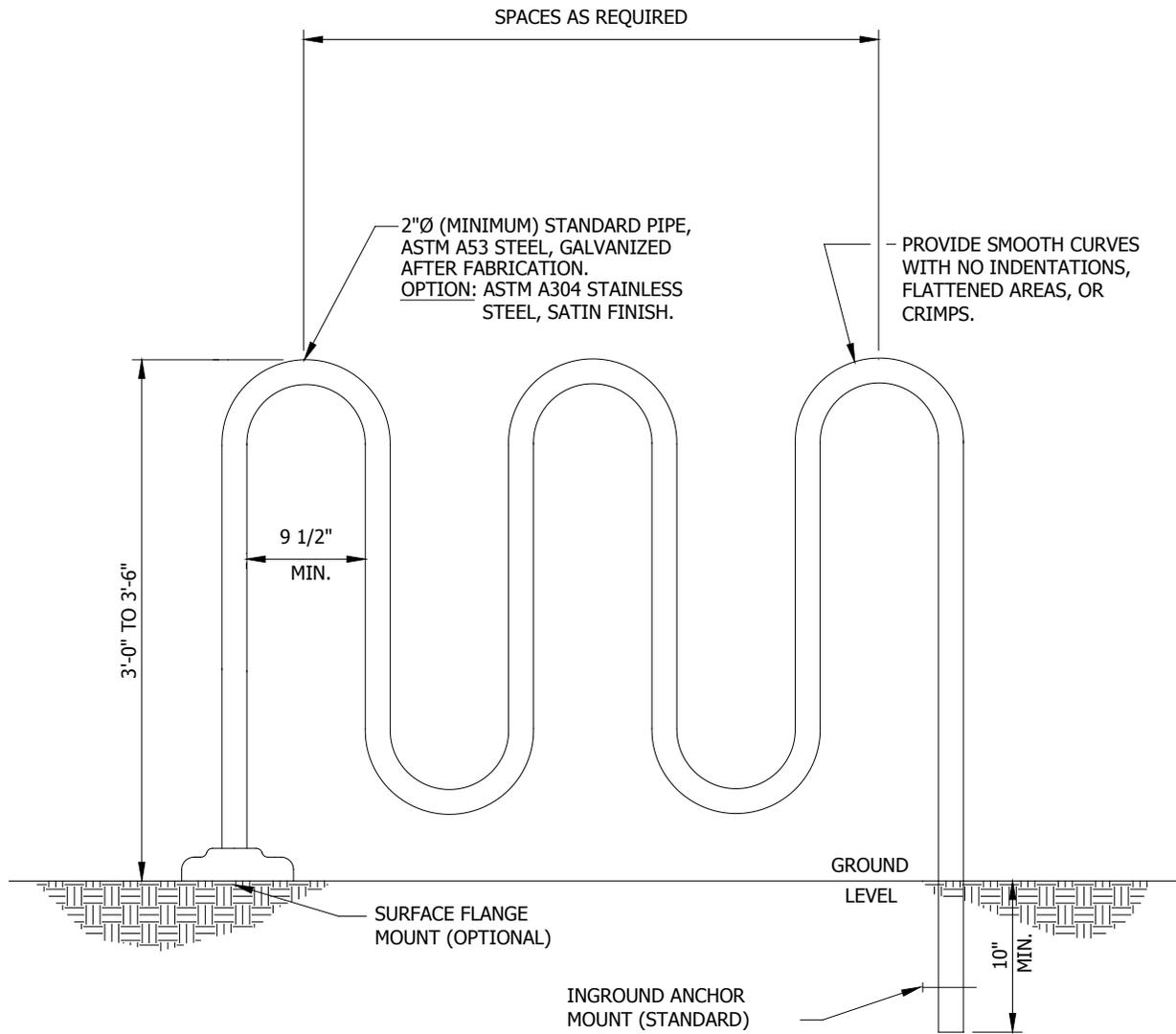
SCALE: NONE

DETAIL 2 – BOLLARDS



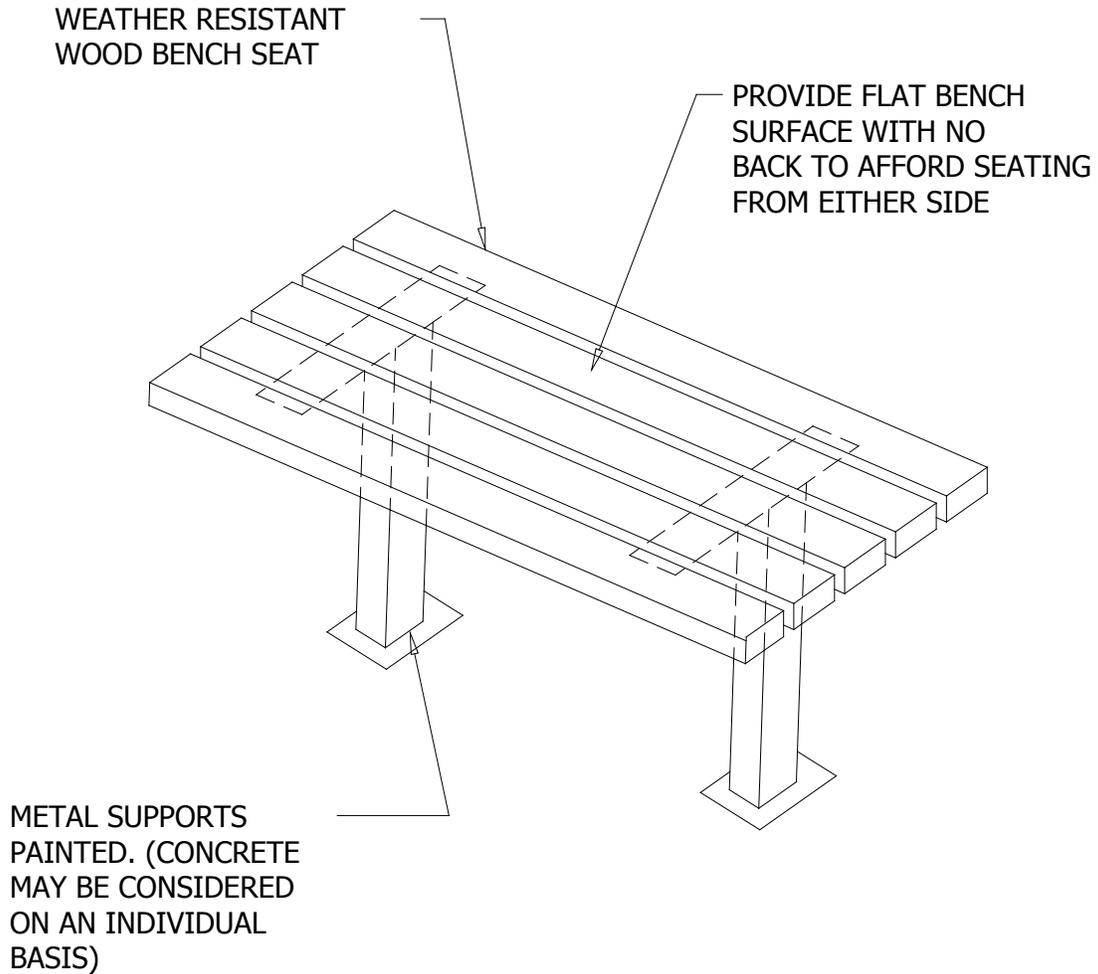
SCALE: NONE
REVISED: 27 DEC 99

DETAIL 3 – BIKE RACK



SCALE: NONE

DETAIL 4 – OUTDOOR BENCH (TYPICAL)



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

SCALE: NONE

END OF DETAILS



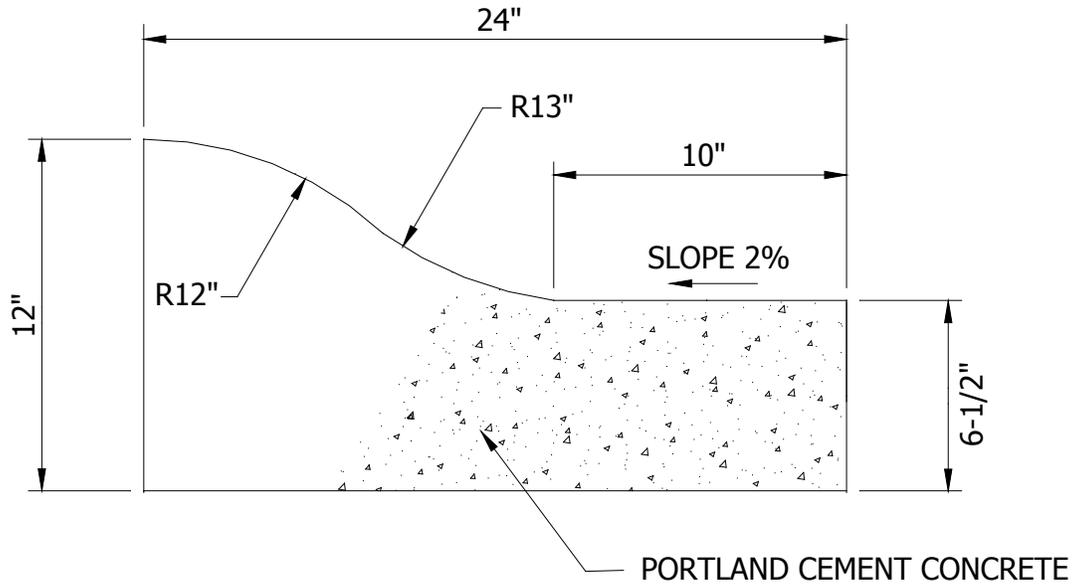
DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 321600 – CURBS AND GUTTERS
DETAIL SHEET

SECTION 321600 – CURBS AND GUTTERS

A. CURB DETAILS

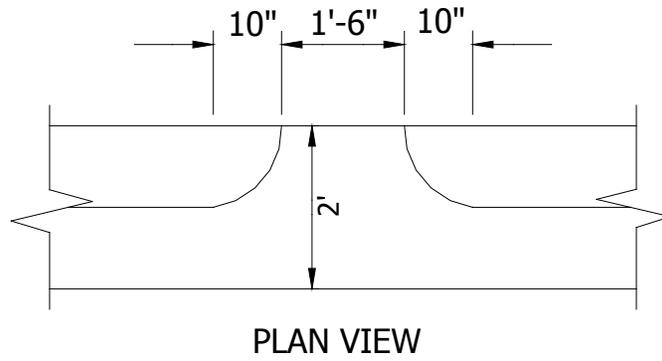
1. Typical Curb and Gutter
2. Typical Curb Cut
3. Asphalt Curb Backing
4. Earthen Curb Backing

DETAIL 1 – TYPICAL CURB AND GUTTER

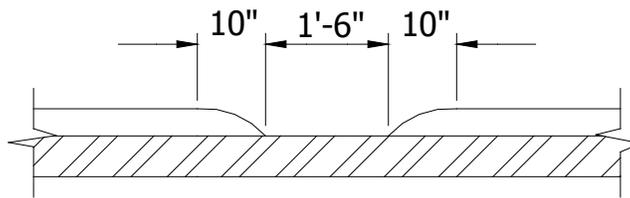


SCALE: NONE

DETAIL 2 – TYPICAL CURB CUT



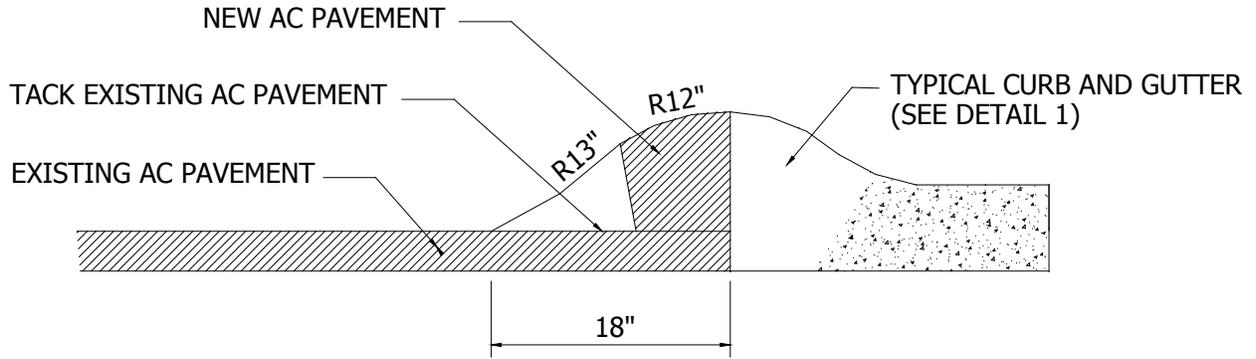
PLAN VIEW



ELEVATION

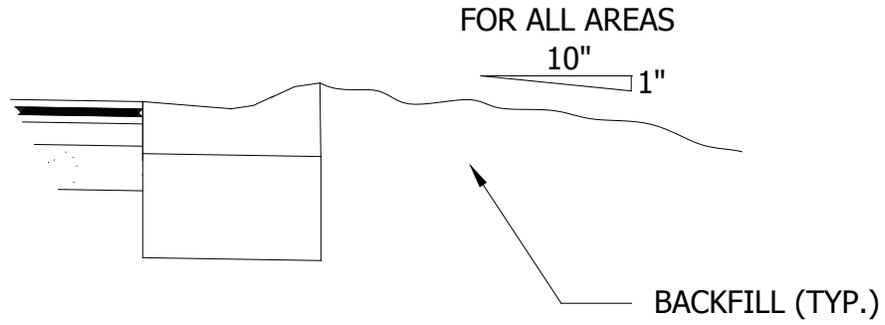
SCALE: NONE

DETAIL 3 – ASPHALT CURB BACKING



SCALE: NONE

DETAIL 4 – EARTHEN CURB BACKING



SCALE: NONE

END OF DETAILS



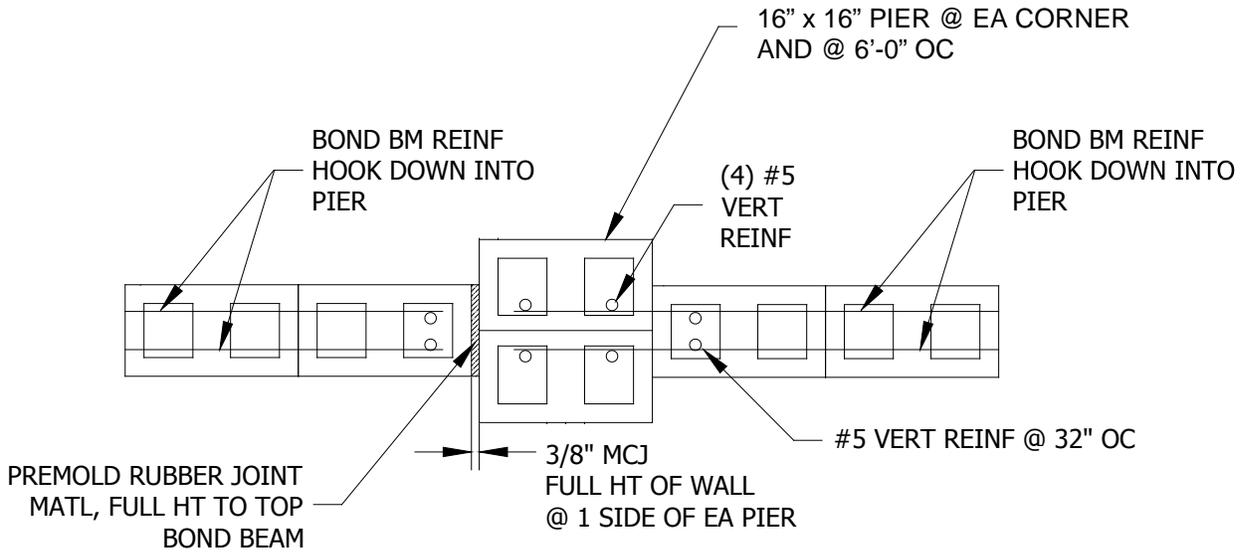
DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 323100 – FENCES AND GATES
DETAIL SHEET

