

**DESIGN and CONSTRUCTION
STANDARDS**

for

**HURLBURT FIELD, FLORIDA
16th CIVIL ENGINEERS**

MARCH 1999

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APPENDIX A - PIPING MATERIAL REQUIREMENTS

REFERENCES: ARCHITECTURAL COMPATIBILITY GUIDELINES
LANDSCAPE DEVELOPMENT PLAN
BASE LANDUSE PLAN

DIVISION 1 - GENERAL REQUIREMENTS

GENERAL

Hurlburt Field, Florida, is located within seismic zone 0, as per AFJMAN 32-1049 (AFM 88-3), Chapter 13. Design for wind load will be in accordance with the most current version of American Society of Civil Engineers Standard (ASCE) 7, Minimum Design Loads for Buildings.

The latest editions of the following codes shall apply to all construction:

Standard Building Code, Southern Building Code Congress International, Inc., Birmingham, AL.

Standard Gas Code, Southern Building Code Congress International, Inc., Birmingham, AL.

Standard Mechanical Code, Southern Building Code Congress International, Inc., Birmingham, AL.

Standard Plumbing Code, Southern Building Code Congress International, Inc., Birmingham, AL.

National Fire Codes, National Fire Protection Association

Florida Model Energy Code, Florida Department of Community Affairs, Tallahassee, FL.

Military Handbook 1008C, U.S. Air Force, HQ AFCESA/DFE.

Military Handbook 1190 as part of DOD Directive 4270.1.

Coordinate traffic flow with Base Civil Engineering. Insure building and parking area do not fall within the explosive arc. Investigate proper limits of explosive arcs.

The existing architecture at Hurlburt Field is a mixture of various types and materials. Exterior materials consist of precast concrete panels, split-face and fluted CMU, exterior insulation system, metal panels, brick, and dark bronze colored aluminum windows and doors frames. The desired architectural style will be selected by the Architect to blend with the surroundings and newest facilities on base at the time of construction. Refer to Architectural Compatibility Guidelines dated 15 October 1992.

All facilities shall be designed in accordance with all Air Force Regulations, Manuals, Handbooks, ETL's, etc. Any conflicts between regulations shall be brought to the attention of the BCE staff for resolution.

Provide handicapped requirements in accordance with American Disability Act (ADA) unless unreasonable for the type of project.

If Government furnished equipment is to be provided to the contractor, provide delivery date, location, who will store, who will assemble, install, test and operate.

Provide an optional bid schedule for reduced construction times when requested by the Air Force.

Assure Security requirements are definitized and coordinated between design disciplines.

Check ongoing projects in design under construction for interface coordination.

Sole source items may be specified in Government contracts. Use of proprietary or sole source must be justified by the User and approved by USACE higher authority.

Avoid unsightly/annoying placement of mechanical and other structural items on roofs.

Gutters and downspouts are to be concealed except for where approved on pre-engineered metal buildings with metal siding. Insure all gutters and downspouts are located on the outside of the building envelope. Avoid using gutters and downspouts on single story buildings less than 5000 square feet. On single story buildings less than 5000 square feet, the roof design shall divert the roof discharge away from the main entry. Avoid poor placement of gutters and downspout. Make sure any wood associated with the gutter construction is fireproofed.

Avoid placement of mechanical items on outside of buildings in view of the public.

Install built-in storm/hurricane shutters on all buildings as part of the construction contracts.

CONSTRUCTION

Assure construction phasing is addressed. Provide recommended construction time with every submittal to reflect any changes.

Construction sites and staging area will be neat and free of trash. Assure all construction debris is removed OFF BASE at contractor's expense. Any hazardous waste removal must be coordinated through 16 CES/CEV (Environmental Branch).

Construction sites shall be screened from view by a chainlink fence with silt-fabric attached.

Contractor trailers shall be of a neat and clean appearance when brought onto Hurlburt Field. Trailers shall not be dirty, rusty, or have big signs on them.

Water and electricity will be provided to the construction contractor at no cost. Construction contractor shall provide meter to meter his use of electricity.

This area has a year round construction season. All materials, trades, and skills utilized in standard construction are available within a distance that will not be an added cost consideration.

All projects shall comply with the energy performance standards as set forth in Title 10 CFR 435 and compliance shall be certified in accordance with Executive Order (EO) 12759, 17 Apr 91.

COST ESTIMATE

If estimate is above authorized funding, identify recommended options to reduce CWE below PA (programmed amount) in the design submittal package. For MILCON Projects, if estimate is above the authorized funding, identify recommended options to reduce the CWE below eighty percent of the PA.

Provide cost estimates for review with design submittals, not after the regular design submittal/late date. Cost Estimates shall be reasonably accurate and reflect prices, etc. common to the local area.

Use Bid Options in lieu of additive alternates.

SUBMITTALS

A. The following submittals are to be submitted to the Base Civil Engineer's Office for approval:

1. All Exterior Finishes - all finishes shall be submitted at one time.
2. All Interior Finishes - all finishes shall be submitted at one time.
3. Fire Sprinkler Shop Drawings
4. Fire Alarm Equipment Shop Drawings
5. Systems Furniture Shop Drawings
6. Landscape Irrigation Shop Drawings

7. Standing seam roof manufacturer's design and erection drawings.
- B. The following items shall be submitted after completion of construction:
1. Warranties, i.e. roof, equipment, etc. prior to Beneficial Occupancy Date (BOD). A complete list of who to contact with phone numbers, fax numbers, etc. for warranty repairs shall be provided at BOD acceptance.
 2. Completed DD Form 1354 within 5 working days after BOD.
 3. Completed Environmental Certificates.
 4. One set of As-Built drawings on mylar and one set on CD-ROM compatible with the Base's CADD system. CD-ROM shall also contain the specifications and soil borings.

DIVISION 2 - SITE WORK

SPECIAL CLAUSES:

Work on flightline may require a construction fence to prevent flying debris from getting on flightline.

All contractors are required to comply with all aspects of the Federal Aviation Regulation (FAR), Part 77, **Objects Affecting Navigable Airspace**, for all work associated near or on the flightline. This includes, but is not limited to, the use of any and all equipment used to construct the facility and the facility itself. The contractor is required to obtain **all necessary permits including FAA form 7460-1 (latest edition) and provide all necessary notices** associated with this requirement. All work within the following areas must be coordinated in writing with the Contracting Officer 21 days in advance of commencement of the work:

1. LATERAL CLEARANCE AREA: A line 1000 feet from and parallel to the centerline of the runway.
2. TAXIWAY SETBACK: A line 200 feet from and parallel to the centerline of any taxiway.
3. APRON SETBACK: A line 125 feet from and parallel to the edge of the aircraft-parking apron.
4. CLEAR ZONE: A line 1500 feet from and parallel to the centerline of the runway beginning at the runway threshold and continuing for a distance of 3000 feet north and south of the ends of the runway.

A copy of FAR, Part 77, and permit applications may be obtained from:

ARP Division ASO-600
Federal Aviation Administration
P.O. Box 20636
Atlanta, GA 30320
Phone: (404) 305-6700

State special clause is required for merchantable timber if site clearing includes trees.

LANDSCAPING: All landscaping shall be in accordance with Hurlburt Field's LANDSCAPE DEVELOPMENT PLAN, dated February 1997. *Note: One change to the Landscape Development Plan is on p. 112 - Do use plastic or fabric weed barriers.*

Soil conditions at Hurlburt are very sandy and are not stable on steep slopes, making it subject to severe washouts. Storm water drainage off of pavement sometimes causes washouts. Provide flumes where runoff is concentrated off pavements and flatten slopes as much as possible.

Ensure that existing permits are closed out with appropriate agencies after completion of project and as-builts filed with the appropriate agency.

Site Plans

The designer shall orient the facilities in accordance with the requirements of ETL 82-6. The designer shall also make the required submittals in accordance with ETL 82-6.1.

Identify construction staging area. If site is congested, is a supplemental staging required? Address screening of construction areas for safety and aesthetics.

In the past contractors have stored stacks of pipe at various locations on the base adjacent to locations where it was to be installed for several months resulting in an unsightly situation. Restrict the contractor's staging areas in the contract documents for future projects. This may require the Contractor to double handle material and/or present time restrictions on how long he could store materials at remote locations prior to installation.

Retention/Detention ponds are especially sensitive. Usage of the proposed centralized storm water retention pond system is required where possible. Swales should be used where possible. Do not create wet retention ponds without the base's written concurrence. The designer must follow Florida Standard 1725 Florida Administrative Code for central ponding system. This will require the designer to coordinate available capacity of central pond with Base Civil Engineering and submit a revised retention pond permit. This will include calculations for the project, which will be deducted from the appropriate retention pond system.

Save existing trees where possible when developing site plans. Mature pines and cedars, as well as hardwood trees, are important. Identify trees to remain on plans. Trees greater than 4 inches in diameter not located on the building site must be identified to remain on the topographic survey. When trees are cut, insure the specs have the Merchantable Timber clause. Landscape plan must be in conformance with Base tree ordinance.

Base policy for clear space/separation distance between buildings requires a minimum clearance of 50 feet on all sides.

Accessibility requirements for rescue and fire fighting shall be provided.

Parking and area lighting shall be located in the planting beds whenever possible. Avoid placing poles closer than three feet from the back of curbs whenever car bumpers can impact them. Install poles on three feet high concrete footings when proximity to vehicles is not avoidable.

Pavements:

Streets, parking lots, and sidewalks shall be designed in accordance with AFM 88-7, Chapters 1, 3, 4, and 5, Military Traffic Management Command Pamphlet 55-14, and the latest addition of the Manual of Uniform Traffic Control Devices.

All parking will be 90 degrees off-street parking. The minimum curb radius at all driveways is 20 feet; the preferred is 35 feet unless WB-50 trucks are expected, then the radius shall be 50 feet.

The minimum curb radius at the intersection of any two streets is 50 feet.

The minimum parking lot setback from streets and buildings is 20 feet.

Entry and exits to parking lots must be located at least 50 feet from intersections.

AE's need to ensure that the vehicle overhang is considered when locating sidewalks next to parking lots.

Use of yellow paint striping on curbs is prohibited.

PCC curbs and gutters shall be provided on all projects. Design shall be similar to the major portion of those existing on base or use details from local city or state highway standards and U.S. Army Corps of Engineers Guide Specification CE 02631, Concrete Sidewalks, Curbs, and Gutters.

Keep slopes as flat as possible. Use paved flumes at curbs cuts and where runoff is concentrated off parking lots and roads.

Unless otherwise approved, placing utilities and storm drainage under roads shall be done by jack and bore.

Water and Sewer

All piping on Hurlburt Field shall be PVC unless use dictates otherwise.

Check fire flow test data for quantity/pressure requirements. Test data cannot be more than six months old.

Water Supply Treatment requirements: The only treatment for Base potable water is chlorination. With new EPA Regulations we may need further treatment at each well.

Wastewater Treatment:

Flow Capacity: The New Base Plant is an Advanced Waste Water Treatment Plant with tertiary treatment and wetland disposal. Capacity of new plant is 1,000,000 gallons per day.

Existing wastewater flow and available design capacity for treatment average a daily flow of 526,000 GPD.

Chemical feed system shall be installed on all closed loop hot and chilled water systems.