SECTION 323100 – FENCES AND GATES

A. SCREENING WALL DETAILS

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

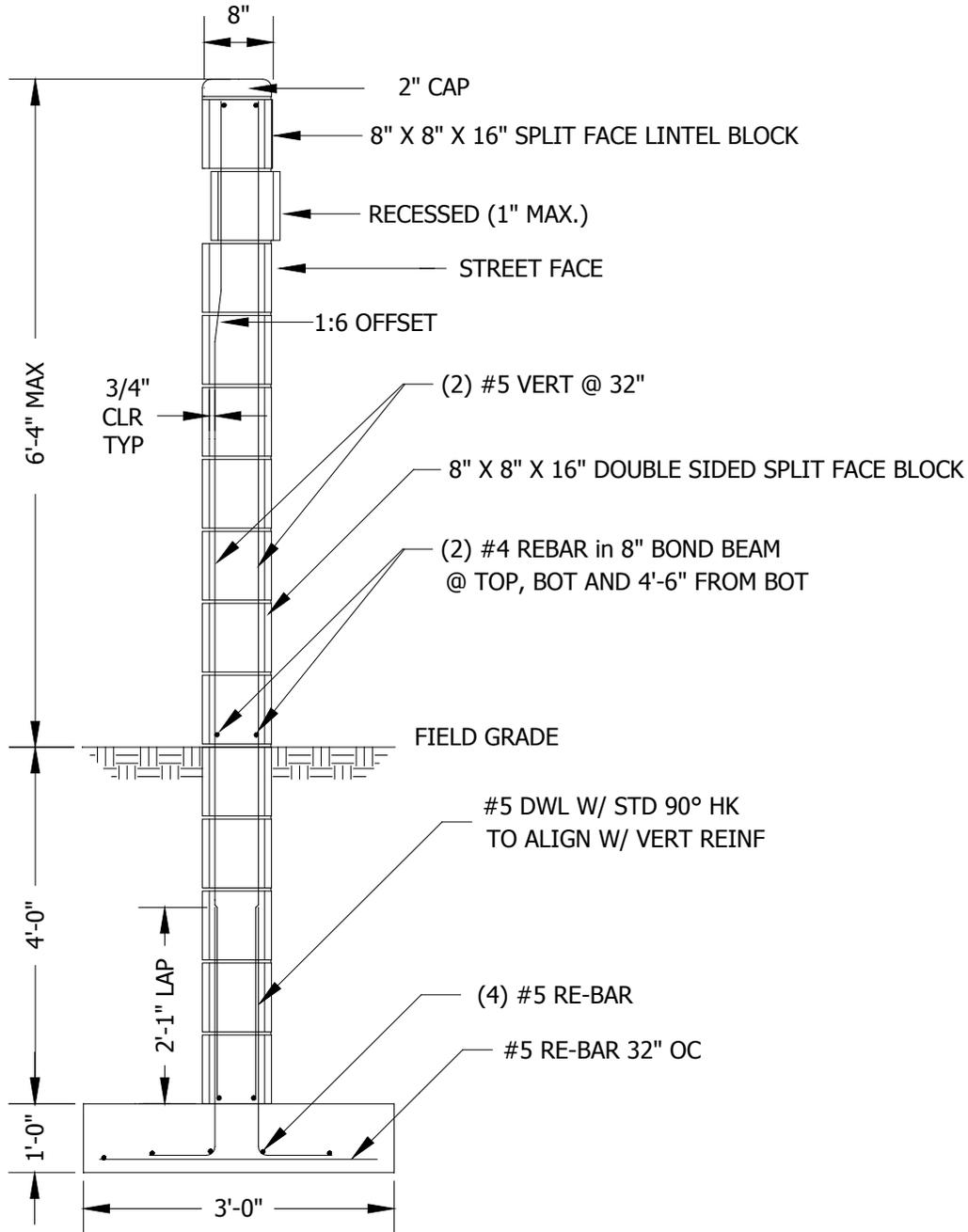
DETAIL 1 – WALL COLUMN (TYPICAL PLAN VIEW)



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

SCALE: NONE

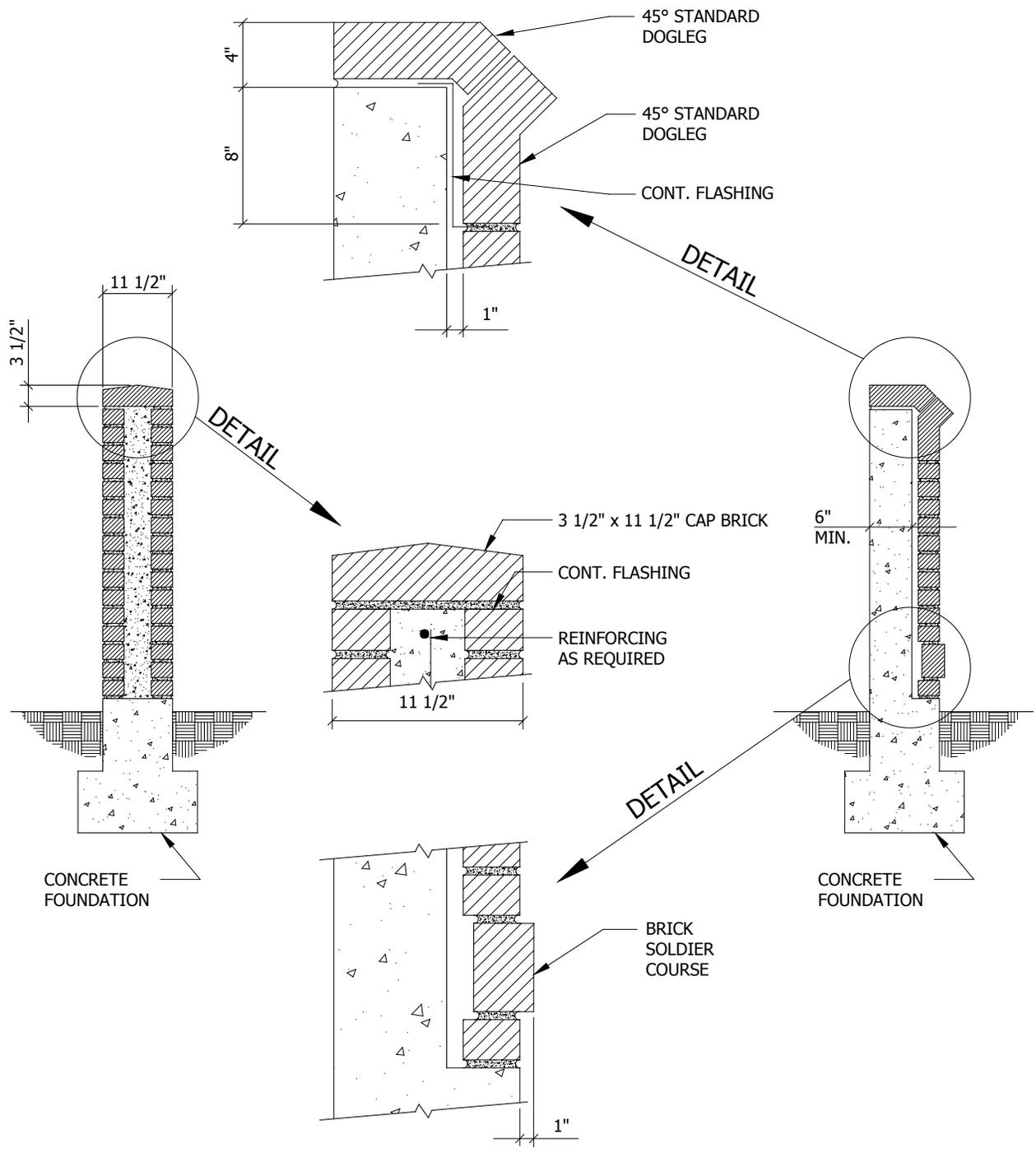
DETAIL 2 – SCREEN WALL (TYPICAL DIMENSIONS)



*This footing design is acceptable for walls up to 6'4" high. Taller walls require validation of the footing design.

SCALE: NONE

DETAIL 3 – WALL SCREEN OR ENCLOSURE



SCALE: NONE

END OF DETAILS



DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 328400 – PLANTING IRRIGATION
DATA SHEET

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 Section 329000)
 - 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/CEAO) 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.

END OF DATA SHEET



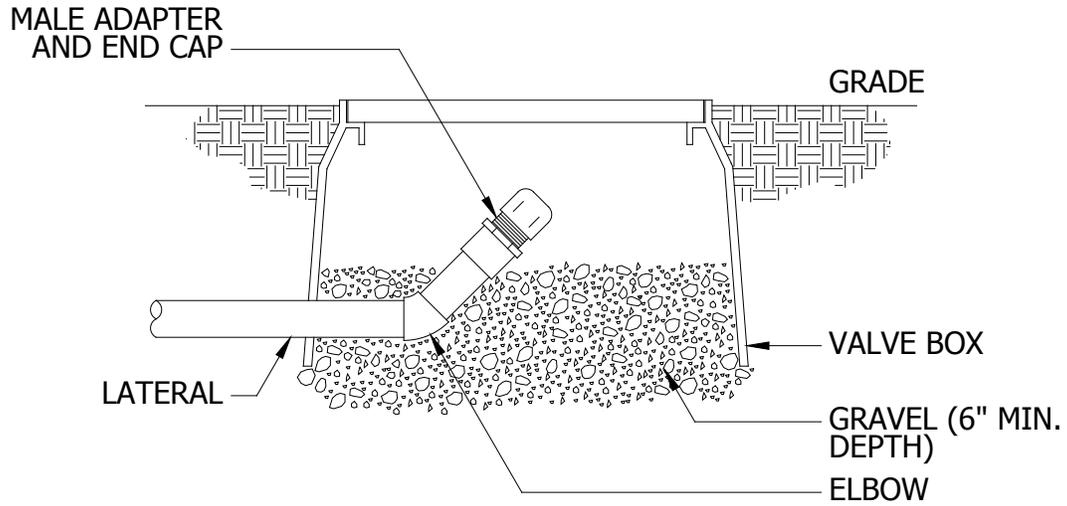
DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 328400 – PLANTING AND IRRIGATION
DETAIL SHEET

SECTION 328400 – PLANTING AND IRRIGATION

A. DETAILS

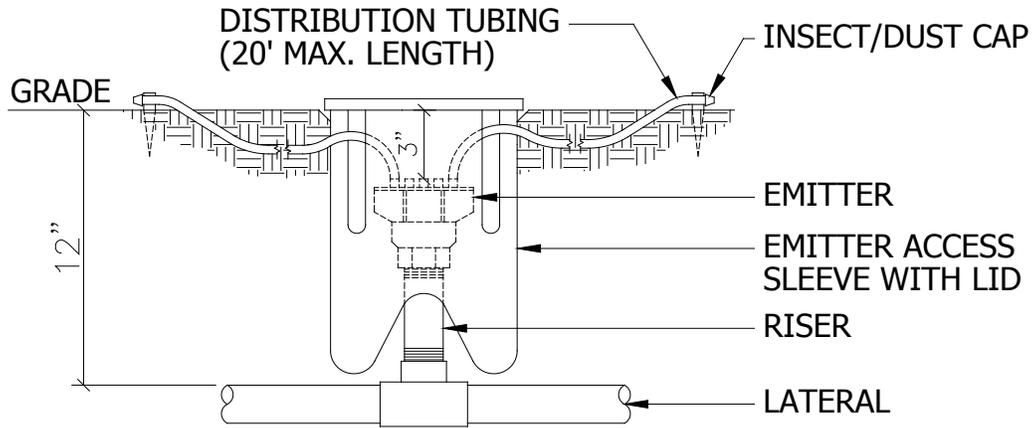
1. Flush Point
2. Emitter
3. Electric Control Valve
4. Quick Coupler Valve
5. Auto Drain Valve
6. Backflow Preventer
7. Swing Joint

DETAIL 1 – FLUSH POINT



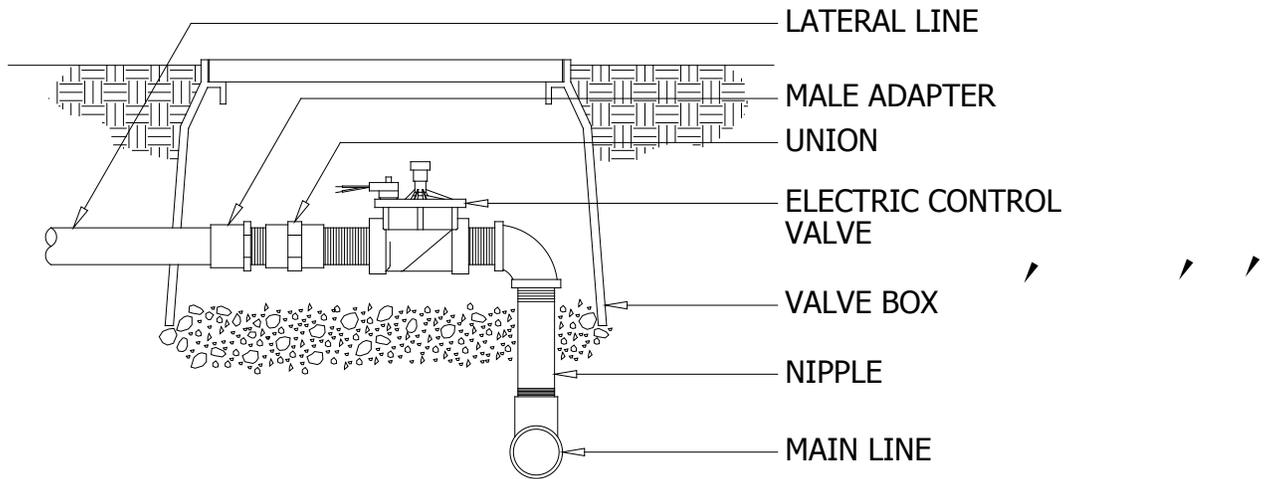
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DETAIL 2 – EMITTER



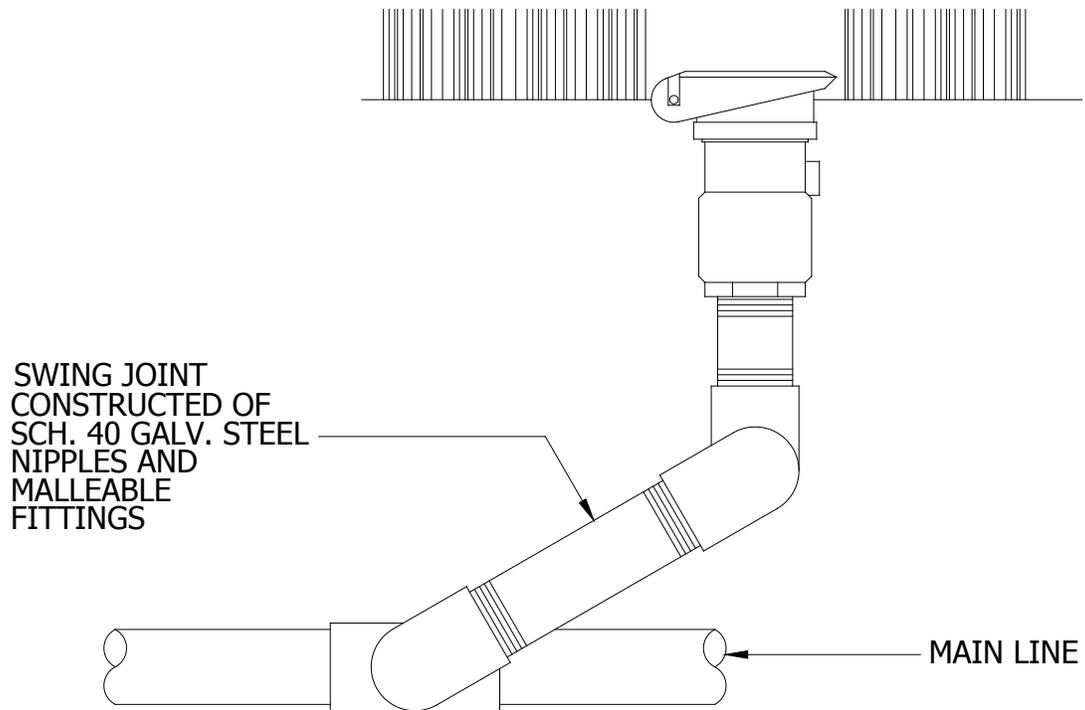
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DETAIL 3 – ELECTRIC CONTROL VALVE



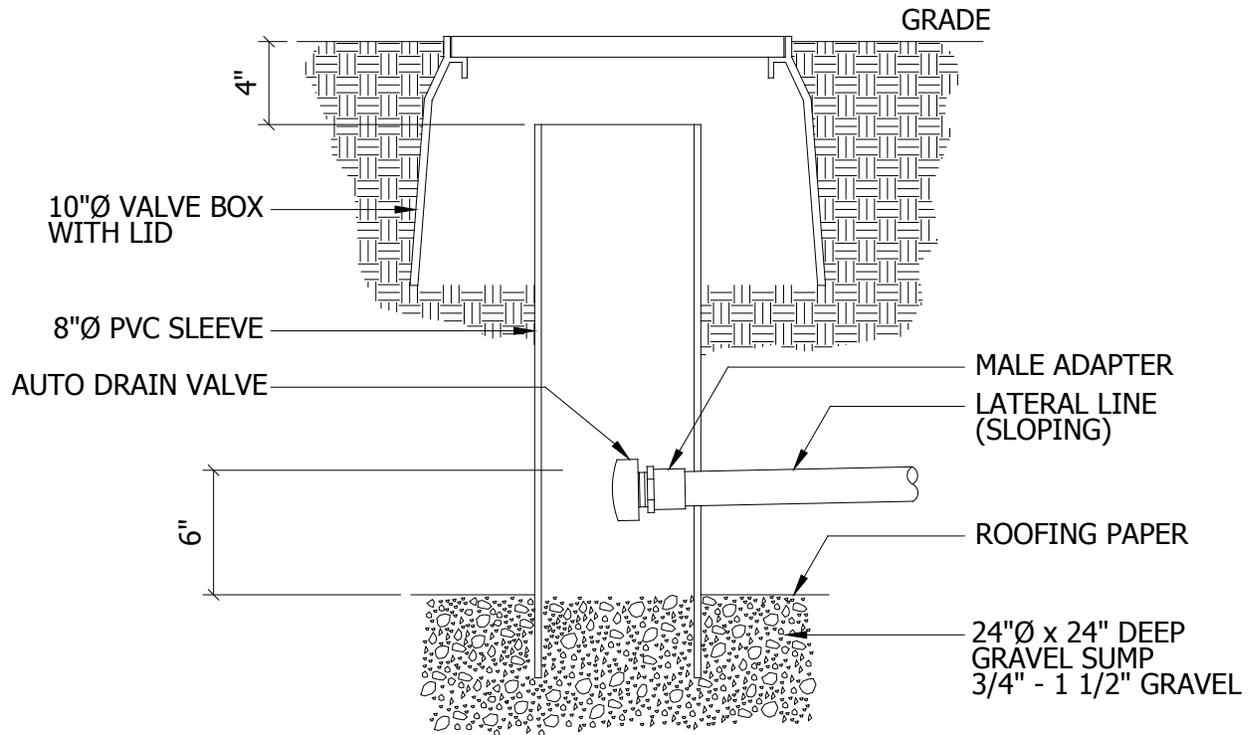
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DETAIL 4 – QUICK COUPLER VALVE