Sanitary Sewage:

Minimum collector line sizes

- (1) Housing area - eight inches
- (2) Other areas - eight inches

Manholes with a minimum diameter of 3 feet shall be provided. Cleanouts shall be provided on all building tie-ins.

Lift stations: A study shall be made of the lift station serving this area to ascertain that it can handle this additional load.

- (1) Each station shall be equipped with dual pumps and motors to provide full standby in the event of one failure. An exhaust system shall also be a part of the lift station to be used when maintaining the station.
- (2) Controls shall be mounted with a weatherproof control panel located above ground.
- (3) Extra manhole capacity shall be provided to give additional storage in the event of power failure.
- (4) Emergency power connections shall be provided so standby generators can be used in the event of power failure.

Design Precipitation:

- Max 1 hour -- 5.3 inches
- Max 2 hour -- 7.1 inches
- Max 24 hour -- 10 inches

PERMITS

Assure permits are coordinated with FDER, state/local agencies and host base environmental. These include sewer, domestic water, storm water, wetland, NPDES and construction permits. Submit permits through 16 Civil Engineers.

The Designer shall determine the required clearances (permits) required from the authorities. The following special clauses will be included in the project specifications: contractor must obtain local construction permit for disruptions of aircraft or vehicular traffic, disruptions of base utility services, or installation which requires subsurface excavation; contractor must coordinate planned interruption to utility services; and contractor must stockpile merchantable pine lumber for pickup by the Air Force Forestry contractor.

PEST CONTROL

Generic Statements shall be included with all Contracts that involve Pest Control work. Note: Before each "finished statement of work goes to base contracting (or applicable authority), it must be approved by the Base Pest Management Office at 16 Civil Engineers (IAW AFI 32-1053).

All of the following must be included in any Statements of Work for Contracts that involve Pest Control work (i.e. termiticide pretreatment of new slabs, pesticide applications to landscaping):

Prospective contractors must send the base contracting office (or applicable authority) proof that all personnel working with pesticides, to be employed on the contract, have current Florida State Certification for the types of operations included in the contract, and show that the contractor is in compliance with all licensing and registration procedures required by Florida State Law. This will be sent in with the bid. Once the contract is awarded, that contractor will send updates to the Base Pest Management Office whenever these personnel/certification situation changes.

Waste Disposal: The contractor will not dispose of any pesticide wastes on base and is totally responsible for disposal of all pesticide wastes.

Chemicals to Use: No pesticides will be used prior to the Base Pest Management Office's approval of that pesticide for contractor use. The contractor will send the Base Pest Management Office a pesticide label and MSDS for each chemical to be used. The Base Pest Management Office will approve or disapprove the submitted chemical within 10 business days of receipt.

Reporting Pest Control Work Complete: The contractor will report all pest control activities to the Base Pest Management Office; this report should be composed of one form (as shown below) for each job. If more than one pesticide was used on a particular job, there should be one form accomplished for each pesticide used. Copies of these forms for the work done, should be turned into the Base Pest Management Office no later that 5 business days after the pest control work is finished.

Contractor Pest Control Operation Report

Date _____ Application Site Type _____
Time _____ Facility # _____
Operation Type _____ Address _____
Labor Hours _____ Survey Hours _____
Worker _____
Job Order# _____

Pest Name _____ Area Treated/Surveyed _____
EPA Reg # _____ Amount Finished Product _____
Pesticide Name _____ Pct (%) Finished Product _____
Finished Form _____ OR _____
Amount Concentrate Used _____

Remarks _____

DIVISION 3 - CONCRETE

Main entrances into facilities shall be dressed up by using exposed aggregate washed concrete, textured finished concrete, brick/block borders, tile pavers, etc., instead of just broomed or burlapped finished sidewalks. Make sure the specifications address the finish that the drawings call for.

DIVISION 4 - MASONRY

Assure integrally colored block (standard smooth-faced, split-faced, or split-ribbed/fluted) specified matches Grasselli's (Grasselli Concrete Products Co., Inc., 4212 Jefferson Ave. S.W., Birmingham, AL 35221, 205-925-3617) light tan cream, William Brothers' Almond, or AAA Ready Mix & Block's Light Tan 2003. Accent block shall be Grasselli's old dark brown CMU or sierra red CMU or Williams Brothers' Russett and/or a change in texture. Standard block, split-faced, or split-ribbed/fluted (limited use) can be used.

All exterior integrally colored block shall be cleaned and two coats of sealer installed as part of the project. For the installation of the sealer, the proper drying time for the block to dry from the cleaning needs to occur. A period of 48 to 72 hours shall occur between the cleaning and the applying of the sealer. During this 48 to 72 hours, no rain shall occur. Some manufacturers recommend waiting three to seven days after a rainstorm before apply a sealer.

Brick used on Base shall match Henderson Brick's #4-6000 FW Velour Modular, Acme Brick's #BL 400 Cedar Heights Modular Velour, or Delta Brick's Pilgrim Ivory 1405.

Precast concrete sills and copings shall be integrally colored to match the CMU.

Screen service areas such as dumpster pads, transformers, chillers, etc. Use compatible materials (i.e. masonry or metal panels) with exterior of facility when possible; use plants as last alternative if cost don't permit. Wood is unacceptable as a screening material. Also, electric meters, water meters, gas vents, etc., should be screened and not in the front/sides of the building.

No painted CMU finishes in entries, lobbies, or stairwells. Use gypsum board, textured coatings, or even plaster.

The use of parapet walls shall be avoided unless approved by the BCE.

DIVISION 5 - METALS: STRUCTURAL & MISC.

Screen service areas such as dumpster pads, transformers, chillers, etc. Use compatible materials (i.e. masonry or metal panels) with exterior of facility when possible; use plants as last alternative if cost don't permit. Wood is unacceptable as a screening material. Also, electric meters, water meters, gas vents, etc., should be screened and not in the front/sides of the building. Make sure walls are high enough for the equipment that is being screened.

DIVISION 6 - CARPENTRY

The use of built-in cabinetry is to be used only when freestanding furniture will not fit the user's requirements or is more expensive.

When built-in cabinetry is utilized, specify full overlay doors and drawers and durable finishes are to be used.

Provide adequate and aesthetically responsible staff and guest coat storage in all administrative areas.

Install chair railings in conference rooms, high visibility DV spaces, and dining areas in areas where wall damage is a possibility from the chairs and other equipment. Use of horizontal chair rail trim in office spaces is discouraged. Insure that chair rails are mounted to the wall at a height where chairs, tables, or other equipment will rub against the wall.

DIVISION 7 - MOISTURE PROTECTION

Assure that a positive vapor barrier is coordinated with the Mechanical Engineer.

Roofs: Provide "Medium Bronze" standing seam metal roofs. Manufacturers of existing metal roofs are Architectural Roof Components Systems, Atlanta Metal Products, Specialty Contractors, Inc., A.E.P. Span Metals, and M & M Systems Incorporated. The Minimum roof slope that will be approved for Hurlburt field is 1:12 (1V on 12H). A roof slope 3:12 (3V on 13H) is preferred and deviation from 3:12 needs approval. Provide wide ridge caps on all roofs.

Soffits: Provide soffit (vented and non-vented) from the same manufacturer of the metal roof so that color matches.

Provide roof gutter systems which are not "attached" to the side of the building. Standing seam metal roofs with integral gutters are a Base standard. Downspouts must be concealed within the building architecture, except for pre-engineered metal buildings with metal siding. If approved to be exposed, they should match color of surface (wall, soffit, fascia, etc.) to which they are attached.

Provide screens and strainers on all gutters.

Downspouts shall not empty on sidewalks. This defeats the purpose of having them. Terminate at concrete splash blocks or storm water drainage system.

Items such as exhaust fans, gutters, downspouts, vent stacks, louvers, etc., shall match the color of the surface on which they are installed. The color shall be factory installed not field painted. For items that cannot be factory finished, the color shall match #2M54E Tortoise Shell from Devoe Paint Co. when the item is installed on the light tan CMU and

Factory finish metal siding for structures like nose docks and hangars shall match color #2M54E Tortoise Shell from Devoe Paint Co.

DIVISION 8 - DOORS, WINDOWS AND GLASS

Door Hardware: Hurlburt Field has a "Best" master keying system in place. Construction specifications must require the contractor to provide door hardware compatible (falcon, arrow,) with the "Best" cores. After Bid Opening, MCP construction funds will be sent to the Base Civil Engineer at Hurlburt Field, to buy the "Best" cores. Identify Best Cores on all AF Form 1178 Cost Estimates as a separate item.

Door Locks - Use Grade 1, Series 4000, heavy duty cylindrical locks on all doors except on special doors such as storefront doors, vault doors, etc.

Neutral colors will be used on interior doors on SOF projects.

All window and door trim shall be dark bronze in color.

Window glazing shall be medium bronze tinted.

DIVISION 9 - FINISHES

GENERAL:

Do not include rooms to be painted in specifications. This always conflicts with finish schedule on plans. Specify only in finish schedule.

Color and finish schedule shall be on the drawings and only on the drawings (not in specifications).

Finish schedule must be clear when room has no ceiling and the exposed metal deck and joists are to be painted.

Raised (computer) flooring on sealed or epoxy concrete floor must be indicated on finish schedule.

Use ceramic tile in place of raised disk/square rubber flooring in vestibule and other areas that the subflooring allows.

Assure drawings/CID carpet samples are coordinated with carpet specifications.

No painted CMU finishes in entries, lobbies, or stairwells. Use gyp board, textured coatings, or even plaster.

Neutral colors will be used on interior doors on SOF projects.

Install stainless steel or PVC/plastic (color coordinated) corner guards in high traffic interior areas.

All window and door trim shall be medium bronze in color.

Items such as exhaust fans, gutters, downspouts, vent stacks, louvers, etc., shall match the color of the surface on which they are installed. The color shall be factory installed, not field painted. For items that cannot be factory finished, the color shall match #2M54E Tortoise Shell from Devoe Paint Co. when the item is installed on the light tan CMU.

Suspended Ceilings shall be 2 X 2 type grid in open office type areas.

All exterior integrally colored block shall be cleaned and two coats of sealer installed as part of the project.

Raised (computer) flooring on sealed or epoxy concrete floor must be indicated on finish schedule.

Interior signs shall be Modulex by ASI Sign System, Norcross, GA, 30071, (404) 448-2026 or 1-800-533-9075, "or equal". Placement of interior signs will be in accordance with AFP 88-40. Most interior signage shall have a bronze/brown background with white lettering at Hurlburt Field.

CARPET POLICY FOR HURLBURT FIELD

I. Carpet Guidance for Commercial Carpets

A. Purpose: The purpose of this guidance is to assist in carpet selection and specification for all Hurlburt Field installations. It is intended to provide facilities with aesthetic surroundings for workers, and better products for maintainability and safety. This guidance provides minimum requirements and covers all installations including MWR and Services facilities, Lodging facilities, and contractor

furnished goods in construction projects. See Residential carpet policy (Section II) for Family Housing installation.

B. Introduction: Carpet selection needs to be based on several factors that incorporate all aspects of carpeting. Carpet life is an important factor in the selection of carpet. Construction, fiber and pattern qualities of carpet will all determine how long a carpet will perform properly. This guidance requires that soil-hiding and anti-crushing properties be a priority in order to provide a quality product and good appearance in future years. Carpet selection must also be compatible with other surrounding finishes and colors. The area the carpet will be installed in as well as areas adjacent to this space must be considered. The carpet is to be a part of a coordinated interior design scheme. The term carpet is used in reference to both broad loom carpet and carpet tile unless noted otherwise.