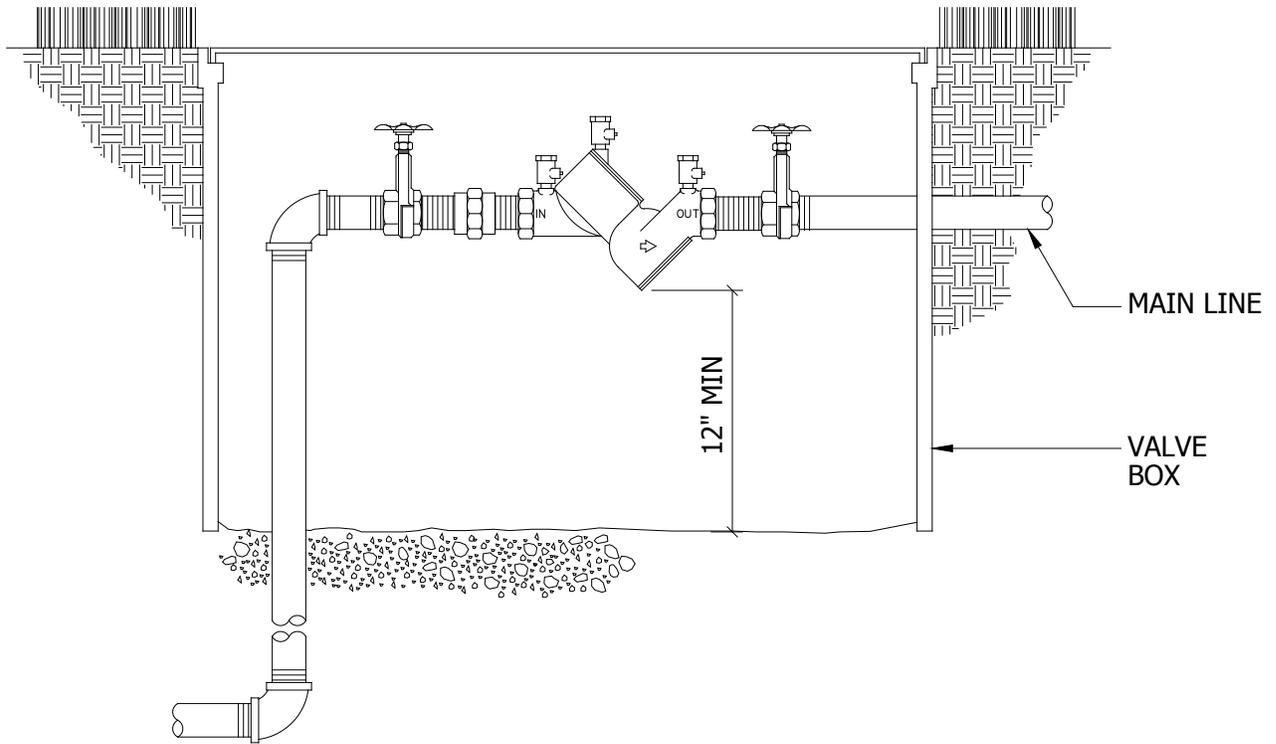
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DETAIL 5 – AUTO DRAIN VALVE



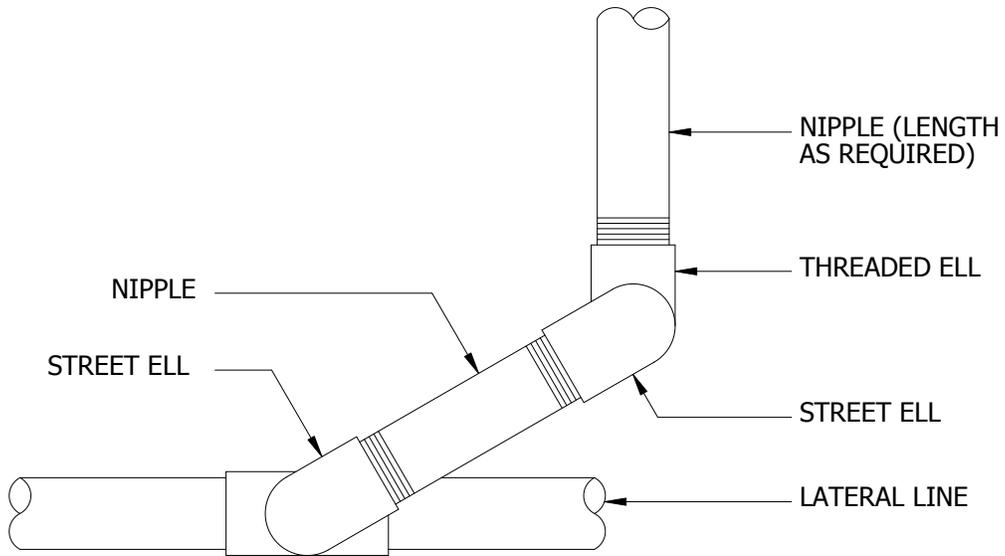
SCALE: NONE

DETAIL 6 – BACKFLOW PREVENTER



SCALE: NONE

DETAIL 7 – SWING JOINT





DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 329000 – TURF, GRASSES, AND PLANTS
DATA SHEET

SECTION 329000 – TURF, GRASSES, AND PLANTS

A. OVERVIEW

1. This section supplements requirements set forth in UFC 3-210-05FA, *Landscape Design and Planting Criteria*.
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.
3. Site details referred to in the text are presented at the back of this section. The site details are available in electronic AutoCAD format from the 92 Civil Engineer Squadron Programs Flight. Details provided in this document are not completed design details but are intended to provide direction and conformity throughout the Base.

B. GENERAL DESIGN GUIDELINES

1. 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.
2. 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.

- a. The zones shall be determined by function as follows: (See Exhibits 1-3 at the end of this Section)
 - 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
 - (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 5 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, low angle or flat trajectory heads or bubblers shall be used. Minimize or eliminate the use of heads which throw water toward the building wall. Where heads directed toward the building are necessary on the windward side of buildings, be sure that the throw of heads is short enough to eliminate wind drift onto 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).
8. 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 1st through June 25th and August 25th through Oct. 1st, 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.
9. 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.
- c. At the end of the maintenance period the landscape contractor shall be required to flatten earth saucers around trees and shrubs to prevent scalping by lawn mowing activities and/or erosion in mulched areas.

10. 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 plant matrices following this section list plant material which can be expected to perform well at Fairchild Air Force Base under average conditions. Typical applications and any required protection from the wind and other adverse environmental conditions are also indicated. The matrices are included to provide the designer with maximum flexibility and as diverse a selection of plants as possible. Use of drought tolerant plant material shall be practiced as much as possible. Plants requiring more water should be limited to key areas where the desired appearance is more important.

D. PLANT SETBACKS, SPACING, 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 Programs Flight shall determine the required area needed to reduce hazards to the traveling public.

2. Spacing

- a. The following minimum spacing's should be used as a general guide for "mass" plantings (as opposed to "specimen" plantings).
 - (1) Street Trees:
 - (a) spacing: 30 to 35 ft
 - (b) distance to sidewalk, curb, etc.: 3 ft minimum; 5 ft or more desirable
 - (2) Conifer Trees:
 - (a) spacing for screens, windbreaks: 12 to 15 ft
 - (b) spacing for lawn plantings: 15 to 20 ft
 - (c) distance to wall: 15 to 20 ft
 - (3) Large Flowering Trees (Flowering Crab, Flowering Cherry):
 - (a) spacing: 15 to 20 ft
 - (b) distance to wall: 15 to 20 ft
 - (4) Small Ornamental Trees (Flowering Dogwood, Common Smoketree):
 - (a) spacing: 10-ft to 15-ft
 - (b) distance to wall: 10-ft to 15-ft
 - (5) Large Shrubs (Lilac, Doublefile Viburnum):
 - (a) spacing: 6 to 8 ft
 - (b) distance to wall: 4 to 5 ft
 - (6) Standard Shrubs (Spreading Juniper, Pyracantha):
 - (a) spacing: 4 to 6 ft
 - (b) distance to wall: 30 to 36 inches
 - (7) Compact Shrubs (Dwarf Juniper, Bumald Spirea):
 - (a) spacing: 3 to 4 ft
 - (b) distance to wall: 24-inches to 30-inches
 - (8) Hedges (Pyramidal Arborvitae, Privet):
 - (a) spacing: 3-ft to 4-ft
 - (b) distance to wall: 24 to 30 in.
 - (9) Ground Covers:
 - (a) 1-gal container: 3 to 4 ft depending on species
 - (b) 4-in. pot container: 18 to 24 in.
 - b. Refer to Details 2 (tree), 3 (shrub), and 4 (ground cover).
3. 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. Ornamental Turf

- a. Ornamental turf areas shall be created by the installation of sod. Not only does sod provide "instant" turf, but it invariably results in a higher grade of turf. Sod materials shall consist predominantly, if not exclusively, of a blend of fescues. Seeding is acceptable where it can be shown to be economically advantageous.
- b. In cases where sod is not used, the following ornamental seed mixture shall be used: (Sod shall also contain a similar mixture of seed varieties.)

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

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

2. 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).

3. 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>
Sheeps Fescue – Marco Polo	70
Canada Bluegrass - Reubens	30
No noxious weeds	

- b. The seeding rate shall be 3.5 lbs/1000 sf (150 lbs/acre).

4. 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 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 ornamental and 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.

5. Topsoil

- a. At Fairchild AFB, sandy loam is sufficient for most turf installation purposes. Sandy loam shall consist of not more than 85% sand, 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%, 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. EKO Compost is organic compost with a local supplier in Spokane Valley. This compost can be incorporated into the on-site soil to improve the nutrient level, and moisture retention properties of the soil.
- c. Mycorrhizal Inoculants added to the plant mix will increase root development, and greatly increase the root's ability to absorb water, nutrients, and improve plant health. Mycorrhizal Fungi are naturally occurring in the soil and provide a beneficial relationship between plant roots and the fungus. Adding mycorrhizal fungi to the plant mix at installation will help restore beneficial soil organisms.
- d. 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. Ornamental and Wear Resistant Turf Grasses
 - a. Turf grasses shall be fertilized at the time of planting, 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 ft²

- 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 ²
Minimum Weight (for rock mulch)	3.0 oz/yd ²
Minimum Tensile Strength	70 lbs
Minimum Puncture Strength	20 lbs
Minimum Permeability	30 gpm/ft ²

- 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. Refer to paragraph K for special additional requirements regarding application of these products.

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 QAE (CEOE), Pest Management, and CEA.

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

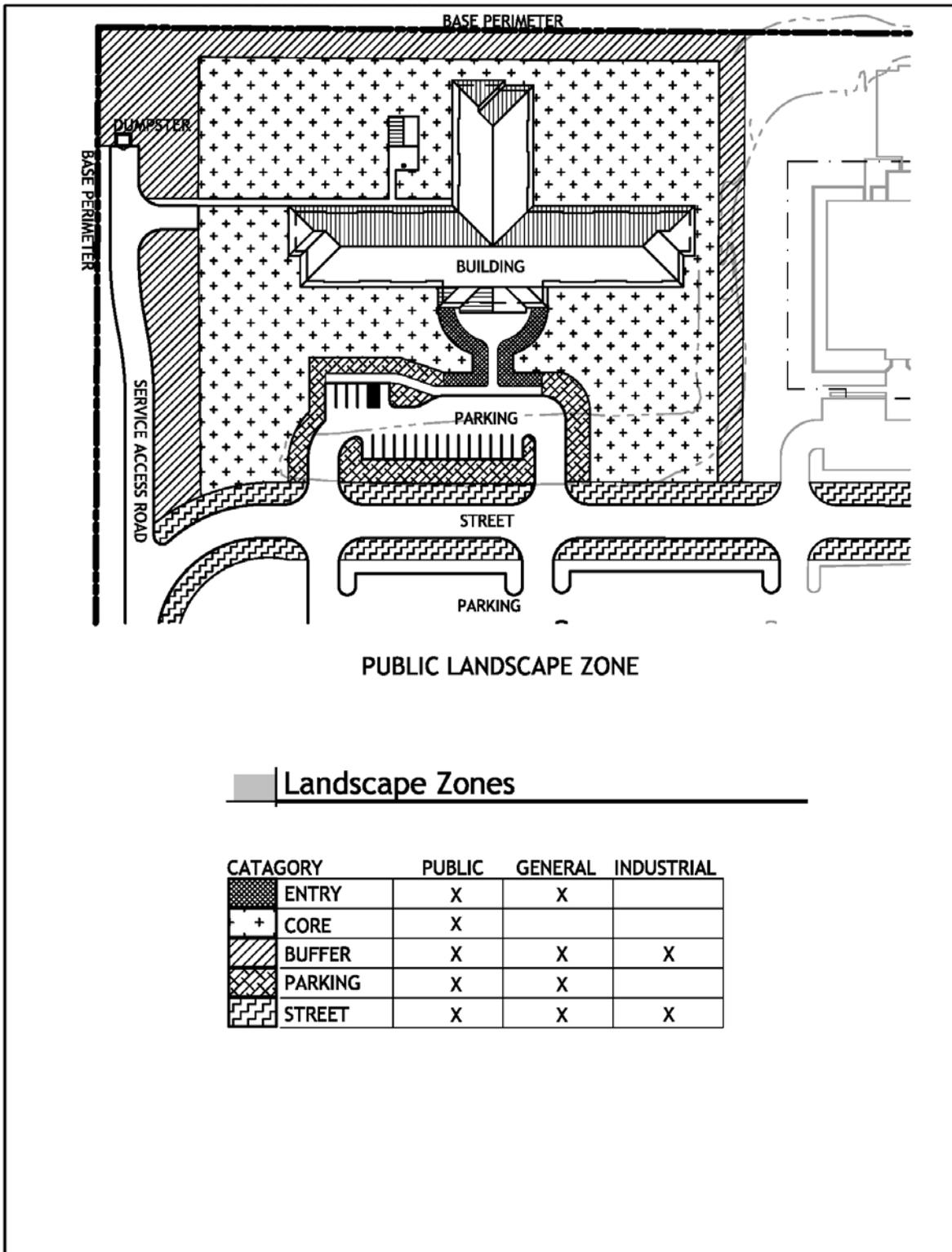
- a. All pesticides and adjuvants used on Fairchild AFB must be approved by all of the following authorities:
 - (1) HQ AMC/ESOF, Air Mobility Command Entomologist
 - (2) 92d Medical Group/BSC (Chief, Military Public Health)
 - (3) 92d CES/CE (The Civil Engineer)
 - (4) 92d CES/CEV (Chief, Environmental Flight)
 - (5) Contracting Officer or his/her authorized representative for the contract
 - (6) Approved Pesticide List

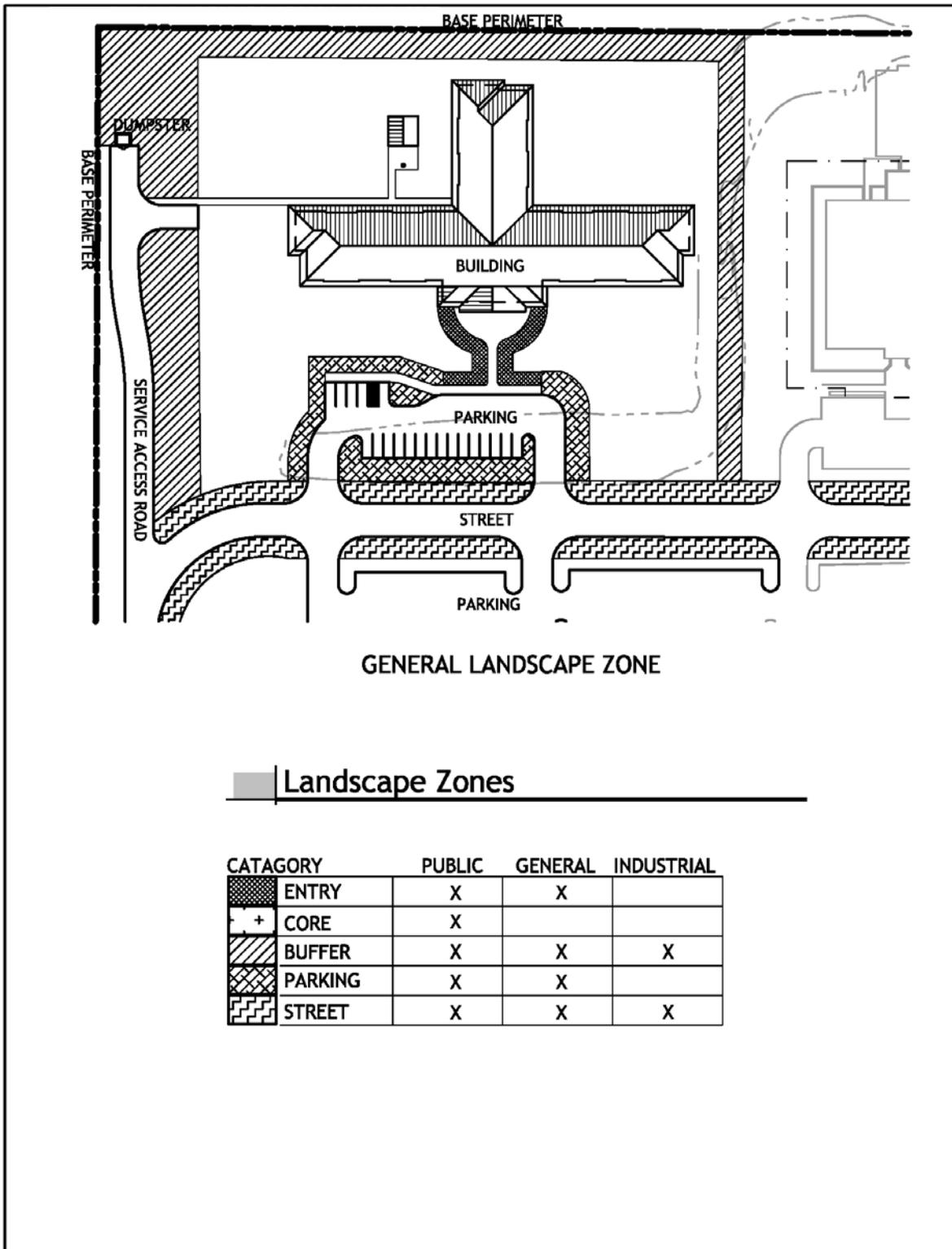
- (7) For list of approved pesticides currently authorized for use on Fairchild AFB and tenant units, refer to AFPMB Standard Pesticide NSN Listing FY 2000 (10/1/99).

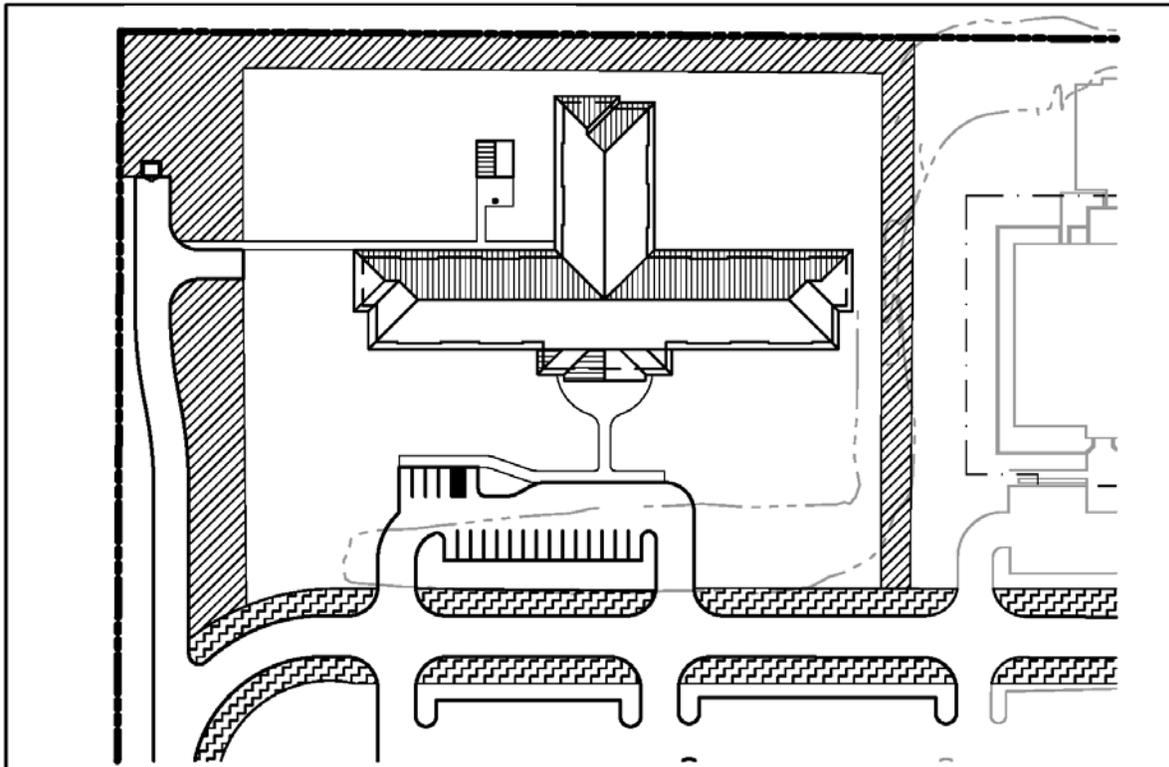
J. MAINTENANCE

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.

END OF DATA SHEET







INDUSTRIAL LANDSCAPE ZONE

Landscape Zones

CATAGORY	PUBLIC	GENERAL	INDUSTRIAL
ENTRY	X	X	
CORE	X		
BUFFER	X	X	X
PARKING	X	X	
STREET	X	X	X

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 _____	



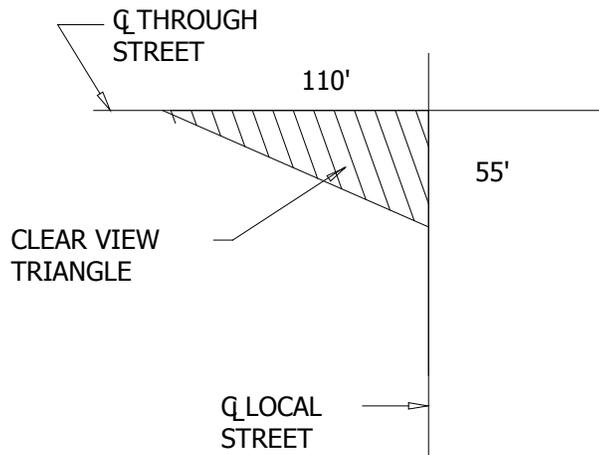
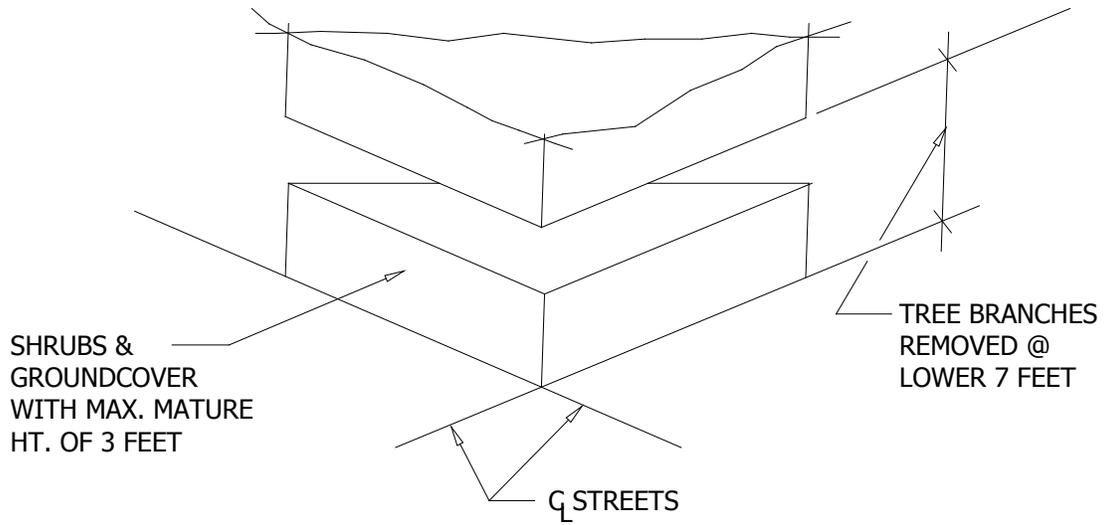
DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 329000 – PLANTS
DETAIL SHEETS

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](#)

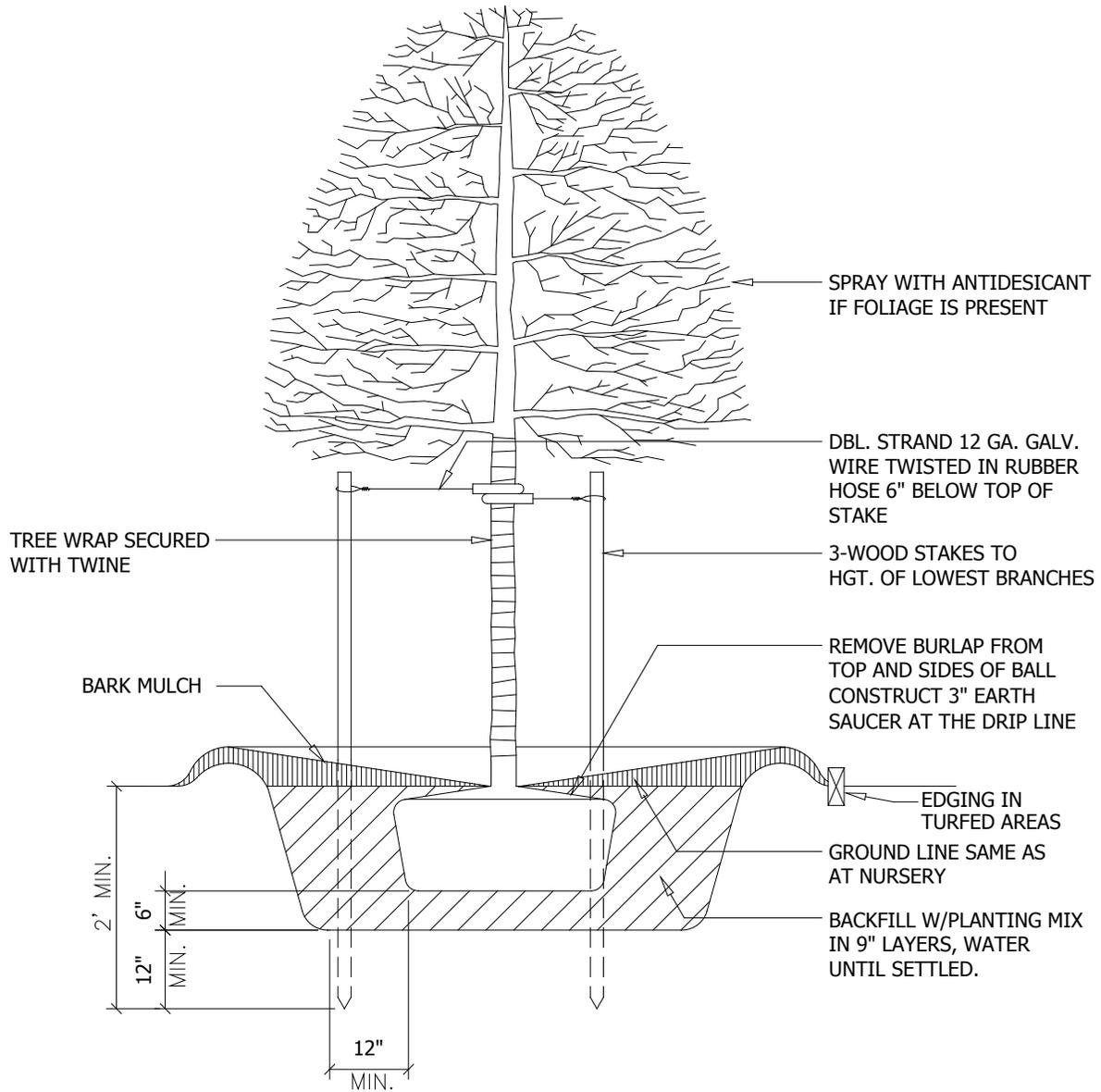
DETAIL 1 – CLEAR VIEW TRIANGLE



SCALE: NONE

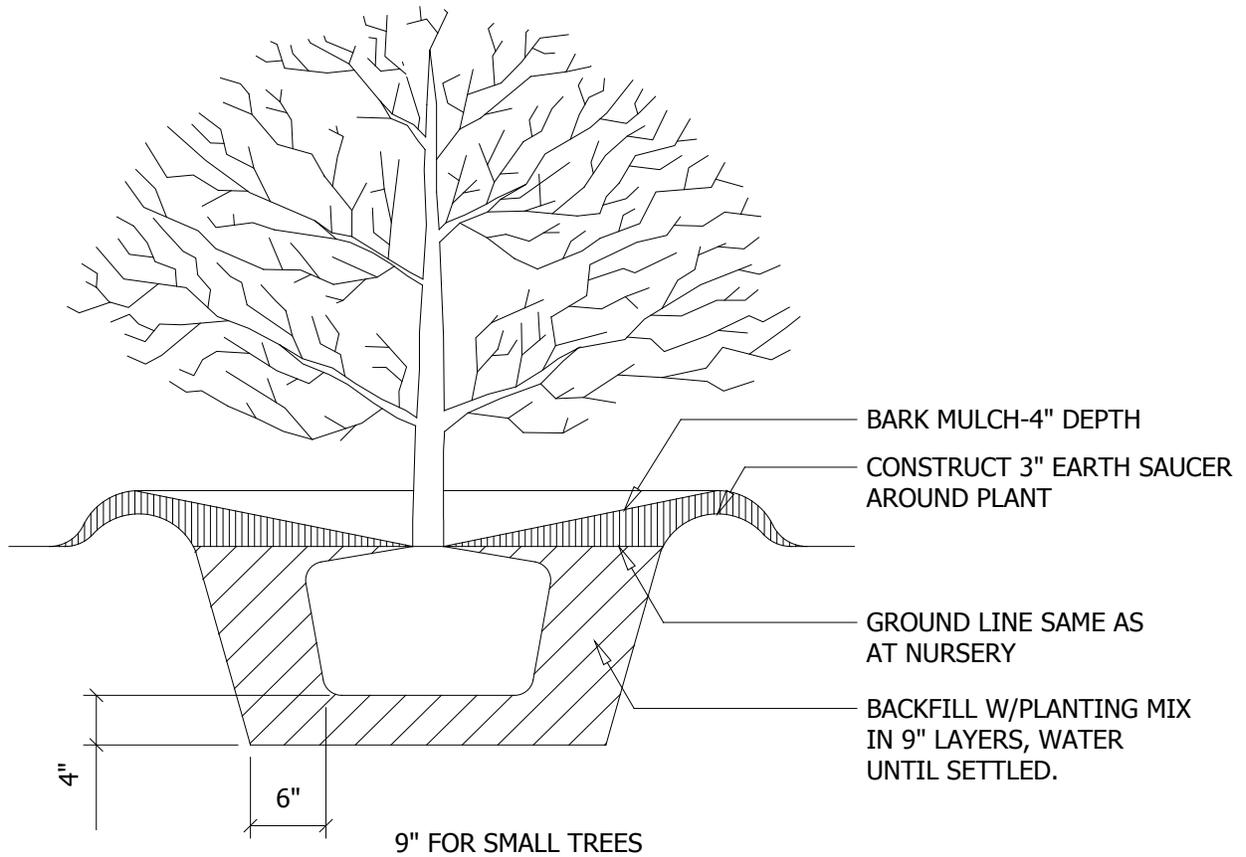
DETAIL 2 – TREE PLANTING

(Conifers Similar)



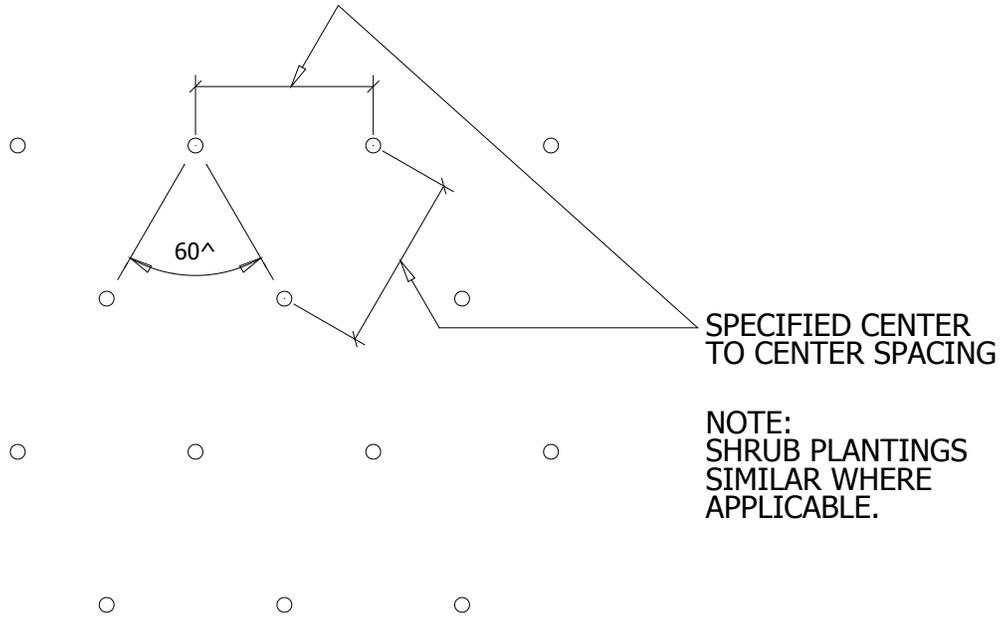
SCALE: NONE

DETAIL 3 – SHRUB PLANTING (Small Trees Similar)



SCALE: NONE

DETAIL 4 – GROUND COVER PLANTING



SCALE: NONE

END OF DETAILS



DIVISION 33 – UTILITIES

BASE DESIGN STANDARDS

FAIRCHILD AIR FORCE BASE
WASHINGTON



DIVISION 33 – UTILITIES
SECTION 330000 – GENERAL REQUIREMENTS
DATA SHEET

SECTION 330000 – GENERAL REQUIREMENTS

A. NATURAL GAS

1. Natural gas is supplied by Avista Utilities and DESC under firm and interruptible rate schedules. Some on base gas lines are maintained by Honeywell Corp. 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, and insure 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 Div 26 for UFG spec 26 27 13.10 30, Electrical Metering, and edit the template specification as appropriate for the specific project. See Div 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.
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, fire hydrants, 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 Antique Linen colored facilities, and "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 Section 320000, Paragraph D.
8. 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

All new potable water piping 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.