C. Carpet Selection: Selection of appropriate flooring to use in the space is the first criteria. Carpeting is not mandatory and should be looked at as one of many flooring finish options. Hard surface flooring is recommended for areas with high traffic, excessive soiling, or probability of moisture is high, (e.g. water fountains in high use areas, adjacent to vending machines, entrances from exterior of building).

1. This guidance prohibits the use of carpet in industrial/shop facilities, warehouse or industrial shops. Administrative and support areas for these facilities may have carpet but durability should be a major consideration.

2. Medical and food service areas must use an anti-microbial carpet to restrict the growth of bacteria.

3. Areas that have computer equipment must use a carpet with anti-static properties to eliminate possible damage to computer and electronic equipment. 3.5 kU or less for general use areas, 2.0 kU or less for computer support areas.

4. Carpet tiles must be used where flat cable power distribution systems are used and in areas that provide access to electrical or telephone raceways in the floor. Carpet tiles may be used in other areas where access or "change-out" capabilities are required.

5. Carpet tiles will meet the same requirements as carpet as specified by this guidance.

6. Carpet and carpet tiles will be current lines, mill end and discounted carpets will not be allowed. Custom carpet will be allowed if guaranteed to be available at a later date.

7. Carpet tile is to be used in administrative areas over 5 workstations and high traffic areas where soiling is more likely.

D. Carpet and Carpet Tile Construction: Carpet selected for AFSOC installations must meet all construction requirements outlined in this guidance.

1. Area rugs are prohibited by this guidance except for light traffic lobby seating areas and walk off mats. Carpet that is not permanently installed is considered an area rug, regardless of size, binding, trimming, or finishing of material edges. Walk off mats specifically designed to meet moisture and soiling requirements of exterior entrances are an exception. Carpet used as wall covering is not allowed under this guidance.

2. Carpet materials and applied treatments will be non-toxic, reasonably non-allergenic, and free of other recognizable hazards.

3. Carpet construction must be tightly woven, tufted, or fusion bonded, with a level loop pile. A medium to low pile plush cut carpet is allowed as a border in very light traffic areas (e.g. executive offices, executive conference room) but pile height must be equal to pile height in carpet that is being bordered. Slight pile height changes (sculptured) carpets can be used in residential and Distinguished Visitor areas only. Carpet must be 12 feet wide for rolled goods, carpet tiles will be 18"x18" squares. Six foot wide rolled goods will be allowed in corridors less than 6 feet wide.

4. Carpet must meet construction requirements of face (or pile) weight for stitches per inch as specified below:

Minimum face (pile) weight-per-	Minimum stitches per inch
20 oz.	13
24 oz.	12

26 oz.	10
28 oz.	9

Carpet with less than 9 stitches per inch is not acceptable for commercial use in AFSOC installations.

E. Carpet Fibers: Carpet yarns must be 100% advanced generation nylon (Nylon 6.6, Antron) for plush cut pile carpeting. Level loop carpet must be 100 % nylon. Solution dyed fibers is required in areas where heavy soiling is a problem.

F. Carpet Backing: All carpet backings must meet requirements of this guidance for AFSOC installations.

1. Carpet pad and cushion backed carpets are not allowed. Aerobic exercise rooms may utilize a low cushion backing for absorption if a rubber-flooring product can not be used.

2. Carpet backing shall be polypropylene (heavy vinyl) or equal synthetic in either a woven or solid construction. Rubber, foam, jute, or sponge back carpet shall not be used.

3. Carpet tile backing shall be a thermal plastic backing with fiberglass reinforcement, or equal (e.g. Glasbac, Everwear, and Keldax)

G. Carpet Pattern: Carpet pattern is "one that contains any decorative, ornamental, or artistic feature". These features maybe free flowing or geometric forms and shapes.

1. Small patterns that meet AFSOC requirements must have at least three distinct colors arranged in a pattern of shapes or color pattern repeats. This will be used in light to moderate traffic areas only.

2. Bold patterns have more than three distinct colors and have a distinct pattern. These must be used in all moderate to severe traffic areas, (e.g. open office areas, heavy use areas, corridors and hallways, dining, and dormitory facilities).

3. Tweed carpet is a tone on tone of one color. AFSOC will consider this type of pattern a solid carpet for installation requirements.

4. A Bold tweed is one that has three or more distinct color variations and will be considered a small pattern for use in light traffic areas only.

5. Solid carpet will only be allowed in family housing units (see policy for residential carpet), Distinguished Visitor transient quarters, and as borders in executive offices and conference rooms.

6. Carpet tile must also meet these pattern requirements. A check pattern produced by using solid color tiles will not be allowed. Each tile must have pattern.

7. Avoid strong patterns with predominate lines running along walls and in corridors to prevent the appearance of the carpet running askew.

8. Pattern size will be in relation to size of area and furnishing for that area.

9. Patterns that are overprinted must be overprinted on a bold tweed carpet and must have sufficient penetration. To insure that the print does not prematurely wear off, the penetration of the overprint dye should be no less than 85% of the pile height.

Carpet Wear Classification

Facility Type

Training Buildings, Educational Facilities, including Dependents Schools

Staff Offices (see Administrative Offices)

Class Rooms - Heavy to Severe

Corridors - Heavy to Severe

Medical Facilities - Heavy to Severe

Research Facilities

Bio-Optics Laboratories- Moderate

Administrative Facilities including administrative areas in other facility types:

Open Plan Offices-Severe

Closed Private Offices-Moderate to Heavy

Corridors -Severe

Conference Rooms- Moderate to Heavy

Executive (General) Offices and Conference Rooms - Light to Moderate

Unaccompanied Enlisted Quarters

Sleeping areas - heavy

Public area, Lobbies, Lounges, TV. areas- Severe

Offices (see Administrative Facilities)

Officer's Quarters

Sleeping Rooms - Heavy

Combination Living and Sleeping areas - Heavy

Public area, Lobbies, Lounges, TV. areas- Severe

Offices (see Administrative Facilities)

Dining Facilities - Severe

Enlisted Dining Facilities

Dining Areas - Severe

Offices (see Administrative Facilities)

Temporary Lodging Facilities

Living and Sleeping areas - Heavy

Chapels and Other Religious Facilities

Worship Areas - Heavy

Education Areas - Heavy to Severe

Clubs, Officer and Enlisted

Offices (see Administrative Facilities)

All areas - Heavy to Severe

Libraries

All Areas - Heavy to Severe

Youth Centers - Severe

Child Care Centers - Heavy to Severe

Theaters - Severe

Exchange Facilities

Sales Area - Severe

Offices (see Administrative Facilities)

Restaurant and Cafeteria Dining Areas - Severe

Banks and Credit Unions

Offices (see Administrative Facilities)

All Other Areas - Heavy to Severe

Bowling Allies - Severe

Golf Course/Club House

Pro Shop and Administrative areas - Moderate to Severe

Dining Areas - Severe

Music and Drama Facilities - Moderate to Severe

H. Carpet Color: The color of the carpet must coordinate with surrounding colors in the area and adjacent areas. Very light and very dark colors will not be allowed due to increased maintenance.

Light colors should not be used as background colors for patterned carpets. Overall pattern should have a medium color tone to ensure good soiling hiding capabilities.

Color selection should be based on use in general areas and future occupants. Color choice should not be a personal preference by the user but incorporate the comprehensive color scheme of the area.

I. Fire Resistance Requirements: Carpet for all areas shall conform to DOC FF1-70 (Pill Test). Carpet systems (carpet and backing) for corridors and high occupancy areas must be tested in accordance with UL 992 (Chamber Test) or Federal Test Method Standard 372 (Radiant Panel). Carpet systems tested in accordance with UL 992 must have a flame propagation index of less than 4.0, class A (the higher the number the greater the hazard).

1. Carpet systems tested in accordance with ASTM E-648 (Flooring Radiant Panel Test) must meet the following criteria:

a) Minimum average critical radiant flux of 0.45 watts per square centimeter, class A, for unsprinkled areas. The lower the number the greater the hazard.

b) Minimum average critical radiant flux of 0.22 watts per square centimeter; class B, for sprinkled areas. The lower the number the greater the hazard

2. Carpet systems tested by ASTM E-84 (Stiener Tunnel Test) must meet the following requirements:

a) Flame spread rate of 0-25, class A, unsprinkled areas. The higher the number the greater the hazard.

b) Flame spread rate of 26-75, class B, for carpet in sprinkled areas. The higher the number the greater the hazard.

3. Installation of fire rated requirements based on occupancy - All carpeted areas except residential family housing units must meet class A requirements. Office and retail spaces are allowed to use class B carpeting if an automatic sprinkler system is operational in that area.

4. Carpet in medical, dormitory, TLF, and lodging facilities, besides complying with all of the above criteria, must have smoke development rating not greater than 450 when tested according to the National Bureau of Standards Smoke Chamber Test.

5. The following are full references to the standards referenced above:

a) DOC FF1-70, Office of the Secretary, Consumer Products Safety Commission, Washington, DC. 20207

b) Underwriters Laboratories, Inc. Publication 992, 333 Pfingsten Road, Northbrook, Illinois 20062

c) Federal Test Method Standard 372, available from Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA. 19120

d) Specifications for Commercial Interiors: S.C. Reznikoff. Whitney Library of Design, 1979.

J. Warranty: A ten year warranty is required by this guidance in order to obtain a quality product that can be serviced and replaced if defective.

K. Installation:

1. Carpet installed on AFSOC installations (except for residential applications) will use the direct glue method without a pad. Release able adhesive is to be used to allow for carpet to be removed with less expense during future renovations. Seams will be kept to a minimum; "patching" small pieces together to finish a layout will not be allowed. Application of a protective coating/spray of commercial grade directly following installation is recommended. Provide releasable adhesive or double glue method that will allow carpet to be removed in the future.

2. Provide adequate ventilation during installation. Allow newly carpeted area to "air out" for 48 to 72 hours to reduce interior air pollutants.

3. Provide soil and moisture walk-off mats at entry doorways.

4. Order 10% additional carpet tile for replacement of damaged tiles in future.

L. Maintenance: A maintenance routine for all carpeting installed on base is expected. A vacuuming and cleaning schedule should be developed along with spot cleaning for spills and emergency cleaning for water damage, in case they are needed. Furniture and equipment that is slid or pushed over carpeting should have appropriate glides or casters to prevent damage to the carpeting. Maintaining the carpet properly will extend the life of the carpet.

M. Base Molding: Molding will be vinyl or rubber, wood is allowed in low traffic, executive areas only. Carpet as base molding is not recommended.

NOTE: Not all carpets on the Federal Supply Schedule meet the requirements of Air Force and AFSOC carpet policies. Review each carpet selection carefully before approving for use. Questions on this policy and qualification of a certain carpet may be directed to HQ AFSOC/CE. Have sample and specifications available if a review is required.

II. Carpet Guidance for Residential Carpet in Family Housing Units

A. Purpose: The purpose of this guidance is to assist in carpet selection and specification for all AFSOC family housing installations. It is intended to provide facilities with aesthetic flooring for AFSOC families and better products for maintainability and longer life cycles of carpeting. This guidance covers all installations of carpeting for family housing, including contractor-furnished goods in construction.

B. Introduction: Carpet selection needs to be evaluated on all factors: location, construction, and installation. This guidance requires that soil hiding and anti-crushing properties be a priority. This guidance is also based upon AF policy for family housing and requires a 7-year life cycle be used in selecting a durable carpet.

C. Carpet Selection: Kitchens, bathrooms, entry areas, patios, and porches exposed to exterior elements (weather and humidity) are not to be carpeted. Carpet living and sleeping areas, and adjoining closets and alcoves.

1. Carpet and pad will be replaced before the mandatory seven (7) years life (Air Force carpet policy) only if it is certified as worn out by the Base Civil Engineer (BCE) and approved for replacement by the MAJCOM Commander.

2. Carpet selected must have anti-stain or stain resistant qualities built into the yarn system or applied during fabrication that will not "wash off" during routine carpet cleaning.

3. Carpet tiles are not allowed.

4. Area rugs are not allowed under this guidance. An area rug is any type of carpet that has a finished edge regardless of type of construction, fiber, binding, or finishing. Carpet must be permanently installed to the floor.

5. Carpet is not allowed on the walls.

6. Carpet must be of current manufacturer's lines. Mill ends and discontinued styles and lines are not acceptable. Custom carpets are only allowed when manufacturer can guarantee availability of carpet to match or replace at a later date.

D. Carpet Construction: All carpet must meet FHA Bulletin UM-44-D minimum requirements and meet requirements of this guidance for construction.

	<u>Enlisted and CGO Housing</u>	<u>FGO and GO Housing</u>
Pile construction	Level cut or loop pile	level cut frieze or plush cut pile
Yarn twist (frieze)	heat set	heat set
Pile height	up to ½"	up to ½"
Minimum face weight	30 oz. for cut pile 26 oz. loop pile	30 oz. frieze level loop 36 oz. plush cut pile
Backing	Polypropylene, woven no jute	Polypropylene, woven no jute
Anti-static	built-in	built-in

Density	4000 minimum (density = $\frac{36 \times \text{pile weight}}{\text{pile height}}$)	4000 minimum
Gauge	1/10 for 30 oz. or less	1/8 for more than 30 oz.

E. Fiber Content: Carpet must be made of 100% new generation nylon (Nylon 6-6, Antron). Wool, cotton or polypropylene (olefin) is not allowed as the fiber of the face of the carpeting.

F. Carpet Backing: Backing will be a synthetic (polypropylene) backing. This guidance does not allow the use of jute backing due to the high humidity rates in the area. Backing will be woven, no attached padding is allowed.

G. Carpet Padding: Carpet pad will be a separate pad that is laid beneath the carpet. Pad will be a prime urethane 7/16" thick, equal to Comfortwear 200 (General Felt Industries). Rebond carpet is not recommended. Padding must carry a lifetime warranty and be FHA approved.

H. Carpet Pattern: solid or soft tweed (slight tone on tone color variation) is recommended. Patterned carpet is not recommended. Large and bold patterns are not allowed.

I. Carpet Color: White, off whites and extremely pale tints are not allowed. Light or medium values of neutrals such as beige, taupe, or warm gray are recommended.

J. Fire Code Requirements: All carpet installed in base housing must pass DOC-FF1-70 (Pill test). Carpet and padding system must meet ASTM E-84 (Stiener Tunnel Test) flame spread rate of 75 or less (class C or better).

K. Warranty: Warranty length must not be less than seven (7) years for total or prorated replacement of carpeting.

L. Installation: Installation must be to industry standards and follow manufacturers recommended installation instructions.

1. Carpet tack strips must be used.
2. No direct glue down is allowed.
3. Provide minimal seams and sections (use remnants of same carpet for closets). Do not locate seams in high traffic areas.
4. Connect seams according to manufacturer's directions. Insure seams are not obvious.
5. Finish cut edges with sealer to prevent raveling.
6. Run seams and pile (nap) in the same direction.

M. Maintenance: These are minimum recommendations for maintenance of carpeting to be provided by occupant. Vacuum carpet weekly (more often in high traffic areas). Remove spots and spills immediately and remove any excess water from seepage or water accidents. Clean with a dry-clean or steam clean system every 12 to 18 months. Do not use bleach or cleaners that will alter the color of the carpeting or leave a residue in the carpet.

NOTE: Not all carpets on the Federal Supply Schedule meet the requirements of Air Force and AFSOC carpet policies. Review each carpet selection carefully before approving for use. Questions on this policy and qualification of a certain carpet may be directed to 16 Civil Engineers. Have sample and specifications available if a review is required.

HURLBURT FIELD CID PROGRAM

1. General

1.1. The Hurlburt Field CID program will supplement Air Force regulations and technical letters dealing with facilities and coordinate with the Hurlburt Field architectural compatibility plan

and facility design standards to complete the picture of what constitutes consistent quality interior design.

1.2. This program will be used on Hurlburt Field facilities by A&E firms for facility projects involving CID.

1.3. The concept is to provide the people who carry out the mission of Hurlburt Field with the best facilities available in support of that mission. Success of the CID program relies on Base Civil Engineering (BCE), and A&E firms, and the Corps of Engineers, and the ultimate user, vigorously working together.

2. Goal

2.1. To have an appropriate corporate image: These includes compatible, professionally designed, and code compliant environments. This is accomplished with the use of solid planning methods and the use of durable, low maintenance materials, thus reducing the life-cycle cost of facilities.

2.2 To ensure the interior appearance of each facility is based on carefully established professional design decisions rather than arbitrary personal preferences.

2.3 To respect Hurlburt Field's architectural and interior design influences, environments and historical factors, including existing built and natural environments.

2.4 To have a complete functioning work environment, to enable new personnel to move into the administrative space with a "brief case move".

2.5 To instill a pride of ownership and therefore encourage maintenance, to respect the facilities and their real owner, the American taxpayer.

3. Scope

3.1 This guidance encompasses all facilities in the MILCON, O&M (including in-house, SABER and self-help) NAF, and MFH programs.

3.2 All CID projects are to be reviewed by 16 CES/CEC.

4. Interior Finishes

4.1 Military Handbook 1190A and NFPA 101 paragraph 6-5.3.2 are to be followed.

4.2 Color schemes are to be well planned and appropriate to any existing requirements as well as the facility mission.

4.3 Finishes are to be selected in keeping with the ultimate goal of timeless maintainable interiors.

4.4 Ceiling and wall colors are to be the lightest color possible, while maintaining the integrity of the design and function of the space, and not interfering with concentration or cresting visual fatigue.

4.5 Toxicity levels generated and fire ratings of all new finishes must be considered. Finishes used in Hurlburt Field facilities must have gone through verifiable fire testing and have assigned class rating. Smoke toxicity testing will also be required on finishes that contain fibers.

4.6 Static electricity conductivity is a factor in areas that have computers. Carpeting must have published test data on the level of static control that the product has been tested for.

4.7 To provide manageable stocking of repair or replacement material for a facility, the number of patterns/colors of the same product must be limited.

Ceilings:

1. Choose the ceiling finish based on the space's functions, paying attention to environmental conditions created by the organization's equipment.
2. Install ceilings in administrative spaces comprised of suspended acoustical ceilings systems to the fullest extent. Perimeter framed gypsum board soffits/headers are to be designed in when necessary for design integrity or utility encasement.
3. A 2'x2' suspended ceiling grid is preferred in office, administrative spaces, high visibility corridors and lobbies. A 2'x4' grid is acceptable for maintenance and storage areas. Dry wall soffits and other ceiling systems, such as suspended metal ceiling systems, can be utilized as part of the design in highly visible lobbies, dining and assembly areas.

Painting:

1. Staff level administrative spaces are to have satin-gloss painted latex gypsum board walls. Doors and door frames, and similar trim are to be semigloss latex enamel paint.

Wall coverings:

1. Textured type II vinyl wall covering can be utilized in mid-management offices and suites. Overall color of wall covering must be light unless used only as a small area accent color.
2. Textured type I vinyl or woven fabric wall coverings can be utilized in upper level management offices and suites, DV areas, and other areas with very low traffic patterns.
3. Type III vinyl or multi-colored paint systems are to be used in corridor spaces of visible administrative facilities. Less visible or very high cart traffic corridor spaces are to have solid painted gypsum board wall, with or without texture, or other prior approved high impact resistant wall panels or systems.
4. Acoustical wall covering is to be used in spaces where sound transmission through walls is an issue and in conjunction with acoustical sound batt insulation installed inside the framed walls.
5. Fabric wall coverings are not recommended for use in high traffic areas and corridors that will encounter wall damage because of staining and tearing.

Flooring:

1. To disguise soiling, floors are to be in medium shades only, and have multicolored pattern.
2. Carpet tiles are to be used for administrative spaces with over 5 workstations in one room. All other administrative areas are to use broadloom carpeting. Only expend funds on carpet borders in open spaces such as conference rooms and entries, not in offices except for highest level management.
3. Patterned carpet graphics are to be more free flowing and less linear in design for ease of installation.
4. Only new generation nylon fibers will be used in carpeting. Solution dyed yarn is preferred.
5. Refer to Hurlburt Field carpet policy (attached) for detailed requirements.

Tile

1. Ceramic tile flooring - use textured unglazed tile flooring products in high traffic and high abuse areas (i.e., entries, kitchens, rest rooms, corridors, and copy rooms).
2. All areas that are to have tile floors, including high use public rest rooms, are to have epoxy grout.
3. Provide tile flooring under water fountains.

Resilient Flooring

1. Where budget is limited, vinyl composition or solid vinyl tile can be used in high traffic abuse areas.
2. In high visibility areas using vinyl composition or vinyl tile, use a pattern that will create interest and eliminate an institutional look.

5. Interior Space Usage/Criteria

5.1 The standardizing of workstations and specs is to pro-actively manage facility space. All standards listed are Hurlburt Field objective goals, and are being developed to ensure quality work spaces and help ease relocating organizations and equipment in the future reorganizations and realignments as Hurlburt Field grows and expands. The "brief case" move concept is developed to reduce the moving cost of personnel and equipment as organizations change location, size and alignments. The 16th Civil Engineering Squadron must approve all deviations at the earliest possible design stage.

5.2 Interior spaces shall consist of open, flexible administrative and specialty space with minimum use of permanent walls. The flexibility will be accomplished through the use of modular or systems furniture as much as possible.

5.3 Reference AFM 86-2, chapter 13, section 13-2, for explanation of terms. The NET FLOOR AREA per building occupant will be 128 square feet.

5.4 Workstation Size Guidelines

5.4.1 Staff work stations - 8'x8' (64 SF), 86% of organization's space.

5.4.2 Intermediate workstations - 8'x12' (96 SF), 9.6% of organization's space.

5.4.3 Director workstations - 12'x12' (144 SF), 3% of organization's space.

5.4.4 Senior Management workstation - 20'x20' (400 SF), 1.4 % of organization's space.

5.4.5 Unmanned workstation - sized according to function, with prior approval.

5.5 Provide floor to ceiling walled office for office functions that require large amount of counseling. Provide small (4-6 seat) conference areas with floor to ceiling walls for consulting in organizations that would have a larger number of worker's in counseling rolls.