G. Utility Outages impacting Fire Suppression or Fire Alarm Systems

1. See Section 330000 Utilities Attachment 1 for BDS requirements and procedures for utility outages impacting fire suppression and fire alarm systems.

END OF DATA SHEET

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. Overlaying the Comprehensive Utility Plan (CUP): The designer draws the PLL on the CUP provided by the BCE.
4. 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](#).
5. Submitting the 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. The description block of the FAFB Form 103 shall say "Verification of Existing Utilities for [insert name of project]". A POC, who can respond to field questions, must be clearly identified in the "Requestor" block of the FAFB Form 103 in case questions develop during the utility marking process.
6. Processing the FAFB Form 103: The BCE PM is responsible for processing the FAFB Form 103 within 10 business days.
7. Assigning A Tracking Number: The BCE PM will coordinate with the Civil Engineer Squadron Programs Flight FAFB Form 103 Monitor, who will assign the permit a tracking number and ensure that the FAFB Form 103 has been submitted in the proper format.
8. Obtaining Signatures: The BCE PM will take the FAFB Form 103 to the weekly coordination meeting at 0900 hours on the first Tuesday after receiving the FAFB Form 103. He/she will follow Base Instructions to obtain signatures for all coordination blocks.
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. 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.

12. **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.
13. **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.
14. **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.
15. **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.
16. **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.
17. **Updating the CUP:** The BCE PM is responsible for formally notifying the Geobase Section, 92 CES/CEOG, of discrepancies in the CUP within 14 days. CEOG is responsible for updating the CUP, and related base maps, within 30 days.

End of Attachment 1



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 92D AIR REFUELING WING (AMC)
FAIRCHILD AIR FORCE BASE WASHINGTON

Section 330000 Attachment #2

25 Apr 06

MEMORANDUM FOR 92 CES/CEO
CEC

FROM: 92 CES/CC

SUBJECT: Fire Suppression/Alarm System Outage Policy Letter

1. It is important that fire suppression and alarm systems be out of service for the minimum amount of time and space necessary to accomplish the work. In addition, 92 CES/CEF must be kept up-to-date on the status of fire suppression and alarm systems.

2. The organization responsible for taking the fire suppression system and/or fire alarm system out of service will use FAFB Form 103, Base Civil Engineering Work Clearance Request, to receive initial clearance. Submissions for fire suppression system outages will be on a separate FAFB Fm 103 from other work clearance requests like digging. Multiple outages will require multiple FAFB Fm 103 submissions.

a. FAFB Fm 103 requests for fire suppression system outages will follow a simplified sign-off procedure. The following organizations are required to coordinate prior to work beginning; all other organizations are optional and are not required to coordinate:

- (1) Electrical Distribution – specifically the fire alarm section.
- (2) Water Distribution.
- (3) Fire Protection.
- (4) Safety.

b. The FAFB Fm 103 shall describe in detail the work on the fire suppression/alarm system. The description shall also include the estimated start date and duration of the outage. If 92 CES/CEF requires additional information, the requesting organization shall provide the information prior to 92 CES/CEF coordination.

c. Minimizing fire suppression/alarm system down time is important. Whenever possible, the fire suppression/alarm system shall be operational.

- (1) For situations where the system can be altered, repaired, and/or restored in a minimum amount of time (less than four days), only one outage shall be required.

(2) For situations where the entire system must be out of service for any length of time, only one outage shall be required.

(3) For situations where only a portion of the system must be out of service for longer than four days, two outages shall be required. The first outage will be to alter the system so that only the portion directly being affected by the work is out of service. The second outage will be to reconnect the out of service section to the system.

d. FAFB Fm 103s will not be required for maintenance in accordance with the Recurring Work Program, for work that lasts less than one working day, or work resulting from a stand-by call or emergency condition. The notification and requirements listed below are still required.

3. After the FAFB Fm 103 has been coordinated by the required organizations, the organization taking the fire suppression/alarm system out of service shall notify the 92 CES/CEF Fire Alarm Control Center. Notification shall occur one working day prior to the fire suppression/alarm system being placed out of service. A second notification is required immediately before beginning work on the system. After the fire suppression/alarm system is returned to service, the requesting organization shall immediately notify the Fire Alarm Control Center.

4. Each requesting organization shall maintain a notification log book. At a minimum, the log shall have the date and time of the notification as well as the requestor's name and the dispatcher at the Fire Alarm Control Center. The Fire Alarm Control Center shall be notified for all system status changes.

5. If there are any questions, comments, or concerns, please contact Capt Scott Cline at x72722.



MATTHEW D. ROBINSON, Maj, USAF
Commander

cc:
92 CES/CEF



DIVISION 33 – UTILITIES
SECTION 331233.00 30 – WATER METERS
FAIRCHILD SPECIFICATION

USACE / NAVFAC / AFCEA / NASA UFGS-33 12 33.00 30 (August 2008)

Preparing Activity: AFCEA

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2010

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- 1.1 DEFINITIONS
- 1.2 REFERENCES
- 1.3 SUBMITTALS
- 1.4 QUALITY ASSURANCE
 - 1.4.1 Installation Drawings
 - 1.4.2 Standard Products
 - 1.4.3 Alternative Qualifications
 - 1.4.4 Material and Equipment Manufacturing Data
- 1.5 WARRANTY
- 1.6 SYSTEM DESCRIPTION
 - 1.6.1 System Requirements
 - 1.6.2 Selection Criteria

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 - 2.1.1.1 Cold-Water Meters - Displacement Type 5/8-inch x 3/4-inch, 1-inch, 1-1/2-inch, 2-inch Size
 - 2.1.1.2 Cold-Water Meters - Compound Type 2-Inch, 3-Inch, 4-Inch, and 6-Inch Size
 - 2.1.1.3 Cold-Water Meter - Turbine Type 2-Inch Size
 - 2.1.1.4 Cold-Water Meter Strainers 2-Inch, 3-Inch, 4-Inch and 6-Inch Size
 - 2.1.2 Meter Programming
 - 2.1.3 [Register Requirements for Remote Registration
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 - 2.2.1 Communications Methods
 - 2.2.2 Communications Protocols and Methods
 - 2.2.3 Communications Channels Surge Protection
- 2.3 METER DATA PROTOCOL
 - 2.3.1 Open Protocol
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 - 2.4.1 Parts List
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PART 3 EXECUTION

- 3.1 INSTALLATION
 - 3.1.1 [Existing Condition Survey
 - 3.1.2 Scheduling of Work and Outages
- 3.2 [FIELD-APPLIED PAINTING

3.3 FIELD QUALITY CONTROL

3.3.1 Performance of Acceptance Checks and Tests

3.3.2 Follow-up Verification

3.3.3 Training

-- End of Section Table of Contents --

NOTE: This specification covers the requirements for installation of water meters (5/8-inch x 3/4-inch, 1-inch, 1-1/2-inch, and 2-inch Displacement Meters; 2-inch, 3-inch, 4-inch, and 6-inch Compound Meters; 2-inch Turbine Meters; 2-inch, 3-inch, 4-inch, and 6-inch Strainers) suitable for billing, allocation of costs, and recording of data for water management and control applications, and provides guidance for the facility energy manager or design engineer after determining what data will be gathered and what analysis procedures will be used.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer. Since metering for water management and costs allocation varies widely, it is expected that the designer will make significant adjustments and additions to this guide specification.

PART 1 GENERAL

1.1 DEFINITIONS

Unless otherwise specified or indicated, water terms used in this specification and on the drawings shall be as defined in **AWWA C700**.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The latest version is required when applied to this specification.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C700 (2009) Standard for Cold Water Meters - Displacement Type, Bronze Main Case

AWWA C701 (2007) Standard for Cold-Water Meters - Turbine Type for Customer Service

AWWA C702 (2001; R 2010) Cold-Water Meters - Compound Type

AWWA C707 (2010) Encoder-Type Remote-Registration Systems for Cold-Water Meters

ASME INTERNATIONAL (ASME)

ASME B1.20.1 (1983; R 2006) Pipe Threads, General Purpose (Inch)

ASME B16.1 (2005) Gray Iron Threaded Fittings; Classes 25, 125 and 250

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2007; TIA 2007-1; TIA 2007-2; TIA 2007-3; TIA 2007-4; TIA 2007-5; Errata 2006-1;

Errata 2007-2; Errata 2009-3) National Electrical Safety Code

IEEE C37.90.1 (2002) Standard for Surge Withstand

Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)
IEC 61000-4-5 (2005; Corr 2009) Electromagnetic Compatibility (EMC) - Part 4-5: Testing and Measurement Techniques; Surge Immunity Test; Ed 2.0

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)
ISO 9001 (2000; R 2008; Corr 1 2009) Quality Management Systems- Requirements

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
ANSI C12.18 (2006) Protocol Specification for ANSI Type 2 Optical Port

ANSI C62.61 (1993) American National Standard for Gas Tube Surge Arresters on Wire Line Telephone Circuits

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
NFPA 70 (2011) National Electrical Code

1.3 SUBMITTALS

NOTE: The submittal description (SD) numbers and names, assigned by the SPECSINTACT Configuration, Control and Coordinating Board, relate to the terminology of the technical sections and should not be changed.

Review SD definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Air Force projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Recommended codes for Air Force projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. Submittal items not designated with a "G" are considered as being for information only for Air Force projects.

- a. Maintenance manual shall provide:
 - (1) Condensed description of how the equipment operates.

- (2) Block diagram indicating major assemblies.
 - (3) Troubleshooting information.
 - (4) Preventive maintenance.
 - (5) Spare parts information.
- b. Provide operation and maintenance manuals required by submittal item "SD-10 Operation and Maintenance Data."

SD-02 Shop Drawings

SD-03 Product Data

Protocol modules[; G][; G, [_____]]

Data recorder[; G][; G, [_____]]

Modems[; G][; G, [_____]]

Submittals shall include manufacturer's information for each component, device, and accessory provided with the meters, protocol modules or communications modules.

SD-06 Test Reports

Acceptance checks and tests[; G][; G, [_____]]

SD-10 Operation and Maintenance Data

Water meters[; G][; G, [_____]]

Communications modules[; G][; G, [_____]]

Protocol modules[; G][; G, [_____]]

Data recorder[; G][; G, [_____]]

Modems[; G][; G, [_____]]

1.4 QUALITY ASSURANCE

1.4.1 Installation Drawings

Drawings shall indicate, but not be limited to, the following:

- a. Elementary diagrams and wiring diagrams with terminals identified of[protocol modules,][communications modules,][Ethernet connections,][telephone lines]. [For each meter installation, provide a diagram identified by the building number.]
- b. One-line diagram, including meters,[protocol modules,][communications modules,][Ethernet connections,][telephone outlets,][and fuses]. [For each meter installation, provide a diagram identified by the building number.]

1.4.2 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for five years prior to bid opening. The five-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the five-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section. All meters provided shall be manufactured by a registered ISO 9001 quality standard facility. All specifications shall meet or exceed the latest revision of AWWA C702.

1.4.3 Alternative Qualifications

Products having less than a five-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 10,000 hours, exclusive of the manufacturer's factory or laboratory tests, is provided.

1.4.4 Material and Equipment Manufacturing Data

Products manufactured more than two years prior to date of delivery to the site shall not be used, unless specified otherwise.

1.5 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract. All meters shall carry the following published warranties:

a. Meters shall be guaranteed to be free from defective materials and workmanship and meet AWWA New Meter Accuracy Standards for a period of five years from the date of installation. At the expiration of this period, meters shall be guaranteed to meet AWWA Repaired Meter Accuracy Standards for the following time periods:

- (1) 5/8 inch to 1 inch: 5 to 15 years from the date of shipment.
- (2) 1-1/2 inch and larger: 5 to 10 years from the date of shipment.

b. All registers are guaranteed for a ten-year period from the date of purchase. Any defective register will be replaced at no cost to the Government.

c. All brass maincases are guaranteed for life by the manufacturer. Any defective maincase will be replaced at no cost to the Government.

1.6 SYSTEM DESCRIPTION

1.6.1 System Requirements

The metering and reading system, consisting of commercial, off-the-shelf meters, protocol modules and communications modules, and communication channels, will be used to record the water consumption and other values as described in the sections that follow and as shown on the drawings.

1.6.2 Selection Criteria

Metering components are part of a system that includes the physical meter, data recorder function, and communications method. Every building site identified shall include sufficient metering components to measure the water parameters identified and to store and communicate the values as required in the following sections. The Contractor shall verify that the metering system installed on any building site is compatible with the facility-wide communication and meter-reading protocol system.

PART 2 PRODUCTS

2.1 WATER METERS

NOTE: This specification is designed for projects where multiple metering systems will be installed on the same project. It is expected that different buildings may have different metering systems depending on the metering system that can be installed economically for any specific building and that meets the needs of the facility analysis and billing system.

Metering features that are unique to a building should be listed in a schedule either in this specification or on accompanying drawings.

2.1.1 Physical and Common Requirements

a. Metering system components shall be installed according to the Metering System Schedule shown[in this specification][on the drawings].

b. Meter shall be rated for use at temperatures from -40 [_____] degrees Centigrade to +70 [_____] degrees Centigrade.

c. Surge withstand shall conform to [IEEE C37.90.1](#).

2.1.1.1 Cold-Water Meters - Displacement Type 5/8-inch x 3/4-inch, 1-inch, 1-1/2-inch, 2-inch Size

Small meters shall be as follows or shall be approved equivalents: Positive displacement meters provided hereunder shall be full-size nutating-disc, magnetic drive, sealed register, cold water meters and shall fully comply with the requirements of [AWWA C700](#) unless otherwise specified hereunder. **No oscillating-piston style meters will be accepted.**

a. Materials

(1) Cases 5/8-Inch x 3/4-Inch, 1-Inch, 1-1/2-Inch: The main case of the meter shall be cast all-bronze, bottom caps shall be cast all-bronze, excepting register boxes and register box lids which shall be bronze or an approved plastic material as specified in [AWWA C700](#). Meter cases constructed of plastic will not be accepted.

(2) Cases 2-Inch: The main case of the meter shall be cast all-bronze, including bottom caps, excepting register boxes and register box lids which shall be bronze or an approved plastic material. Meter cases constructed of plastic will not be accepted.

(3) Register Box Rings and Lids: Register box rings and lids shall be made of a copper alloy containing not less than 57 percent copper, or all bronze, or an approved suitable synthetic polymer.

(4) Measuring Chambers: Measuring chambers shall be made of a copper alloy containing not less than 85 percent copper and suitable amounts of tin, lead, and zinc or of a suitable synthetic polymer.

(5) Discs: Discs shall be made of vulcanized hard rubber or a suitable synthetic polymer with specific gravity approximately equal to that of water. They shall have sufficient dimensional stability to retain operating clearances at working temperatures of up to +27 degrees Centigrade and not warp or deform when exposed to operating temperatures of +37 degrees Centigrade.

(6) Measuring Chamber Diaphragms: Measuring chamber diaphragms shall be made of phosphor bronze, stainless steel, hard rubber, or a suitable synthetic polymer.

(7) Spindles, Thrust Rollers, and Thrust-Roller Bearing Plates: Spindles, thrust rollers and thrust-roller bearing plates shall be made of phosphor bronze, stainless steel, hard rubber, or a suitable synthetic polymer.