6. Furnishings

Conventional Freestanding

1. Training rooms - tables are to have front modesty panels. Lecterns should be wired for speaker light and for rooms with over 35 people, to be wired for amplification.

2. Use modular, gangable, folding conference tables to the fullest extent possible for ease in configuring space to individual functions.

3. All table and work surface tops except for highest-ranking upper management are to be finished with plastic laminate tops. Wood edging may be introduced if wood is a strong design element in the adjacent interior spaces.

4. Check table height with chair arm height to insure that arms will slide under the tabletop.

5. Upholstery - use fabric that tests over 35,000 double rubs in the Wyzenbeck Test for fabric durability. Use patterned fabric on seating wherever possible to help hide soiling and add texture to interiors. Leather is only to be used in the highest management offices and DV facilities.

6. Task chairs - no fabric covered armrest. Use more durable urethane or other similar solid finish.

7. All task chairs must have 5 casters; swivel bases, adjustable arm rest, and controls for ergonomic adjustments of back and seat tilts and heights.

8. Conference chairs - will have casters. Seat will have swivel and tilt capabilities. Gallery seating for other than highest-ranking management is to have stacking capabilities. Insure that arm height will slide below tabletop.

9. Use high back chairs on upper management desk chairs and conference chairs, or at the head of conference table.

Modular/Systems Workstations

1. Modular furniture wrapped in a panel system is an alternative to cantilevering systems furniture. Use this type of furniture layouts in areas that do not require height adjustments for work surfaces and overhead storage.

2. All desks and work surfaces that are placed away from walls and panels must have full modesty panels and side panels, no "C" legs.

3. Only the most durable, maintenance free, and strongest components are to be used, such as all steel comonetry
4. Use only the most durable, maintenance free, factory finished steel or wood veneer overhead storage unit's drawers are to be used. Fabric is allowed in areas where soiling will not become noticeable after years of use.
5. All modular wall panels are to have the same fabric and color throughout a facility, no accent panels. Accent panels limit future reconfigurations of the panels.
6. Systems furniture and panels with the in the same facility shall be standardized to the same manufacture to allow for compatible hook-up of components in future realignments.
7. All file storage will have metal glides and rollers, preferable concealed. Also provide a catch to keep drawers from being pulled all the way out.
8. Overhead storage will have a catch mechanism to keep door from dropping if not pushed completely back when opening. Provide locks on storage units, keyed alike to each workstation.
9. Work surfaces to be light tone color. No dark colors that will induce eye strain. "Speckled" or small print pattern with smooth finish is recommended.
10. Powered panels will be 8 wire systems. Power poles are to be used only as a last resort; power will run through wall cavities and into the base of the panels.
11. All furniture colors will be mid range neutrals and as homogeneous as possible, this includes fabrics, trim and paint colors. Stronger, accent colors and patterns will be introduced with seating fabrics.
12. Design furniture layout with as many same sized items as possible and as few typical workstations as possible to ease ordering, inventory, and future re configuring.
13. Utilize "to the floor" pedestals and mobile pedestals over hanging pedestals.
14. Choose less intense colors for the panel. Heather or small patterns are recommended.

Storage

1. Centralized common file banks are preferred over storage cabinets at individual workstations.
2. Provide locks for file cabinets. Keyed individually.
3. Utilize freestanding filing as opposed to stacked storage units on modular walls when ever possible.

7. Miscellaneous

- 7.1 Comprehensive Interior Design (CID) packages are to include some or all of the following items. These items are in additions to workstation furniture and interior finishes. Makeup of the CID list will be determined per facility project, early in the design process.
- 7.2 Facility wide - signage (including directories, in/out boards, workstations, stairwell and elevator, door, and rest room signage), bulletin boards, and artwork.
- 7.3 Work areas - trash receptacles, filing (including safes), coat storage (staff and quest), clocks, artwork, lighting.
- 7.4 Conference Rooms - visual presentation cabinets, artwork, lecterns (in large conference rooms), A/V equipment, cabinets and storage, projection/visual screens, credenza or side table in large conference rooms.
- 7.5 Video telecommunication rooms - A/V computer cabinets.
- 7.6 Kitchenettes - built in appliances, freestanding appliances.
- 7.7 Lobbies - guest seating, building directory, planters

8. Installation

1. Specifications for all new building finishes and signage are to include statements to provide the using agency's representative with extra stock materials for future repair or replacement use. The extra stock supplied can be requested in the form of number of units or a percentage of the total installed.

DIVISION 10 - SPECIALTIES

GENERAL:

Make sure the signage in the CID and drawings/specifications agree. Assure specifications reflect actual signage depicted in SID/CID.

Include building signage in contract. Use brown plastic lettering for the exterior signage. Signage needs to comply with AFSOC Regulation 88-1, Facility Design, Exterior Signage, 10 Feb 94.

All road signs installed as part of the contract shall be painted brown on the back and the post shall also be painted brown (Fed. Std 595B, color 20122) except for all regulatory signs. These will comply with the Manual on Uniform Traffic Control Devices.

Wall Protections/Trim: Install bumper guards in high cart traffic areas.

Bulletin Board Guidance

1. Because of their untidy, unprofessional nature, facility managers should control the placement and quantity of bulletin boards.
 2. Bulletin boards are to be located in less public areas, away from main guest entry points and lobbies, and in areas such as break rooms, coffee areas, and coat storage areas.
- 6.5.3.2 Again because of bulletin boards' unprofessional images, the facility should control what is displayed. Closely control personal ads.

Rest Room Accessories

1. Check custodial contracts on items that maintenance/house keeping uses, e.g. toilet paper holders, paper towel size, and soap dispenser type for availability of products used in equipment. Most toilet paper dispensers should be capable of holding a jumbo roll, which has a three-inch center core diameter and the paper itself, is 4" wide by 1,075' long.
2. All combination paper towel dispenser and waste receptacle units must have two separate doors. No single, full-face units are to be used. The separate doors allow for any further necessary towel type changes. There are manufacture's that have convertible dispensing units available. This accommodates any future changes in towel types.
3. American Disabilities Act Accessibility Guidelines (ADAGA) must be followed for mounting locations along with the following placement information. Toilet tissue dispensers in standard stalls are to be installed with centerline of unit to be 12" from front edge of water closet. Toilet tissue dispensers of handicapped stalls are to be installed with centerline of unit even with front edge of water closet.
4. No feminine product dispensers are to be installed in women's rest rooms. Feminine product disposal equipment is to be installed in all water closet stalls for woman's rest room.
5. Provide 8" stainless steel shelves in rest room. Avoid the use of vanities and utilize wall-hung lavatories in high use public rest rooms.
6. Laminate toilet partitions are recommended for most facilities unless there are special requirements that dictate the use of other materials.
7. Insure that rest room mirrors are hung to accommodate handicapped and a second mirror to accommodate a large range of user heights. Mirrors should extend up to 6'-5" in Men's rest room and 6'-0" in Women's rest rooms. These are minimums.
8. Provide a full-length mirror, located to allow for adequate viewing.

Base Interior Sign Standard

1. Purpose of interior signage
 - 1.1 To guide visitors through a building, from the entry point to the correct desk and person.
 - 1.2 To convey information clearly and make a positive contribution to the overall visual of the facilities at Hurlburt Field.
2. Interior signage is standardized by the function it serves.
 - 2.1 Information signs

- 2.2 Building directory, installed at main building entry point.
- 2.3 Floor directory, a secondary directory containing individual floor information only, used in multiple story facilities.
- 2.4 Identification signs
- 2.5 Room identification, used for multiple occupant rooms.
- 2.6 Office identification used for single occupant offices.
- 2.7 Work station identification, used in open office environments, with systems or modular furniture panels surrounding individual work areas.
- 2.8 Desk identification used in open office environment, with conventional freestanding desks.
- 3. Direction signs
 - 3.1 Directional signs can be wall or ceiling hung. Signage can direct traffic to high use areas such as conference rooms.
- 4. Interior signage is to meet the following requirements.
 - 4.1 Simplicity, provide only the needed information. Provide organization or task information instead of name information wherever possible.
 - 4.2 Consistency, apply signage uniformly throughout facility.
 - 4.3 Visibility, locate signs at significant places and orient them to provide clear lines of sight for users.
 - 4.4 Accessibility, to provide a universally accessible facility, all fixed information such as room numbers, elevator, stairs, and rest room graphics are to have Braille characters or in be Braille. Room numbers shall have raised text and Braille. Room names and person names shall have interchangeable letters.
 - 4.5 Flexibility, due to the dynamics of many of the organizations it is required that all tenants exclusive information is totally field changeable, without total sign replacement. Signs are to be "sleeve" type with interchangeable, reusable panels. Lettering will be vinyl cut letters. Standard font styles Optima or Helvetica if Optima is not available.
 - 4.6 Color, signage shall not compete or be in conflict with the CID of the facility. Colors are to be neutral tones, with high contrasting background and text colors.
 - 4.7 Signage Plans and specifications will be included in all CID packages. If no facility renovation is programmed, a comprehensive facility wide interior signage plan is to be developed and new signage purchased. Signage will be from one source within in a facility, Regardless of the number of users within that single facility.
 - 4.8 Procuring Interior Signage through:
 - 4.8.1 In new facility construction and facility renovation projects, rest room and door signage is funded with construction funds. All other information, identification, and direction signage is funded as part of the CID.
 - 4.9 See AFP 88-40 for additional information on hierarchy of facility signage, layout and wall placement.

DIVISION 11 - EQUIPMENT: NOT USED

DIVISION 12 - FURNISHINGS

Address systems furniture and furniture prewiring, including connectors/plugs. All systems furniture shall be prewired for telephone, computer, LAN (Local Area Network), and electrical.

Systems Furniture: Insure wall panels do not cover up light switches, fire alarm pull boxes, etc.

Make sure systems furniture, prewiring and plug requirements are coordinated with building systems.

Wall Off mats/surfaces

- 1. Utilize large areas of in-laid walk-off matting at building entry points, to preserve the adjacent interior flooring.

Window Treatments

1. General administrative areas are to have 1" wide metal horizontal blinds.
2. Upper level management administrative areas can utilize vertical vinyl blinds with wall covering or fabric inserts.
3. Due to high maintenance needs, the use of fabric pleated drapes is highly discouraged.

See Hurlburt Field CID Program, paragraph 6., page of this document for additional Furnishings information.

DIVISION 13 - NOT USED

DIVISION 14 - CONVEYING SYSTEMS

All hoist systems shall be load tested before the facility will be accepted.

Elevators at Hurlburt shall be AC gearless type to avoid oil leaks and possible contamination environmentally and to reduce energy consumption, unless otherwise approved by the BCE. Assure elevators comply with local regulations and O&M contractual requirements. Where hydraulic elevators are approved, provide automatic rail oilers. For all elevators, supply a fireman's service key of type G1617X.

DIVISION 15 - MECHANICAL

GENERAL

All piping on Hurlburt Field shall be in accordance with Appendix A.

Provide a tracer wire on top of all non-metallic piping buried 150 millimeters (6 inches) below finish grade or deeper. Tracer wire shall be magnetic detectable conductor, brightly colored plastic covering, imprinted with the type of service in large letters.

Provide water tube boilers on all projects.

In accordance with Executive Order 12902, dated March 1994, provide water efficient plumbing fixtures (toilets, urinals, faucets, etc.)

Supply chain and locks on all outside valves and backflow preventors that support a fire sprinkler system. Locks shall be keyed with Best's cylinders.

Items such as exhaust fans, gutters, downspouts, vent stacks, louvers, etc., shall match the color of the surface on which they are installed. The color shall be factory installed not field painted. For items that cannot be factory finished, the color shall match #2M54E Tortoise Shell from Devoe Paint Co. when the item is installed on the light tan CMU.

WATER AND SEWER

1. Check fire flow test data for quantity/pressure requirements. Test data cannot be more than six months old.

2. Water-Supply - Waste Treatment:

a. Water Supply Treatment requirements: The only treatment for Base potable water is chlorination. With new EPA Regulations we may need further treatment at each well.

b. Wastewater Treatment:

(1) Flow Capacity: The New Base Plant is an Advanced Waste Water Treatment Plant with tertiary treatment and wetland disposal. Capacity of new plant is 1,000,000 gallons per day.

(2) Existing wastewater flow and available design capacity for treatment average a daily flow of 526,000 GPD.

c. Chemical feed system shall be installed on all closed loop hot and chilled water systems.

3. Sanitary Sewage:

a. Minimum collector line sizes

(1) Housing area - eight inches

(2) Other areas - eight inches

b. Manholes with a minimum diameter of 4 feet shall be provided. Cleanouts shall be provided on all building tie-ins.

c. Lift stations: A study shall be made of the lift station serving this area to ascertain that it can handle this additional load.

(1) Each station shall be equipped with dual pumps and motors to provide full standby in the event of one failure. An exhaust system shall also be a part of the lift station to be used when maintaining the station.

(2) Controls shall be mounted with a weatherproof control panel located above ground.

(3) Extra manhole capacity shall be provided to give additional storage in the event of power failure.

(4) Emergency power connections shall be provided so that standby generators can be used in the event of power failure.

(5) All lift stations shall be screened with split-faced CMU walls, plantings, or combination of both.

4. Pipelines/Utility doors/Manholes: Manholes shall be 48 inches in diameter. Manhole spacing shall not exceed 300 LF. All junctions shall be in manholes. Water and sewer lines shall be apart on paralleled lines with sewer lines below water lines. Line crossings shall be separated 6 inches with potable lines on top. Sleeves shall be used under roadways. Maximum/Minimum depths of cover: The minimum depth shall be 18" and the maximum depth due to the high water table shall be 48". Long force mains shall have air relief. Check valves shall be installed at the discharge of all lift station pumps.

5. Backflow prevention: Backflow preventors shall be installed on all domestic and fire suppression systems tied into the Base water supply. The preferred location of backflow preventors is in mechanical room or below grade if located outside. If approval is given to place above ground, screen and protect from freezing and place backflow preventors where not visible from the street.

Install backflow preventors in the required position specified by the manufacturer with accessibility for testing and maintenance. Accessibility is defined as having adequate clearance

from walls and obstructions. Backflow preventor should be installed at least 6 feet from ceiling, have 12" to 30 " diameter clearance around and have adequate space below the device to use a ladder (minimum of 5' open floor space).

6. Cleanouts: Do not install cleanouts in the middle of corridors or doorways. Prefer wall cleanouts.
7. All inside fire suppression piping shall be schedule 40 (minimum) for all pipe sizes.

HVAC

1. Assure written temperature and humidity control requirements are identified in writing before starting design of the HVAC system. Humidity control is desired on all projects. At the minimum, the system specified should be capable of being modified to provide humidity control either by some control component or alteration of sequence of operation.
2. Design facility for connection to the base wide DDC system. The Base system is Network 8000 software and controls as manufactured by Barber-Colman/Siebe. A phone and LAN connection shall be located next to the Barber Colman Global Control Module in each facility.
3. Is equipment redundancy required: All requests for redundant equipment shall be identified in writing before starting design of the HVAC system.
4. Is a dedicated independent HVAC system or a split system required to meet user requirements: All requests for dedicated independent HVAC equipment shall be identified in writing before starting design of the HVAC system.
5. When systems are required to control space relative humidity, the design shall provide this control independent of the space load. In other words, reheat capacity shall be capable of maintaining the space temperature at the set point with no space internal load present.
6. Do not use fan coil air conditioning units at Hurlburt Field.
7. Maintenance Considerations:
 - a. In order to have a maintainable chiller system; the chiller shall have semi-hermetic compressors and air-cooled.
 - b. Hot and chilled water systems shall utilize end suction, base mounted, flexible coupled, pumps for circulating water.
 - c. Corrosion Control/Cathodic Protection: All dissimilar metals and exposed metal systems shall be protected from corrosion. Corrosion prevention to include isolation of dissimilar metals, painting and any other electrolytic corrosion prevention shall be installed.
 - d. Water treatment: Chemical feed system shall be installed on all close loop hot and chilled water systems.
 - e. Maintainability shall be designed into the project. Outside double doors with louvers shall be provided on equipment rooms. Space for maintenance shall be provided around all equipment.
 - f. Heating and domestic water piping may be insulated with fiberglass insulation. All chilled water piping shall be insulated with cellular glass insulation. Specifications shall be prepared to eliminate the options for flexible cellular and fiberglass insulation for chill water piping.
 - g. Provide at least the minimum space that the equipment manufacturer requires for proper maintenance and operation of his equipment.

h. Operating instruction manuals shall be furnished for all equipment in accordance with the Special Clause for Air Force Operations and Maintenance Manuals in the specifications. Contractor shall also install a cabinet in the mechanical room for storage of manuals, shop drawings and one set of as-built drawings (Contractor is to provide one copy of each). This Special Clause must be detailed by the designer to cover the specific items of equipment in the project.

i. Spare parts inventory list shall be provided for all equipment.

j. All equipment shall be compatible with existing equipment.

8. HVAC Controls:

The project shall be designed for Direct Digital Control (DDC) systems to match the Base's DDC System. The system shall be Barber Colman Network 8000 Direct Digital Control System.

Barber Colman Network 8000 Direct Digital Control System, hereinafter referred to as Barber Colman DDC, shall consist of a Global Control Module with Local Portable Programmer's Terminal, Local Control Modules/Microzone II for air handling units, Local Control Modules/Microzone II for the boiler and chiller, and Variable Air Volume Box Controllers for variable air volume terminals. The system shall be complete with all sensors, wiring, software, and hardware to form a functional HVAC automation system. Sensors, sensor wiring, gauges, thermometers and other accessories, which are not part of the packaged Network 8000 system or Local Area Network, shall be as specified hereinafter. Training shall be provided in accordance with paragraph TRAINING. Control system submittals shall be made in accordance with paragraph SUBMITTALS. Control system shall be set up for connection to the base LAN.

a. In addition to the hardware and software required at the building, the contractor shall also provide the following software development for the existing Barber Colman Network 8000 Host

System located in the Energy Management Control System (EMCS) section of Base Civil Engineering.

b. Graphical Building Representation: A graphical building representation with room names and room numbers shall be created for the Host System. The software shall allow logical routing from the room to the boiler and/or chiller through all intermediate items of equipment. At each level, the user shall be able to route to the previous display, the next logical equipment item, or the main building plan. User interface shall be roller mouse or digitizer for this operation. All building related attributes such as room set points, occupied schedules, etc. shall be displayed real-time and accessible from the graphic screen for modification.

c. Graphical System Schematics: A graphical system schematic for each air handling unit, chiller, pump, boiler, and variable air volume terminal shall be supplied with all sensed parameters displayed. In addition to the sensed parameters, system schematics including water coils shall display the chilled water or hot water supply temperature as measured at the chiller or boiler respectively. All system related attributes such as equipment control set points, throttling ranges, operating schedules, etc. shall be displayed real-time and accessible from the graphic screen for modification.

d. System support: The contractor shall provide 1-year system support for all hardware and software in the control system at no additional cost to the building owner. System support shall include modem communication between the contractor and the building, the contractor and the EMCS host, and voice communication between the owner and the contractor. The system support service shall be available 5 days per week between 9 am and 4 pm. During the 1-year system support period, the contractor shall maintain a duplicate set of building software on his support computer. At the owner's option, software problems will be solved by verbal instruction, remote correction by the contractor on the support computer keyboard, or on site correction by the contractor. The number of system support calls shall be unlimited during the 1 year period.

9. Energy Conservation: High efficiency chillers and boilers shall be specified. Heat recovery/desuperheater units should be considered when domestic hot water demands are significant.

SPECIALTIES - MECHANICAL

For dormitories, use ETL 93-2: Dormitory Criteria for Humid Areas.

Provide only above ground fuel storage tanks. Make sure they are visually screened. Check cathodic protection on connecting fuel lines (as well as cathodic protection for complete project). New fuel tanks less than 550 gallons shall be double wall/secondary containment.

Underground fuel tanks are not allowed.

AFFF fire suppression systems shall not include underground tanks or other means to contain the foam in the event of a discharge. Hurlburt Field will handle a foam discharge under established contingency procedures. The design of an AFFF system should insure there is no means to purposely directly discharge into either the sanitary or stormwater systems.

Electrical and mechanical drawing must be coordinated to avoid conflicts for electrical service to equipment.

Buried pipelines. Cathodic protection should be considered for all buried pipelines except PVC.

Concerning fire detection and protection, assure all HVAC equipment shuts down, always tie fire pumps into fire alarm panel, and use electrical driven fire pumps.

Avoid placement of mechanical items on outside of buildings in view of the public.

Avoid unsightly/annoying placement of mechanical and other structural items on roofs.

Provide all equipment schedules and sequence of operations on the drawings.

Ensure all exterior mechanical equipment is screened.

POL lines will not be placed underground unless site conditions warrant and underground placement approved. Underground POL piping will be double-walled with monitoring system.

DIVISION 16 - ELECTRICAL

GENERAL

Do not attach security lights to the side of the building. Light the building from other sources (poles, ground mounted floodlights, soffit lighting). For parking lots, use bronzed light posts--no wood; light poles shall be round tapered type, constructed of seamless extruded aluminum with a bronze factory finish. Fixtures shall also have bronze finish; Parking lot light fixture shall be low-profile rectilinear fixture with flat prismatic lens ("shoe box"). For street lighting, poles shall be concrete with bronze fixtures; use fixtures similar to "shoe box" except with diffuser to provide IES Type III light pattern.

Address systems furniture and furniture rewiring, including connectors/plugs. All systems furniture shall be prewired for telephone, computer, LAN, and electrical.

Exterior surface mounted conduits, electrical boxes, etc. are not allowed. All conduits, electrical boxes, etc. shall be concealed on the interior of all facilities (exception will be industrial type facilities such as maintenance areas).

All electrical distribution should be underground.

Document all user power and grounding requirements. 24 volts DC and 400 HZ power are not unusual in facilities associated with aircraft electronics. Identify any 220-volt or 440 volt requirements.

Check for nonlinear electrical loads if electronic/computer equipment will be used in the facility.

Identify limits of explosion proof electrical requirements.

If emergency power is required, identify equipment to be on emergency power. Size the generator accordingly.

Separate circuits shall be provided for computers within facilities. This practice is to keep noise and/or harmonics produced by other equipment off the computer circuits.