(8) Intermediate Gear Trains: Frames, gears, and pinions shall be made of a suitable copper alloy, other suitable non-corrosive metals, or other suitable materials.

(9) External Fasteners (Casing Bolts, Studs, Nuts, Screws, and Washers): External fasteners shall be made of a copper alloy containing not less than 57 percent copper, stainless steel, or steel treated to resist corrosion by a process approved by the Government. Fasteners for no-pressure assemblies may be made of a suitable synthetic polymer. All external case closures, such as rings, clamps, screws, bolts, cap bolts, nuts and washers, shall be designed for easy removal following lengthy service.

(10) Water Meter Coupling - 5/8-Inch x 3/4-Inch: A water coupling shall be composed of one meter coupling nut, one meter coupling tail piece (straight), and one rubber-type washer for meter coupling. The meter coupling tailpiece and nut shall be a copper alloy containing not less than 57 percent copper. The coupling nut shall have internal straight pipe threads conforming to

ASME B1.20.1. Pitch diameter shall be that shown on **AWWA C700**. The coupling tailpiece shall have external taper pipe threads conforming to **ASME B1.20.1** and an internal diameter approximately equal to the nominal thread size of the tailpiece. Lengths and thread sizes shall be those listed in **AWWA C700**. One water meter coupling and one additional rubber-type washer for meter coupling (total of two rubber-type washers) shall be provided with each meter.

(11) Companion Flanges - **1-1/2-Inch** and **2-Inch**: Companion flanges shall be made of cast iron.

b. General Design

(1) Pressure Requirements: Meters supplied under this specification shall operate without leakage or damage to any part at a working pressure of 150 psi.

(2) Accessibility: All **1-1/2-inch** and **2-inch** meters shall be designed for easy removal of all interior parts without disturbing the connections to the pipeline.

c. Detail Design

(1) Cases: All meters shall have an outer case with separate, removable measuring chambers. Cases shall not be repaired in any manner. The inlet and outlet shall have a common axis. A meter case shall include the top case and bottom case, or main case and bottom plate, whichever is applicable. Connection flanges shall be parallel.

(2) Connections: Meter case connections for **5/8-inch x 3/4-inch** and **1-inch** meters shall be meter casing spuds on both ends. Spuds shall have external straight threads conforming to **ASME B1.20.1** as far as the specifications apply. Pitch diameters shall be those shown in **AWWA C700**. Main case connections for **1-1/2-inch** and **2-inch meters** shall be oval-flanged on both ends. Flanges shall be faced and drilled and shall be the oval type. The drilling shall be on a horizontal axis; the number of bolt holes and the diameters of the bolt holes and bolt circle shall be as listed in **AWWA C700**. Two oval companion flanges, gaskets, bolts and nuts shall be provided with each meter. Companion flanges shall be faced, drilled, and tapped in conformance with **ASME B1.20.1**. Dimensions shall be those listed in **AWWA C700**. Companion flanges shall be cast iron.

(3) Registers: Registers shall be straight-reading and shall read in 1000-gallon increments. The register shall be equipped with a center-sweep test hand with the test circle located on the periphery of the register and graduated in 100 equal parts, with each tenth graduation being numbered. Register construction shall conform to all applicable requirements of **AWWA C700**.

(4) Register Boxes: The lid shall be recessed and shall overlap the register box in order to protect the lens. The lens shall be held securely in place.

(5) Intermediate Gear Trains: Intermediate gear trains may be mounted on the measuring chamber, in the upper main casing, or when not exposed to water, combined with or adjacent to the register gearing.

(a) Oil-enclosed type - Gear trains exposed to water shall be of the oil-enclosed type, shall have a separate housing or form housing with the main casing or measuring chamber, and shall

operate in a suitable lubricant.

(b) Magnetic coupled drives - When intermediate gear trains are located in the water compartment of the meter, the revolutions of the train output spindles shall be transmitted to the registers by means of magnetic couplings through the meter cases. When the intermediate gear trains are located in the register compartments, the disc nutations shall be transmitted by magnetic couplings.

(6) Measuring Chambers: The measuring chambers shall be self-contained units, smoothly finished, firmly seated, and easily removed from the main cases, and shall not be cast as part of the main cases. The measuring chambers shall be so secured in the main cases that the accuracy of the meter will not be affected by any distortion of the cases that might occur when operating with a pressure less than 150 psi.

(7) Discs: Discs shall be smoothly finished, disc plated, whether flat or conical, shall be either reinforced or equipped with thrust rollers. Discs may be one piece or composed of a plate with two half balls. The disc spindles shall be fastened securely. The disc nutations shall not exceed the quantities listed in [AWWA C700](#).

(8) Strainers: All meters shall be provided with strainer screens installed in the meter. Strainer screens shall be rigid, fit snugly, be easy to remove, and have an effective straining area at least double that of the main case inlet.

(9) Seal Wire Holes: Register box screws and inlet and outlet coupling nuts, if provided, shall be drilled for seal wires. Seal wire holes shall not be less than $3/32$ inch in diameter.

(10) Registration Accuracy: Meters shall meet the following requirements for accuracy with water of a temperature of less than +27 degrees Centigrade.

(a) Normal Flow Limits - At any rate of flow within the normal test flow limits specified on [AWWA C700](#), the meter shall not register less than 98.5 percent and not more than 101.5 percent of the water that actually passes through it.

(b) Minimum Test Flow - At the minimum test flow rate specified in [AWWA C700](#), the meter shall not register less than 95 percent and not more than 101 percent of the water that actually passes through it.

(11) Markings: The size, model, and direction of flow through the meter shall be marked permanently on the outer case of all meters. All meters shall have the manufacturer's serial numbers stamped on the meter main case and top of the reading lid.

(12) Register Boxes: The name of the manufacturer shall be marked permanently on the lid of the register box. The serial number of the meter shall be imprinted on the lid and the main case.

2.1.1.2 Cold-Water Meters - Compound Type 2-Inch, 3-Inch, 4-Inch, and 6-Inch Size

Compound meters shall consist of a combination of a main-line meter of the turbine type for measuring high rates of flow and a meter of appropriate size for measuring low rates of flow. The compound meter shall have an automatic valve mechanism for diverting low rates of flow through the bypass meter. **Both metering devices with registers shall be contained in the same case.** The operating and physical characteristics shall conform to those specified within [AWWA C702](#).

a. Materials

(1) Cases: The main case of the meter shall be made of a copper alloy containing not less than 75 percent copper.

(2) Register Box Rings and Lids: Register box rings and lids shall be made of a cast copper alloy containing not less than 75 percent copper, forged or die-cast copper alloy containing not less than 57 percent copper or a suitable synthetic polymer.

(3) Measuring Cages or Chambers: Measuring cages or chambers shall be made of a copper alloy containing not less than 84 percent copper and suitable amounts of tin, lead, and zinc or of a suitable synthetic polymer.

(4) Measuring Turbines, Pistons and Discs: Turbines, pistons and discs shall be made of vulcanized hard rubber or a suitable synthetic polymer with specific gravity approximately equal to that of water. They shall have sufficient dimensional stability to retain operating clearances at working temperatures of up to +27 degrees Centigrade and not warp or deform when exposed to operating temperatures of +37 degrees Centigrade.

(5) Disc and Turbine Spindles: Measuring chamber spindles shall be made of phosphor bronze, stainless steel, ceramic, or suitable synthetic polymer.

(6) Intermediate Gear Trains: Frames, gears and pinions of intermediate gear trains exposed to water shall be made of copper alloy containing not less than 85 percent copper and suitable amounts of tin, lead, and zinc, or suitable synthetic polymer. When not exposed to water, intermediate gear trains may be made of a suitable synthetic polymer.

(7) External Fasteners (Casing Bolts, Studs, Nuts, Screws, and Washers): External fasteners shall be made of a copper alloy containing not less than 57 percent copper, stainless steel, or steel treated to resist corrosion by a process approved by the Government. Fasteners for no-pressure assemblies may be made of a suitable synthetic polymer. All external case closures, such as rings, clamps, screws, bolts, cap bolts, nuts and washers, shall be designed for easy removal following lengthy service.

(8) Companion Flanges: Companion flanges shall be made of cast iron.

(9) Automatic Valves: The valve weights shall be lead, or a copper alloy containing not less than 75 percent copper, or a copper alloy shell loaded with lead. The valve and supplemental hinge pins or spindles shall be a copper alloy containing not less than 75 percent copper, or stainless steel, and all valve and supplemental weight hinge bearings shall be bushed with hard rubber or bronze or other suitable bushing material. If the valve contains a clapper, it shall be faced with a removable semi-hard seat. Valve seats shall be made of a copper alloy containing not less than 75 percent copper and suitable amounts of tin, lead, and zinc.

b. General Design

(1) Pressure Requirements: Meters supplied under this specification shall operate without leakage or damage to any part at a working pressure of 150 psi.

(2) Accessibility: All compound meters shall be designed for easy removal of all interior parts without disturbing the connections to the pipeline.

(3) Registration Accuracy: Meters shall meet the following requirements for accuracy with water of a temperature of less than +27 degrees Centigrade.

(a) Normal Flow Limits - The meter shall not register less than 97 percent and not more than 103 percent of the water actually passed through it at any rate of flow within the normal test flow limits specified in [AWWA C702](#), except in the registration of flows within the changeover from bypass meter to main meter.

(b) Changeover Flow - The beginning of the changeover is when the accuracy of registration falls below 97 percent due to the operation of the automatic valve mechanism, and the end of changeover is when accuracy of registration again reaches 97 percent. The registration of these changeover rates of flow shall not be less than 90 percent and not more than 103 percent. The difference in the rate of flow at the beginning and at the end of the changeover shall not exceed the figures listed in [AWWA C702](#).

(c) Minimum Test Flow - There shall not be less than 95 percent of actual flow recorded when a test is made at the minimum test flow shown in [AWWA C702](#).

(4) Markings: The size, model, and direction of flow through the meter shall be cast or stamped in the outer case of all meters.

(a) Register Boxes - The name of the manufacturer shall be permanently impressed on the lid of the register box. The serial number of the meter shall be imprinted on the lid.

c. Detail Design

(1) Main Case: All meters shall have an outer case with separate, removable measuring chambers. Cases shall not be repaired in any manner. The inlet and outlet shall have a common axis. Connection flanges shall be parallel.

(2) External Case Screw, Bolts, Nuts and Washers: All external screws, bolts, cap bolts, nuts and washers shall be designed for easy removal after lengthy service.

(3) Main Case Connections: All main case connections shall be flanged. The bolt holes shall comply with [AWWA C702](#).

(a) 2-Inch Meters - The flanges for 2-inch meters shall be oval. The drilling of oval flanges shall be on the horizontal axis.

(b) Meters Larger than 2-Inch - The flanges for 3-inch, 4-inch, and 6-inch meters shall be the round type, faced and drilled, and shall conform to [ASME B16.1](#) for bronze pipe flange, Class 125.

(4) Companion Flanges: Companion flanges of the same size and type as the meter flanges shall be provided, and gaskets, nuts, and bolts shall be provided. Round companion flanges shall be faced, drilled, and tapped in accordance with [ASME B1.20.1](#) and shall conform to [ASME B16.1](#) for cast-iron pipe flange, Class 125. All companion flanges shall comply with [AWWA C702](#) for drilling, diameter, and thickness specifications.

(5) Tapped Bosses: All meters shall be provided with tapped bosses in the top of the case near the outlet for field testing purposes.

(6) Registers: Registers shall be straight reading and shall read in cubic feet (cu.ft.). Except for those instances when test conditions require the use of a different register, the register provided with the meter shall be the same register that was on the meter when it was tested for accuracy. The register lock and side gears shall be fastened securely to the number wheel discs and

hubs. The tumbler pins shall mesh accurately at the turnover points with the lock and side gears of the adjacent number wheels. Both main and pinion shafts shall be so secured in the register frame and/or register plates that they cannot get out of position. The pinion shaft shall be so designed that there is no possibility of its bending and allowing the pinion to skip the turnover point. The numerals on the number wheels shall not be less than $3/16$ inch in height and should be readable at a 45-degree angle from vertical. Registers that are hermetically sealed shall have gears and pinion which shall run free on fixed shafts or be fixed on shafts that run free in the register frame and/or register plates and shall be constructed so that they cannot be unmeshed. The registers shall have a center-sweep test hand with a test circle located on the periphery of the register and graduated in 100 equal parts, each tenth graduation numbered. The maximum quantity indicated by a single revolution of the test hand and the minimum capacity of the register shall be as listed in AWWA C702. The maximum indication on the test circle and the minimum register capacity of the bypass unit shall be in accordance with the approved AWWA Standard for the type of meter used as the bypass unit.

(a) Coordinator Registers - The meter may be equipped with a coordinator so that the readings of both sections can record on a single register. The register construction shall conform to previously mentioned requirements, and the maximum quantity indicated by a single revolution of the test hand and the minimum capacity of the register shall conform to AWWA C702.

(7) Register Boxes: The lid shall be recessed and shall overlap the register box to protect the lens.

(8) Intermediate Gear Trains: Intermediate gear trains may be mounted on the measuring chamber or cage or in the main casings. When not exposed to water, they may also be combined with or adjacent to the register gearing. Gear trains exposed to water shall be the oil-enclosed type, shall have separate housings or shall form housings with the main casings or measuring chambers, and shall operate in a suitable lubricant. Gear trains made of non-corrosive metals or synthetic polymers may be exposed to water.

(9) Measuring Chambers or Cages: The main-line section chambers or cages shall be self-contained units firmly seated and easily detached and removed from the main case. Chambers or cages with turbines that have revolving spindles shall have removable bearings for such spindles. Chambers or cages with stationary spindles on which the turbines revolve shall provide rigid, centrally located fastenings for the spindles. The spindles shall be removable. The main-line section chambers or cages shall be interchangeable in all meters of the same size, make, and model.

(a) Bypass Chamber - The bypass chamber shall be a type covered by an approved AWWA Standard. The chamber shall be a self-contained unit, firmly seated and easily removed from the case, and shall not be cast as part of the outer case. The chamber shall be secured in position in the outer case so that any slight distortion of the case which might occur under 150 psi pressure will not affect the accuracy of the meter.

(10) Measuring Turbines and Discs: Measuring turbines that have

revolving spindles shall rotate on spindles supported by bushings or replaceable bearings. Turbines that rotate on stationary spindles shall also have bushings or replaceable bearings. The plates of disc pistons, whether flat or conical, shall have metal reinforcements or shall be equipped with thrust rollers.

(11) Magnetic Coupled Drives: When intermediate gear trains are located in the water compartment of the main or bypass section of the meter, the revolutions of the train output spindles shall be transmitted to the registers by means of magnetic couplings through the meter case. When intermediate gear trains are located in the register compartments, the revolutions shall be transmitted by magnetic coupling.

(12) Automatic Valves: The automatic valve shall be of a type suitable for such purpose. It shall close by force. The weight of the valve and any supplemental force imposed on it shall offer sufficient resistance to the incoming water to divert all small rates of flow through the bypass meter until such time as the rate of flow through the meter is great enough to ensure efficient operation of the main measuring section. Valve hinge pins or spindles shall be bushed. Valve sets shall be bronze or other corrosion-resistant material, shall have a satisfactory width of face, and shall be held firmly in place. A clapper or swing-type valve shall be provided with a removable semi-hard seat.

(13) Bypass Meter: The physical and operating characteristics and dimensions of the bypass meter shall be in accordance with the approved AWWA Standard for the type of meter used as the bypass.

(14) Strainers: Strainers, if provided, shall be rigid, shall be easily removed and shall have an effective straining area at least double that of the water main-case inlet.

(15) Seal Wire Holes: Register box screws shall be drilled for seal wires. Seal wire holes shall be not less than 3/32 inch in diameter.

2.1.1.3 Cold-Water Meter - Turbine Type 2-Inch Size

Turbine meters provided hereunder shall be Class II, in-line, horizontal-axis, high-velocity type and shall fully conform to the requirements of AWWA C701, except as otherwise specified herein. The 2-inch turbine meter shall have oval flanged ends and shall be supplied with one companion flange, gaskets, and with bolts and nuts as specified herein.

a. Materials

(1) Cases: All turbine main cases shall be bronze. No exceptions will be allowed.

(2) Register Box Rings and Lids: Register box rings and lids shall be made of a cast copper alloy containing not less than 75 percent copper, forged or die-cast copper alloy containing not less than 57 percent copper or a suitable synthetic polymer.

(3) Measuring Cages or Chambers: Measuring cages or chambers shall be made of a copper alloy containing not less than 84 percent copper and suitable amounts of tin, lead, and zinc or of a suitable synthetic polymer.

(4) Measuring Turbines, Pistons and Discs: Turbines, pistons and discs shall be made of vulcanized hard rubber or a suitable synthetic polymer with specific gravity approximately equal to that of water. They shall have sufficient dimensional stability to retain operating clearances at working temperatures of up to +27 degrees

Centigrade and not warp or deform when exposed to operating temperatures of +37 degrees Centigrade.

(5) Disc and Turbine Spindles: Measuring chamber spindles shall be made of phosphor bronze, stainless steel, ceramic, or suitable synthetic polymer.

(6) Intermediate Gear Trains: Frames, gears and pinions of intermediate gear trains exposed to water shall be made of copper alloy containing not less than 85 percent copper and suitable amounts of tin, lead, and zinc, or suitable synthetic polymer. When not exposed to water, intermediate gear trains may be made of a suitable synthetic polymer.

(7) External Fasteners: (casing bolts, studs, nuts, screws, and washers). External fasteners shall be made of a copper alloy containing not less than 57 percent copper, stainless steel, or steel treated to resist corrosion by a process to be approved by the Government. Fasteners for no-pressure assemblies may be made of a suitable synthetic polymer. All external case closures, such as rings, clamps, screws, bolts, cap bolts, nuts and washers, shall be designed for easy removal following lengthy service.

(8) Companion Flanges: Companion flanges shall be made of cast iron.

b. General Design

(1) Pressure Requirements: Meters supplied under this specification shall operate without leakage or damage to any part at a working pressure of 150 psi. Pressure drop through turbine meters and strainers, when operated within specified normal flow limits, shall not exceed the characteristics outlined in [AWWA C701](#).

(2) Accessibility: All turbine meters shall be designed for easy removal of all interior parts without disturbing the connections to the pipeline. Turbine meters shall have readily accessible change gears, adjustable vanes or other approved means to adjust meter registration. Such adjustment feature shall be an integral part of the removable rotor/register assembly and not of the main or bottom case of the meter.

(3) Registration Accuracy: Meters shall meet the following requirements for accuracy with water of a temperature of less than +27 degrees Centigrade.

(a) Normal Flow Limits - The meter shall not register less than 97 percent and not more than 103 percent of the water actually passed through it at any rate of flow within the normal test flow limits specified in [AWWA C702](#), except in the registration of flows within the changeover from bypass meter to main meter. Turbine meters shall be designed to allow prolonged operation at or near the upper limit of the specified normal flow range without premature degradation of registration accuracy or other evidence of undue wear. Meters shall also be capable of accepting sudden increases in flow at high rates of flow without decoupling the register.

2.1.1.4 Cold-Water Meter Strainers 2-Inch, 3-Inch, 4-Inch and 6-Inch Size
 General: All strainers provided shall have top access. Cases for 2-inch, 3-inch, 4-inch and 6-inch strainers shall be bronze. Strainer plates for all sizes shall be 18-8 stainless steel or bronze. All strainers shall conform to [AWWA C702](#).

NOTE: SeBiLOY is an acceptable substitute for bronze.

NOTE: If programming capability is not required,

omit the following section.

2.1.2 Meter Programming

- a. Meter shall be programmable by software supplied by the meter manufacturer.
- b. Software shall have a user-friendly, Windows-compatible interface.
- c. Software shall operate on [Windows, [____]] operating systems.
- d. Software shall allow the user to configure the meter, troubleshoot the meter, query and display meter parameters and configuration data and stored values.
- e. Meter firmware shall be upgradeable through one of the communications ports without removing the unit from service.

NOTE: The following optional features will usually be deleted. These features could be used for connection to an Energy Management and Control System (EMCS).

- f. [Meter shall include output options for analog milliamp signals.]
- g. [Meter shall have two channels of analog output, 0-1mA or 4-20mA, for positive [and negative] watt/hour readings.]
- h. [Meter shall have two form C, dry contact relay outputs for alarm or control.]

2.1.3 [Register Requirements for Remote Registration

- a. Meters must have encoder-type remote-registration conforming to the latest version of **AWWA C707**. Registers using generator pulses or low voltage conversions are not permitted. Power requirement for data transmission must be supplied by an interrogation device. Registers must be compatible with various brands of interrogation equipment. The register must provide at least six-digit visual registration at the meter. The units, the month and year of manufacture, and other identification information must clearly be printed on the face of the register. The register must also have a full test sweep hand or dial. The register must, in a digital format, simultaneously encode at least six significant digits of the meter reading for transmission through the remotely located receptacle. A meter identification number must also be provided with each reading.
- b. All registers shall be easily upgraded to Automatic Meter Reading (AMR), which includes telephone, radio, cable, Energy Management and Control System (EMCS), Direct Digital Control (DDC), and Supervisory, Control and Data Acquisition (SCADA), with the substitution of the remote receptacle with a Meter Interface Unit (MIU). Data transmission shall be instantaneous and supplied in ASCII format without conversion or modification. The register must operate reliably down to at least 3.0 volts. Color-coded wire terminals (red, green and black) shall be provided; however, only the red and black terminals will be utilized for a two-wire connection to the interface ScanPad. The green terminal shall only be utilized to convert to AMR via the use of a MIU. A suitable wire terminal cover shall be provided and be factory potted when ordered for underground pit installations.
- c. All registers must be removable without disassembly of the meter or depressurizing the service line. The register must be free of openings to protect the internal electronics of the register. Lens covers shall be made of polycarbonate or other suitable engineering polymer for

indoor installations and mineral glass for underground pit installations. All other register assembly and material requirements stated herein shall also apply.]

2.2 COMMUNICATIONS

NOTE: Communications features may not be needed.

Data logging of one month of data may be recorded inside the meter. Recorded data may be read simply by a handheld instrument if read daily or monthly.

2.2.1 Communications Methods

a. Optical Port

The optical port shall communicate with a hand-held reading device according to the following requirements.

(1) Communications standards

(a) ANSI C12.18

(b) MV90 protocol

(2) Read operations

(a) Current values

(b) Values since last reset

(c) Last reset value

(d) Meter status

(e) [Load profile]

(3) Write operations

(a) Meter setup

b. Serial Port

Provide a serial port for connection to the modem module where required in this specification.

(1) [On-board serial port types]

(a) [RS232]

(b) [RS485]

c. Ethernet

For those meters using the Ethernet, logged information shall be sent using open standard Internet protocols.

(1) On-board Ethernet port support

(a) HTTP

(b) SMTP

(c) Modbus

(2) Distribute stored data by:

(a) FTP

(b) [E-mail]

(3) [On-board web server]

2.2.2 Communications Protocols and Methods

Communications protocols and methods shall be native to the meter. Provide **communications modules** as required to accomplish the following.

a. Meter shall include an IR port ("IR" in Metering Systems Schedule) (for communication to external devices such as handheld readers) that supports a minimum speed of 9600 baud.

b. [Meter shall include [one] [RS-232 ("RS232" in Metering Systems Schedule)] or [one][RS-485 ("RS485" in Metering Systems Schedule)] digital communication port. Each port shall be user-configurable with regard to speed, protocol, address, and other communications parameters. Ports shall support a minimum communication speed of 9600 baud for the RS232 port.]

c. [Meter shall have a port that can be configured as a [10/100 Base-T Ethernet port ("BaseT" in Metering Systems Schedule)].]

(1) [A communication module that converts serial RS232 or RS485 to Ethernet will be acceptable.]

d. [Auto Answer minimum 1200 baud internal modem ("A56K" in Metering Systems Schedule). Internal modems shall include automatic data buffering to provide faster, more reliable communications and the ability to automatically answer on a connected line.]

e. [Meter shall be equipped with one pulse output channel ("Pulse" in Metering Systems Schedule) that can be configured for operation as KYZ pulse output.]

2.2.3 Communications Channels Surge Protection

Communications equipment shall be protected against surges induced on its communications channels. Communication interfaces to all field equipment shall be protected to meet the requirements of IEEE C37.90.1 or the requirements of IEC 61000-4-5, test level 4, while the equipment is operating. Fuses shall not be used for surge protection. Metallic cables and conductors which serve as communications channels between buildings shall have surge protection installed at equipment rated for the application installed at each end, within three feet of the building cable entrance. Surge protectors shall meet the requirements of the applicable extension of ANSI C62 (for example, ANSI C62.61).

NOTE: Communication methods, modules and software can be used for Automatic Meter Reading (AMR). AMR may not be needed. If AMR is to be implemented, considerable coordination of the communications sending, receiving and protocols will be required.

2.3 METER DATA PROTOCOL

Power meters shall have communicating data protocols native or provided in supplemental modules to communicate with the communications methods that follow.

2.3.1 Open Protocol

NOTE: This section should be modified to be facility-specific.

The Contractor shall verify that the meter native protocol is consistent with the facility data recording and communication and data storage system. The Contractor shall provide additional converters and modules as required for a complete measurement, recording, communicating and data storage system.

- a. [Meter shall be fully supported by MV-90 software system] or existing AMR software that is MV-90 compatible.
 - b. For systems that use proprietary software, an alternative, competitive software system must be available.
- Systems capable of using more than one brand of commercially available meters are expected. In addition, if proprietary meter reading software is used, meters are to be capable of being read by more than one manufacturer's software.

2.4 SPARE PARTS

2.4.1 Parts List

Provide spare parts as follows:

- a. **Water meters** - one for every 20 installed.
- b. **Communications modules** - one for every 20 used.
- c. **Protocol modules** - one for every 20 used.
- d. Other electronic and power components - one for each type used.

2.5 METERING SYSTEM SCHEDULE

NOTE: Each building should be listed on a separate row. Identify the characteristics for the specific meter and communications method for each building. The following completed data is an example only. Delete existing values.

METERING SYSTEM SCHEDULE

1 2 3 4 5

Bldg # Type of Meter Communication Meter

Location

Remarks

101 1"

displacement

IR RS232 Bldg Small building.

Consumption

reimbursable

billing only.

102 2" turbine BaseT, 56K Bldg Interval

recording

103 3/4"

displacement

Local Bldg

Metering System Schedule Notes by column position:

NOTE: Provide a drawing to show locations and details for mounting and routing conduit and wires.

PART 3 EXECUTION

3.1 INSTALLATION

Water meter installations shall conform to **AWWA C700**, **AWWA C701** and **AWWA C702**. Electrical installations shall conform to **IEEE C2**, **NFPA 70** (National Electrical Code), and to the requirements specified herein. Provide new equipment and materials unless otherwise indicated or specified.

NOTE: Remove the following section if existing condition surveys are not required.

3.1.1 [Existing Condition Survey

The Contractor shall perform a field survey, including inspection of all existing equipment, resulting clearances, and new equipment locations intended to be incorporated into the system, and provide an existing conditions report to the Government. The report shall identify those items that are non-workable as defined in the contract documents. The Contractor shall be held responsible for repairs or modifications necessary to make the system perform as required.]

NOTE: Installation of water meters will require that water service be disconnected from the building. Provide coordination steps for the work

and require the Contractor to perform the work after normal hours if disconnected service will impact mission requirements for that facility.

3.1.2 Scheduling of Work and Outages

The Contract clauses shall govern regarding permission for water/power outages, scheduling of work, coordination with Government personnel, and special working conditions.

3.2 [FIELD-APPLIED PAINTING

Where field painting of enclosures is required to correct damage to the manufacturer's factory-applied coatings, provide the manufacturer's recommended coatings and apply in accordance with the manufacturer's instructions.]

3.3 FIELD QUALITY CONTROL

3.3.1 Performance of Acceptance Checks and Tests

a. Meter Assembly

(1) Visual and mechanical inspection

(a) Compare equipment nameplate data with specification and approved shop drawings.

(b) Inspect physical and mechanical condition.

(c) Verify grounding of metering enclosure, if required.

(d) Verify the presence of surge arresters.

(2) Electrical tests

(a) Verify that correct multiplier has been placed on face or meter, where applicable.

(b) Prior to system acceptance, the Contractor will demonstrate and confirm the meter is properly wired and is displaying correct and accurate water information.

3.3.2 Follow-up Verification

Upon completion of **acceptance checks and tests**, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the Contract, the Contracting Officer shall be given five working days' advance notice of the dates and times of checking and testing.

3.3.3 Training

The Contractor shall conduct a training course for meter configuration, operation, and maintenance of the system as specified. The training shall be oriented for all components and systems installed under this Contract. Training manuals shall be delivered for [_____] trainees with two additional copies delivered for archiving at the project site. The Contractor shall provide all audiovisual equipment and all other training materials and supplies. A training day is defined as eight hours of classroom instruction, including two 15-minute breaks and excluding lunchtime, Monday through Friday, during the daytime shift in effect at the training facility. For guidance in planning the required instruction, the Contractor shall assume that attendees have a high school education or equivalent, and are familiar with utility systems. Approval of the planned training schedule shall be obtained from the Government at least 30 days prior to the training.

a. Training

The course shall be taught at the project site within 30 days after completion of the installation for a period of one [_____] day(s). A maximum of [6] [_____] personnel will attend the course. The training shall

include:

- (1) Physical layout of each piece of hardware.
- (2) Meter configuration, troubleshooting and diagnostics procedures.
- (3) Repair instructions.
- (4) Preventive maintenance procedures and schedules.
- (5) Testing and calibration procedures.

-- End of Section --



DIVISION 33 – UTILITIES
SECTION 335113.00 30 - GAS METERS
FAIRCHILD SPECIFICATION

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- End of Section Table of Contents --

SECTION 33 51 13.00 30

NATURAL-GAS METERING

NOTE: This specification covers the requirements for gas meters, regulators, piping to accommodate new meters, and provisions for automated meter reading.

Edit this guide specification for project-specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

PART 1 GENERAL

NOTE: This guide specification is intended for use when specifying steel piping in nominal pipe size at pressures and other conditions governed by ASME B31.8, "Gas Transmission and Distribution Piping Systems," and aboveground steel piping both outside (up to 1.50 meters (5 feet) beyond exterior walls) and within buildings in compliance with NFPA 54, "National Fuel Gas Code."

Show the following information on the project drawings:

- 1. Layout and location of piping.
- 2. Location of appurtenances, valves, etc.
- 3. Details of method of mounting piping.
- 4. Capacity of pressure regulators.

1.1 RELATED REQUIREMENTS

Section 23 03 00.00 20 BASIC MECHANICAL MATERIALS AND METHODS applies to this section, with additions and modifications specified herein.

1.2 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN GAS ASSOCIATION (AGA)

AGA ANSI B109.1 (2000) Diaphragm-Type Gas Displacement Meters (Under 500 cubic ft./hour Capacity)

AGA ANSI B109.2 (2000) Diaphragm-Type Gas Displacement Meters (500 cubic ft./hour Capacity and Over)

AGA ANSI B109.3 (2000) Rotary-Type Gas Displacement Meters

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ANSI/ASCE/SEI 25 (2006; R 2008) Earthquake-Activated Automatic Gas Shutoff Devices

ASME INTERNATIONAL (ASME)

ASME B1.1 (2003; R 2008) Unified Inch Screw Threads (UN and UNR Thread Form)

ASME B1.20.1 (1983; R 2006) Pipe Threads, General Purpose (Inch)

ASME B16.11 (2009) Forged Fittings, Socket-Welding and Threaded

ASME B16.3 (2006) Malleable Iron Threaded Fittings, Classes 150 and 300

ASME B16.33 (2002; R 2007) Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 psi, Sizes NPS 1/2 - NPS 2

ASME B16.38 (2007) Large Metallic Valves for Gas Distribution (Manually Operated, NPS 2 1/2 to 12, 125 psig Maximum)

ASME B16.39 (2009) Standard for Malleable Iron Threaded Pipe Unions; Classes 150, 250, and 300

ASME B16.5 (2009) Standard for Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24

ASME B16.9 (2007) Standard for Factory-Made Wrought Steel Buttwelding Fittings

ASME B18.2.1 (1996; R 2005) Square and Hex Bolts and Screws (Inch Series)

ASME B18.2.2 (1987; R 2005) Standard for Square and Hex Nuts

ASME B31.8 (2007) Gas Transmission and Distribution Piping Systems

ASME BPVC SEC VIII D1 (2007; Addenda 2008; Addenda 2009) Boiler and Pressure Vessel Code; Section VIII, Rules for Construction of Pressure Vessels Division 1

ASTM INTERNATIONAL (ASTM)

ASTM A 193/A 193M (2009) Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service

ASTM A 194/A 194M (2009) Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both

ASTM A 53/A 53M (2007) Standard Specification for Pipe,

Steel, Black and Hot-Dipped, Zinc-Coated,
 Welded and Seamless
 MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS
 INDUSTRY (MSS)
 MSS SP-58 (2009) Pipe Hangers and Supports -
 Materials, Design and Manufacture,
 Selection, Application, and Installation
 MSS SP-69 (2003) Pipe Hangers and Supports -
 Selection and Application (ANSI Approved
 American National Standard)
 MSS SP-89 (2003) Pipe Hangers and Supports -
 Fabrication and Installation Practices
 MASTER PAINTERS INSTITUTE (MPI)
 MPI 9 (Oct 2009) Exterior Alkyd, Gloss, MPI
 Gloss Level 6
 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
 NFPA 54 (2009) National Fuel Gas Code
 SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION
 (SMACNA)
 SMACNA 1650 (1998) Seismic Restraint Manual Guidelines
 for Mechanical Systems, 2nd Edition
 THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)
 SSPC Paint 25 (1997; E 2004) Zinc Oxide, Alkyd, Linseed
 Oil Primer for Use Over Hand Cleaned
 Steel, Type I and Type II
 SSPC SP 1 (1982; E 2004) Solvent Cleaning
 SSPC SP 3 (1982; E 2004) Power Tool Cleaning
 SSPC SP 7/NACE No.4 (2007) Brush-Off Blast Cleaning
 U.S. DEPARTMENT OF DEFENSE (DOD)
 MIL-STD-101 (1970; Rev B) Color Code for Pipelines &
 for Compressed Gas Cylinders
 U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
 49 CFR 192 Transportation of Natural and Other Gas by
 Pipeline: Minimum Federal Safety Standards
 49 CFR 195 Transportation of Hazardous Liquids by
 Pipeline

1.3 SUBMITTALS

**NOTE: Review submittal description (SD) definitions
 in Section 01 33 00 SUBMITTAL PROCEDURES and edit
 the following list to reflect only the submittals
 required for the project. Submittals should be kept
 to the minimum required for adequate quality control.
 A "G" following a submittal item indicates that the
 submittal requires Government approval. Some
 submittals are already marked with a "G". Only
 delete an existing "G" if the submittal item is not
 complex and can be reviewed through the Contractor's
 Quality Control system. Only add a "G" if the
 submittal is sufficiently important or complex in
 context of the project.
 For submittals requiring Government approval on Army
 projects, a code of up to three characters within
 the submittal tags may be used following the "G"**

designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects. Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

- SD-03 Product Data
 - Pressure regulator[; G][; G, [_____]]
 - Valves
 - Risers
 - Transition fittings
 - Gas meter[; G][; G, [_____]]
- SD-07 Certificates
 - Welder's qualifications
 - Welder's identification symbols

1.4 QUALITY ASSURANCE

1.4.1 Welder's Qualifications

Comply with ASME B31.8. The steel welder shall have a copy of a certified ASME B31.8 qualification test report. Submit each welder's identification symbols, assigned number, or letter, used to identify work of the welder. Affix symbols immediately upon completion of welds. Welders making defective welds after passing a qualification test shall be given a requalification test and, upon failing to pass this test, shall not be permitted to work this contract.