Coordinate all mechanical devices with electrical supply.

Replace overhead electrical power with underground.

Electrical and mechanical drawing must be coordinated to avoid conflicts for electrical service to equipment.

Provide only electric motor driven fire pumps on all projects requiring fire pumps.

Telephone requirement and computer cable requirements must be coordinated with user. Each user has their specific computer requirements and all design is not the same. For MILCON projects, all design and construction of all necessary communications ducts and manholes needed to bring communications to a new facility from the existing utility system will be included. The construction cost estimate will include the cost to procure communications cable necessary to connect new facility to existing system. MILCON construction dollars will be transferred to the Base from the Corps of Engineers so that the Base Communications Squadron can procure and install the cable.

Existing Energy Source: Electricity - All systems requiring power shall be powered from the existing government 12,470-volt primary system. Natural Gas - Okaloosa County Gas District (John Sullivan, 904-678-2123), the gas supplier furnishes this service.

Transformers shall be located in an area that provides easy access to all components inside unit. Transformers shall be dead front, loop feed type. Locate transformer at rear of building in screened "mechanical" yard.

All underground ducts shall include spare conduits or capacity for future use.

Provide access to components for maintenance purposes at all electrical equipment locations.

Switches and controls shall have a permanent label indicating its purpose and be located within easy access to maintenance personnel.

If a security system is required, the design shall include conductors, devices and control panel.

Provide a lighting protection system if required.

Cathodic protections:

Buried pipelines. Cathodic protection should be considered for all buried pipelines except PVC. Specifications for cathodic protection should be performance type.

Storage tanks - all tanks shall meet the special design criteria as required by Florida DER. All fuel storage tanks on Hurlburt Field shall be aboveground type.

Underground utilities shall be jacked and bored under heavily traveled roads or runways unless approved by the Base Civil Engineer to cut.

Wall mounted exterior light fixtures shall not be used. Exterior lighting shall be by pole mounted fixtures or fixtures on the ground. For building entrance lighting, use recessed fixtures in soffits where possible.

Provide louvers or conditioned electrical room.

Provide separate Electrical Room. Do not use Mechanical Room for Electrical Room.

Provide 120-volt service to Generator Battery Charger.

Telephone equipment room shall be conditioned space.

Use sectionalizers in lieu of manhole.

Interior lighting shall use fluorescent (T-8) fixtures with energy saving ballast in admin areas and HID fixtures in industrial type areas.

FIRE DETECTION/PROTECTION

1. Assure local authority having jurisdiction concurs with fire detection/protection design concept and approves design. Performance requirements must comply with Military Handbook 1008C and NFPA (whichever requirement is stricter shall govern).
2. Where performance spec is used for fire suppression, do not show fire sprinkler system past the supply distribution point unless Facility is a hangar. Provide sprinkler system design as support to cost estimate only. When contract specifications require contractor to design fire sprinkler system and contract drawings also show a detailed design, if this design does not meet contract requirements we must pay the difference between his approved design and that shown on drawings. Do not provide any detailed design on the drawings when a performance spec is used, unless it is a hangar. See MIL-HDBK 1008A.
3. Provide an addressable fire detection system in projects of sufficient size to justify cost, i.e. dormitories, multi-story buildings, etc.
4. Fire flow test data is often inadequate or incorrect by the time a contract is awarded and contractor design is initialed. Confirm fire flow test data just prior to advertisement. Also, if we upgrade water supply lines in project, perform Hardy Class Analysis with new supply.
5. Exposure protection is limited due to the location.
6. Fire extinguisher cabinets shall be wall mounted recessed type measuring 9" X 9" X 22 ".
7. Fire extinguishers shall be 4A:60BC rated dry chemical type for all type fires.
8. Emergency lighting shall be provided at all means of egress. See 5-9 Life Safety Code.
9. Existing base fire alarm receiving system is a radio transmission type Building Transceivers Model BT2-3 manufactured by Monaco Enterprises, Inc, East 14820 Sprague Ave, Spokane Washington 99216, 509-926-6277 (Monaco D500-2). Operating frequency for system is 173.8875 MHz.
10. Fire Detection - The design shall include a fire detection system for all areas of the facility. System designed shall utilize multiplexing technology, i.e. addressable detectors. Fire alarm panel shall contain an addressable detector. Fire alarm panel shall contain a liquid crystal display (LCD) to provide information on the location and armature of alarm and/or trouble conditions.
11. Assure suppression system meets needs--foam, dry chemical, wet chemical, steam. Provide backflow preventors for fire suppression systems. If backflow preventor is located outside, protect from freezing and screen it.
12. Assure all HVAC equipment shuts down.
13. Provide firemen service or elevators.
14. Specify lamp test switch in lieu of suitable means of testing lamps.
15. Duct mounted smoke detectors in supply and return if over 15,000 CFM and between 2000-15000 CMF, one detector in supply.
16. Smoke detectors below computer floor.

17. Always tie fire pumps into fire alarm panel.
18. Use electrical driven fire pumps.
19. Paint all fire alarm junction boxes red.
20. Show flow and tamper switches on different zones.
21. Fire Alarm Systems should meet the following specifications for nonaddressable and addressable systems:
22. Control unit shall be exclusively solid state, modular in design with plug-in capability. Operating voltage of system shall be 24 volts D.C.
23. Audible-Visual Alarms shall be utilized throughout a facility. Visual alarms shall be installed in restrooms only. For a renovation to a facility, the audible device shall be of the same type as those currently installed in the existing facility.
24. Mechanical type gas shut-off valves for the fire protection systems in kitchen exhaust hoods shall be used in lieu of electric type valves. Using this type of valve will prevent us from having to reset valves whenever we loose power.

SECTION 16721: FIRE ALARM AND SMOKE DETECTION SYSTEMS

NONADDRESSABLE

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1. APPLICABLE PUBLICATIONS: 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.

1.1 Factory Mutual System (FM) Publication:

Approval Guide (Equipment, Materials, Services for Conservation of Property) 1989 with Quarterly Supplements.

1.2 National Fire Protection Association (NFPA) Standards:

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|----------|--|
| NFPA 70 | National Electrical Code. |
| NFPA 72 | Installation, Maintenance and Use of Protective Signaling Systems. |
| NFPA 72E | Automatic Fire Detectors. |
| NFPA 90A | Installation of Air Conditioning and Ventilating System. |

1.3 Underwriters Laboratories, Inc. (UL) Publications:

Fire Protection Equipment Directory (Jan 1989 with Quarterly Supplements).

UL 38 Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems

UL 228 Door Closures-Holders, with or without Integral Smoke Detectors.

UL 268 Smoke Detectors for Fire Protective Signaling Systems.

UL 268A Smoke Detectors for Duct Application

UL 464 Audible Signal Appliances.

UL 521 Heat Detectors for Fire Protective, Signaling Systems.

UL 864 Control Units for Fire-Protective Signaling Systems.

1.4 SUBMITTALS

A. Submit shop drawings showing all system components under provisions of Section 01300.

B. Submit manufacturer's data on all components used in the system under provisions of Section 01300.

C. Under no circumstances will installation begin prior to approval of submittals.

2. GENERAL: The Contractor shall furnish and install all devices, hardware, panels, conduit wiring, etc., to provide a complete and working system in accordance with the plans and specifications.

2.1 Operation: Operation of any automatic fire detection device or manual station shall result in the continuous ringing of all fire alarm bells in the building, shutdown of air-handling units, flashing of visual alarm lights, and activation of the radio transceiver for transmission of a radio signal to central monitor location. The fire alarm system shall be wired as a Class A. Any alarm or trouble condition silenced at the panel shall not remove that condition from the radio transceiver inputs.

3. MATERIALS AND EQUIPMENT:

3.1 General Requirements: Materials and equipment shall be new standard products of the manufacturer's latest design, and suitable to perform the function intended. Components of two or more models will not be combined to form a single control unit. This equipment will have been in use for the two years preceding the contract bid. Where two or more pieces of equipment must perform the same functions, the same manufacturer shall produce this equipment. The name of the manufacturer and the serial numbers shall appear on all major components. A rigid plastic placard not less than 16-in. square showing each device by zone will be placed adjacent to the control unit. Locks for all cabinets shall be keyed the same as the Monaco Radio Transceiver. (CORE NUMBER C415A).

3.2 Quality Requirements: All materials and equipment shall conform to the requirements of the UL, or the FMS for fire-alarm systems of the type indicated. The Contractor shall submit proof that the items furnished under this specification conform to these requirements. The UL label or seal, or listing in the UL Fire Protection Equipment Directory will be accepted as evidence that the items conform to UL requirements. The FMS label or seal, or listing in the Factory Mutual Approval Guide will be accepted as sufficient evidence that the items conform to the FMS requirements.

3.3 Shop Drawing and Installer Qualifications: Within 30 days after receipt of notice to proceed and prior to starting installation, the Contractor shall submit to the Contracting Officer for approval a complete set of shop drawings to include all material and equipment proposed for installation.

Shop drawings shall show the complete conduit and wiring layout for the equipment, including AWG size and type wire, number of conductors and connections to the equipment items and shall be furnished in accordance with SPECIAL CLAUSES. In addition to a wiring diagram of the system, the drawings shall include schematics for the control unit. Schematics shall not be "typicals" but shall be for the specific equipment to be furnished. The drawings shall be point to point from panel to each J-box to each device and show wire color and wire number. Numbers will be installed on wires using crimp-on tags placed 5 to 6 inches from wires end. Installation of any equipment contained in the materials list shall not commence until shop drawings have been submitted to the Contracting Officer. The Contractor shall also submit for approval, at the same time, the qualification of the installing firm, including the supplier's certificate of acceptance of the qualifications of the installing firm. The schedule shall include catalog numbers, samples, drawings, testing laboratory's reports on the devices to be installed, and such other descriptive matter as may be required to show conformance with these specifications.

3.4 Spare-Parts data: After submittal of the list of equipment, and no later than 2 months prior to contract scheduled completion, the Contractor shall furnish four copies of spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies, with current unit prices and source of supply; a list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified below to be furnished as part of the contract, and a list of additional items recommended by the manufacturer to assure efficient operation for a period of 120 days at the particular installation.

3.5 Qualifications of Installer: The system shall be installed by an experienced firm regularly engaged in the installation of automatic fire-detection and alarm systems in accordance with NFPA standards. The alarm system contractor shall be state certified as Alarm System Contractor I and listed under the Underwriters Laboratories (UL) directory as an UL certified fire alarm contractor. The Contracting Officer shall reject any proposed installer who cannot show evidence of such qualifications.

4. INSTALLATION AND WIRING: System components shall be securely fastened to their supports independently of the wiring. The control unit will be installed in a room directly accessible from the building exterior. Runs of conduit, tubing, wire and cable shall be straight, neatly arranged, properly supported, and parallel or perpendicular to walls and partitions. Installation of wiring shall conform to NFPA 70 and SECTION: ELECTRICAL WORK, INTERIOR. All wiring shall be installed in conduit. The sum of the cross-sectional areas of individual conductors shall not exceed 40 percent of the interior cross-sectional area of the conduit. Wiring for fire alarm zones shall be color-coded by zone with each color remaining consistent throughout the zone. This does not negate the requirements for numbering wires. Numbers will originate at the control panel and be used throughout the circuit at all junctions and terminal devices. Wiring for audible/visual circuits shall be color-coded red for positive and black for negative. All junction boxes and their covers will be painted red.