1.4.2 Safety Standards

Conform to 49 CFR 192 [and 49 CFR 195].

1.5 DELIVERY, STORAGE, AND HANDLING

Handle, transport, and store pipe and fittings carefully. Plug or cap pipe ends during transportation or storage to minimize dirt and moisture entry. Do not subject to abrasion or concentrated external loads.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Conform to NFPA 54 and with requirements specified herein.

2.2 PIPE AND FITTINGS

2.2.1 Aboveground and Within Buildings and Vaults

NOTE: For steam electric generation stations, industrial and institutional plants, and central heating plants, use Schedule 80 black steel piping in accordance with ANSI B31.1 for threaded joints.

- a. Pipe: Black steel in accordance with **ASTM A 53/A 53M**, Schedule [40] [80], threaded ends for sizes **50 mm 2 inches** and smaller; otherwise, plain end beveled for butt welding.
- b. Threaded Fittings: **ASME B16.3**, black malleable iron.
- c. Socket-Welding Fittings: **ASME B16.11**, forged steel.
- d. Butt-Welding Fittings: **ASME B16.9**, with backing rings of compatible material.
- e. Unions: **ASME B16.39**, black malleable iron. Provide dielectric unions where cathodic protection is provided on steel gas mains and/or service lines.
- f. Flanges and Flanged Fittings: **ASME B16.5** steel flanges or convoluted steel flanges conforming to **ASME BPVC SEC VIII D1**. Flange faces shall have integral grooves of rectangular cross-sections which afford containment for self-energizing gasket material.

2.2.2 **Risers**

Manufacturer's standard riser, transition from plastic to steel pipe with **0.18 to 0.30 mm 7 to 12 mil** thick epoxy coating. Use swaged gas-tight construction with O-ring seals, metal insert, and protective sleeve. Provide [remote bolt-on or bracket] [or] [wall-mounted] riser supports [as indicated].

2.2.3 **Transition Fittings**

NOTE: Choose the applicable options from the following.

[a. Steel to Plastic (PE): As specified for "riser" except designed for steel-to-plastic with tapping tee or sleeve. Coat or wrap exposed steel pipe with heavy plastic coating.]

[b. Plastic to Plastic: [Manufacturer's standard bolt-on (PVC to PE) plastic tapping saddle tee, UL listed for gas service, rated for **690 kPa (gage) 100 psig**, and O-ring seals.] [Manufacturer's standard slip-on PE mechanical coupling, molded, with stainless-steel ring support, O-ring seals, and rated for **1035 kPa (gage) 150 psig** gas service.] [Manufacturer's standard fused tapping (PE-to-PE) tee assembly with shut-off feature.]]

2.3 **VALVES**, ABOVEGROUND

[Provide lockable valves where indicated.]

2.3.1 **Shutoff Valves, Sizes Larger Than 50 mm 2 Inches**

NOTE: Choose one of the options below.

Do not use cast-iron material for valve body or gas-meter body in seismic zones 3 and 4.

[[Cast-iron] [or] [steel] body ball valve with flanged ends in accordance with **ASME B16.38**. Provide PTFE seats.] [Cast-iron body plug valve in accordance with **ASME B16.38**, nonlubricated, wedge-mechanism or tapered lift plug, and flanged ends.]

2.3.2 **Shutoff Valves, Sizes 50 mm 2 Inches and Smaller**

NOTE: Choose one of the options below.

[[Bronze] [Steel] body ball valve in accordance with **ASME B16.33**, full port pattern, reinforced PTFE seals, threaded ends, and PTFE seat.] [[Bronze] [Steel] body plug valve in accordance with **ASME B16.33**, straightway, taper

plug, regular pattern with a port opening at least equal to the internal pipe area or round port full bore pattern, non-lubricated, PTFE packing, flat or square head stem with lever operator, 860 kPa (gage) 125 psig rating, threaded ends.]

2.3.3 Pressure Regulator

Self-contained with spring-loaded diaphragm pressure regulator, kPa to mm psig to inches water reduction, pressure operating range as required for the pressure reduction indicated, volume capacity not less than indicated, and threaded ends for sizes 50 mm 2 inches and smaller, otherwise flanged.

2.3.4 Earthquake Automatic Gas Shutoff Valves

NOTE: Provide this earthquake protective feature primarily for seismic zones 3 and 4.

 ANSI/ASCE/SEI 25 and UL listed or AGA listed or International Association of Plumbing and Mechanical Officials (IAPMO) listed. The valve may be either pendulum or ball construction with [remote [, pneumatic] [electronic] [or] [electric]] actuator.

2.4 GAS METER

NOTE: Do not use cast-iron material for valve body or gas-meter body in seismic zones 3 and 4.

 [AGA ANSI B109.1] [AGA ANSI B109.2] [AGA ANSI B109.3] [pipe] [pedestal] mounted, [diaphragm] or [bellow] [style], [cast-iron] [enamel-coated steel] [aluminum] case. Provide combined [odometer-type] register totalizer index, UV-resistant index cover, water escape hole in housing, and means for sealing against tampering. Meter shall be temperature-compensated type and sized for the required CFM [BTU/HR] flow rate. Provide meters with a pulse switch initiator capable of operating up to speeds of 500 maximum pulses per minute with no false pulses and requiring no field adjustments. Provide not less than one pulse per 2.83 cubic meters 100 cubic feet) of gas. Minimum service life shall be 30,000,000 cycles.

2.4.1 Energy Monitoring and Control (EMCS) or Automatic Meter Reading Interfaces

NOTE: Where an Installation-wide Energy Monitoring and Control System exists, provide EMCS manufacturer compatible remote monitoring, meter reading and data collection. Designer should verify EMCS compatibility with specific gas meter manufacturer to ensure accurate transmission of data as generated. Of particular note is if there are "pre-divide" parameters associated with the meter that reflects the actual volume measurement and the meter cam settings.

Designer will have to edit this paragraph to include specific requirements for the EMCS or for an automated meter reading system. Since there are several protocols and proprietary systems, meter data capture and transmission are unique to each project and Installation. Typically there are data loggers and remote reporting units that may use communication protocols and transmission such as a

local LAN, hardware, or radio frequencies. Specifications for the communication protocol should be listed here or included in a separate specification.

Gas meters shall be capable of interfacing (output signal equivalent to flow rate) with the existing Energy Management Control System (EMCS) for data gathering in units of CFM. Meters shall not require power to function and deliver data. Output signal shall be either a voltage or amperage signal with can be converted to a flow rate specification.

2.5 HANGERS AND SUPPORTS

MSS SP-58, as required by MSS SP-69.

2.6 WELDING FILLER METAL

ASME B31.8.

2.7 PIPE-THREAD TAPE

Antiseize and sealant tape of polytetrafluoroethylene (PTFE).

2.8 BOLTING (BOLTS AND NUTS)

Stainless steel bolting; ASTM A 193/A 193M, Grade B8M or B8MA, Type 316, for bolts; and ASTM A 194/A 194M, Grade 8M, Type 316, for nuts. Dimensions of bolts, studs, and nuts shall conform with ASME B18.2.1 and ASME B18.2.2 with coarse threads conforming to ASME B1.1, with Class 2A fit for bolts and studs and Class 2B fit for nuts. Bolts or bolt-studs shall extend through the nuts and may have reduced shanks of a diameter not less than the diameter at root of threads. Bolts shall have American Standard regular square or heavy hexagon heads; nuts shall be American Standard heavy semifinished hexagonal.

2.9 GASKETS

Fluorinated elastomer, compatible with flange faces.

2.10 IDENTIFICATION FOR ABOVEGROUND PIPING (INTERIOR)

MIL-STD-101 for legends and type and size of characters. For pipes 19 mm 3/4 inch OD and larger, provide printed legends to identify contents of pipes and arrows to show direction of flow. Color code label backgrounds to signify levels of hazard. Make labels of plastic sheet with pressure-sensitive adhesive suitable for the intended application. For pipes smaller than 19 mm 3/4 inch OD, provide brass identification tags 40 mm 1-1/2 inches in diameter with legends in depressed black-filled characters.

PART 3 EXECUTION

3.1 INSTALLATION

NOTE: To assist the designer in selecting the proper documents for a specific project, the following scope in accordance with documents is provided:

1. NFPA 54 Scope: "1.1.1 Applicability: Coverage of piping systems extends from the point of delivery to the connections with each gas utilization device. For other than indicated liquefied petroleum gas systems, the point of delivery is the outlet of the service meter assembly, or the outlet of the service regulator."

2. ASME B31.8 Scope: "802.11. This code covers the design, fabrication, installation, inspection, testing and safety aspects of operation and

maintenance of gas transmission and distribution systems, including gas pipelines, gas compressor stations, gas metering and regulation stations, gas mains, and service lines up to the outlet of the customer's meter set assembly 802.14. This code does not apply to (c) piping beyond the outlet of the customers meter set assembly."

Install gas piping, appliances, and equipment in accordance with NFPA 54.
[Install distribution piping in accordance with ASME B31.8.]

3.1.1 Meters

Meters shall be installed in accordance with [AGA ANSI B109.1] [AGA ANSI B109.2] [AGA ANSI B109.3]

3.1.2 Piping

Cut pipe to actual dimensions and assemble to prevent residual stress.
[Provide supply connections entering the buildings as indicated.] Within buildings, run piping parallel to structure lines and conceal in finished spaces. Terminate each vertical supply pipe to burner or appliance with tee, nipple and cap to form a sediment trap. To supply multiple items of gas-burning equipment, provide manifold with inlet connections at both ends.

3.1.2.1 Cleanliness

Clean inside of pipe and fittings before installation. Blow lines clear using 550 to 690 kPa (gage) 80 to 100 psig clean, dry compressed air. Rap steel lines sharply along entire pipe length before blowing clear. Cap or plug pipe ends to maintain cleanliness throughout installation.

3.1.2.2 Aboveground Steel Piping

Determine and establish measurements for piping at the job site and accurately cut pipe lengths accordingly. For 50 mm 2 inch diameter and smaller, use threaded or socket-welded joints. For 65 mm 2-1/2 inch diameter and larger, use flanged or butt-welded joints.

a. Threaded Joints: Where possible, use pipe with factory-cut threads; otherwise cut pipe ends square, remove fins and burrs, and cut taper pipe threads in accordance with ASME B1.20.1. Provide threads smooth, clean, and full-cut. Apply anti-seize paste or tape to male threads portion. Work piping into place without springing or forcing. Backing off to permit alignment of threaded joints will not be permitted. Engage threads so that not more than three threads remain exposed. Use unions for connections to [valves] [meters] for which a means of disconnection is not otherwise provided.

b. Welded Joints: Weld by the shielded metal-arc process, using covered electrodes and in accordance with procedures established and qualified in accordance with ASME B31.8.

c. Flanged Joints: Use flanged joints for connecting welded joint pipe and fittings to valves to provide for disconnection. Install joints so that flange faces bear uniformly on gaskets. Engage bolts so that there is complete threading through the nuts and tighten so that bolts are uniformly stressed and equally torqued.

d. Pipe Size Changes: Use reducing fittings for changes in pipe size. Size changes made with bushings will not be accepted.

e. Painting: Paint new ferrous metal piping, including supports, in accordance with Section 09 90 00 PAINTS AND COATINGS. Do not apply paint until piping tests have been completed.

f. Identification of Interior Piping: Identify interior piping aboveground in accordance with MIL-STD-101, using adhesive-backed or

snap-on plastic labels and arrows. In lieu of labels, identification tags may be used. Apply labels or tags to finished paint at intervals of not more than 15 meters 50 feet). Provide two copies of the piping identification code framed under glass and install where directed.

3.1.2.3 Wrapping

Where connection to existing steel line is made underground, tape wrap new steel transition fittings and exposed existing pipe having damaged coating. Clean pipe to bare metal. Initially stretch first layer of tape to conform to the surface while spirally half-lapping. Apply a second layer, half-lapped and spiraled as the first layer, but with spirals perpendicular to first wrapping. Use 0.025 mm 10 mil minimum thick polyethylene tape. In lieu of tape wrap, heat shrinkable 0.025 mm 10 mil) minimum thick polyethylene sleeve may be used.

3.1.3 Regulators and Valves

3.1.3.1 Pressure Regulator

Provide [plug cock] [or] [ball valve] ahead of regulator. [Install regulator outside of building and 450 mm 18 inches aboveground on riser.] [Install regulator inside building and extend a full-size vent line from relief outlet on regulator to a point outside of building.] [Install gas meter in conjunction with pressure regulator]. On outlet side of [regulator] [meter], provide a union and a 10 mm 3/8 inch gage tap with plug.

3.1.3.2 Stop Valve and Shutoff Valve

Provide stop valve on service branch at connection to main and shut-off valve on riser outside of building.

3.1.4 Pipe Sleeves

[Comply with Section 07 84 00 FIRESTOPPING.] Where piping penetrates concrete or masonry wall, floor, or firewall, provide pipe sleeve poured or grouted in place. Make sleeve of steel or cast-iron pipe of such size to provide 6 mm 1/4 inch) or more annular clearance around pipe. Extend sleeve through wall or slab and terminate flush with both surfaces. Pack annular space with oakum, and caulk at ends with silicone construction sealant.

3.1.5 Piping Hangers and Supports

NOTE: In seismic zone 3 or 4, provide seismic restraints in accordance with SMACNA Seismic Restraint Mnl.

Selection, fabrication, and installation of piping hangers and supports shall conform with MSS SP-69 and MSS SP-89, unless otherwise indicated. [Provide seismic restraints in accordance with SMACNA 1650.]

3.2 FIELD QUALITY CONTROL

3.2.1 Metal Welding Inspection

NOTE: To assist the designer in selecting the proper documents for a specific project, the following scope in accordance with documents is provided:

- 1. NFPA 54 Scope: "1.1.1 Applicability: Coverage of piping systems extends from the point of delivery to the connections with each gas utilization device. For other than indicated liquefied petroleum gas systems, the point of delivery is the

outlet of the service meter assembly, or the outlet of the service regulator or service shutoff valve when no gas meter is provided.

2. ASME B31.8 Scope: "802.11. This code covers the design, fabrication, installation, inspection, testing and safety aspects of operation and maintenance of gas transmission and distribution systems, including gas pipelines, gas compressor stations, gas metering and regulation stations, gas mains, and service lines up to the outlet of the customer's meter set assembly 802.14. This code does not apply to (c) piping beyond the outlet of the customers meter set assembly."

Inspect for compliance with [NFPA 54] [and] [ASME B31.8]. Replace, repair, and then re-inspect defective welds.

3.3 PROTECTIVE COVERING FOR ABOVEGROUND PIPING SYSTEMS

Apply finish painting conforming to the applicable paragraphs of Section 09 90 00 PAINTS AND COATINGS and as follows: for Ferrous Surfaces, touch up shop-primed surfaces with ferrous metal primer of the same type paint as the shop primer. Solvent-clean surfaces that have not been shop primed in accordance with SSPC SP 1. Mechanically clean surfaces that contain loose rust, loose mill scale, and other foreign substances by power wire brushing in accordance with SSPC SP 3 or brush-off blast clean in accordance with SSPC SP 7/NACE No.4 and primed with ferrous metal primer in accordance with SSPC Paint 25. Finish primed surfaces with two coats of exterior alkyd paint conforming to MPI 9.

-- End of Section --

END OF BASE DESIGN STANDARDS

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