5. AUDIBLE AND VISUAL ALARM DEVICES: Audible and visual devices shall be furnished to indicate an alarm throughout the building. Type devices are specified below. The centerline of the devices shall be mounted not less than seven feet above the finished floor at the locations shown on the drawings. All devices shall be supervised and operate on low voltage D.C. furnished by the control panel. All audible devices shall meet UL 464 requirements.

5.1 Signal Devices: Strobe horns shall be used for noncoded signals. Bells will be used where horns conflict with other devices. Chimes will be used in low noise areas such as hospitals and childcare facilities.

5.2 Visual Alarm Indicator: Visual indicators shall have a high impact plastic translucent lens with "FIRE" printed in red letters on at least two sides and shall be positioned to be readable from any angle. The signal shall be non-coded and shall flash on-and-off at a minimum rate of 60 flashes per minute. This indicator will normally be integral with the horn except where only a visual indicator is required.

6. **MANUAL FIRE-ALARM STATIONS:** Manual fire-alarm stations shall be of the noncoded type located near exits in the approximate locations indicated and mounted at the heights indicated on the plans. Surface-mounted stations shall have an integral or matching back box. Stations shall be of the single action glass rod type requiring a common slotted screwdriver for access. Keys or special tools are not acceptable. Stations will be of metal fabrication.

7. **FIRE-DETECTING EQUIPMENT:** Fire detecting equipment shall conform to NFPA 72E and shall be of the following types, as indicated on the drawings and as approved by the Contracting Officer: fixed-temperature heat detector, fixed/rate of rise heat detector; photoelectric smoke detector. Detector circuit design shall be suitable for the types and numbers of detectors, as approved, and shall limit detector circuit current not to exceed ratings of the detectors and associated relays.

7.1 **Location:** Detecting equipment shall be installed as shown on the drawings. Should a conflict occur between the drawings and the NFPA codes, the NFPA codes will take precedence. Fire alarm components will not be installed on building exteriors unless expressly required by NFPA codes and then must be weather proof. Pull stations will have removable plastic covers and be sealed around their mounting surface. Detectors shall be placed to provide full coverage as required in NFPA 72E.

7.2 **Photoelectric Type Smoke Detectors:** Ceiling or duct mounted smoke detectors that operate on the light scattering or the light obscuration principle shall be furnished. Detectors shall conform to the requirements of UL 268. Detector sensitivity shall be factory set to meet UL 268 requirements. Detector amplifiers and sensing circuits shall be exclusively solid state. The detector shall incorporate a solid state voltage regulator, which can maintain detection sensitivity over an input voltage range of 18-32VDC. Current limiting shall protect the detector against power surges and noise protection. Internal relays or solid-state switches shall provide trouble and alarm contacts for annunciation. The smoke detector shall have a magnetic self-test feature. The detector shall have terminals or connector plugs for making all connections and shall be installed in accordance with the manufacturer instructions. Detectors that are not powered by zone voltage will be powered from the DC circuits of the fire alarm control panel.

7.3 **Heat Detectors:** Heat detectors shall function on both the rate of rise and fixed temperature principle for below ceiling detectors. Above ceiling detectors will be 190-200 Deg fixed temp. Detectors in foyers or breezeways will be 135 deg fixed temp. Detectors will not be mounted in direct airflow from ducts or adjacent to incandescent lighting. Detectors shall be low profile design, white in color and be provided with a plastic mounting plate for surface mounting. Fixed / rate of rise heat detectors shall be installed in the locations shown on the plans. Additionally, heat detectors shall be installed in all rooms, halls, storage areas, basements, attics, lofts, spaces above suspended ceilings, and other subdivisions and accessible spaces, and inside all closets, elevator shafts, enclosed stairways, dumbwaiter shafts and chutes as in accordance with NFPA 72E. The temperature rating of the detectors shall be 135 or 190-200 degrees Fahrenheit as indicated on the drawings. Installed locations on drawings are approximate only; actual placement will be such that rate of rise detectors shall not be in the direct path of air flow outlets and shall be at least five feet from heat/air conditioner ducts. The heat detectors selected shall meet the requirements of UL 521 and shall be installed in accordance with the manufacturer's instructions. LED indicators will be provided for inaccessible heat detectors and installed on the ceiling below it's respective detector.

7.4 **Duct-Mounted Smoke Detectors:** Duct-mounted photoelectric smoke detectors shall be furnished and installed where indicated. The detector shall provide detection for combustion gases and smoke in air conditioning ducts in compliance with the NFPA 90A. The detector shall be UL Listed specifically for the use in air handling systems. The detector shall operate at air velocities ranging from 500 ft. per minute to 3500 ft. per minute without requiring compensation for operation at specific air velocities. Sampling tubes of sufficient length shall be provided so that the sampling tube can be cut to exact length at the installation site to match duct width at the installed location and must be secured to the duct on both sides. The detector shall function in conjunction with the fire detection system control equipment to shut down the air handling devices via the fire control panel. A remote key/reset/test switch shall be furnished at a location that is easily accessible for testing the

duct detector. The detector housing shall be equipped with a transparent viewing port which shall permit viewing of detector head Alarm/Power-On indicator at viewing angles up to 80 degrees off normal and inspection of cleanliness conditions inside the detector head mounting chamber. The detector shall be the plug-in type in which the detector base contains terminals for making all wiring connections. The detector indicator shall blink intermittently during standby conditions and shall glow red during alarm conditions. All LED's to indicate the operating and alarm condition and test and reset buttons or test part shall be visible, and accessible, with the unit installed and the cover in place. Detector operating voltage will be supplied from the DC circuits of the fire alarm panel. Detectors shall have the alarm verification feature in conjunction with the control panel.

8. CONTROL UNIT: Control unit (Fire alarm panel) shall be installed as part of the system in each protected building and shall be approved for use with the fire detecting equipment, manual fire-alarm stations, and alarm-sounding devices. The unit shall operate with 24 volts DC derived from its internal AC rectifier/power supply. The control unit circuits shall be exclusively solid state. The control unit shall be housed in a substantial steel cabinet with lock and key. The cabinet shall be painted inside and out. The control unit shall include light emitting diodes (LED's)(Lamps or neon tubes not acceptable) to visually indicate the system condition, e.g., alarm and trouble by zone, system trouble conditions, primary and backup power supply status, etc. A single switch will be provided to test all LED's. The control unit shall include switches and devices to test all control unit functions. This includes a system test switch, zone disable, system reset, disconnectable bell, auxiliary disconnect and audible trouble silence switch, etc. The silence switch shall be provided with an audible resound feature. The unit shall supervise all alarm initiating circuits and all alarm sounding circuits. The components will be modular with plug-in capability. Wires will not require removal to service a module. A separate supervisory module will be provided for tamper and supervisory circuits. Rigid engraved plastic ID tags attached to the face of the control unit or the internal face providing they are visible through a transparent window will identify all zones. Paper, etching or embossing tape is not acceptable. It shall also provide regulated and unregulated DC power for smoke detectors that do not operate on zone voltage. With a zone disabled the control unit shall repeat the alarm sequence when a second, third, etc., alarm is initiated in other zones. All LED's shall be plainly visible when the door on the control unit is closed. The control unit shall operate separate audible and visual signals when a ground fault is detected in any supervised circuit or device. It shall sound a distinct audible alarm and flash the visual alarm indicators throughout the building when any manual or automatic device on the system is activated. The fire alarm panel shall be equipped with at least two alarm relays and one trouble relay as integral components of the panel. Add on relays are not acceptable. One alarm relay and the trouble relay dry contacts shall be used solely to activate a radio transceiver, Monaco Model BT2-3. The second alarm relay shall accomplish all auxiliary control, interlock and shutdown functions, as indicated herein and as shown on the drawings. Only low voltage (24) will be brought into the panel for auxiliary functions. The control panel shall have the alarm verification and walk-through test features. The walk test feature will be solely a function of the panel. The use of plug-on units and special devices in conjunction with this feature is unacceptable. The control unit shall meet the requirements of UL 864 and shall be listed for NFPA 72 and NFPA 72E SERVICE. Transmitter disconnect module not acceptable.

9. TRANSCEIVERS: Radio transceiver shall be provided for interface of the building fire alarm system and the existing Base central monitor receiver. The transceiver required shall be a Building Transceiver BT2-3 manufactured by Monaco Enterprises, Inc. Wiring used to interface the transceiver alarm and trouble inputs with the fire alarm control panel shall be no greater in size than 18 AWG. The frequency of operation for the transceiver shall be 173.8875 MHz. Only general alarm and trouble conditions will be zoned into the Monaco from the control unit, unless requested otherwise. If a facility should require more than five zones to be interfaced into the Monaco then a BT2-4 will be required.

9.1 Antenna: Antenna for radio transmitter shall be Monaco Assembly Part No. 190-400-00.

9.2 Antenna Cables: Antenna cable for transmitter shall be RG-8/AU coaxial cable if length is greater than 20 feet. If length is less than 20 feet then use RG-58/AU. Utilize proper fittings or connectors with center conductors soldered to connector pins. Pressure type connectors are not acceptable. Protect exterior entry points against moisture.

10. POWER SUPPLY:

10.1 Primary Power Supply: Primary power supply for the control unit shall be on a dedicated branch circuit wired ahead of the facilities main circuit breaker and protected by surge protection devices. The service disconnect shall be accessible only to authorized personnel, installed adjacent to the control unit and clearly marked FIRE ALARM. Id tag will be rigid plastic. Primary power supply wiring shall be installed in electrical metallic tubing in accordance with the applicable requirements of SECTION: ELECTRICAL WORK, INTERIOR. Transformer, rectifiers, and other required power-supply components shall be incorporated in the control unit, or a separate power-supply unit may be furnished and installed if approved for the application.

10.2 Standby Power Supply: Standby power to insure operation of the fire alarm system in the event of primary power failure shall be provided by no more than two each maintenance free storage batteries. Power supply shall be provided with an automatic battery charger capable of a high/low charge rate. The transfer to battery shall be automatic upon failure of the primary power supply; indicated by a trouble signal at the control unit. Battery shall have the capacity to operate the fire system for 24 hours and then be capable of sounding all alarms for five minutes in the event of total failure of the primary power supply. The charging circuit for the battery shall be supervised to indicate a low battery condition and be rated to recharge fully discharged batteries in 24 hours.

11. FIRE DEPARTMENT EQUIPMENT: The Contractor furnished transceiver will interface, and be fully compatible with the Government system. The existing system is a Monaco D500 Plus Radio Fire Alarm System.

12. DRAWINGS AND MANUALS: Upon completion of the installation and prior to final inspection, the Contractor shall furnish four copies of "as-built" drawings. Drawings shall show equipment configuration, control panel equipment and subassembly locations, and the location of the transceiver and all connecting wiring. Drawings shall include all wiring color codes and terminal numbers and termination points for all wires. In addition, the Contractor shall furnish four copies of a manual giving complete instructions for the operation, inspection, testing, and maintenance of the system including wiring diagrams.

13. End of line devices: The drawings shall include a detailed wiring layout showing all junction boxes and all system wiring, including number of wires, with zones and alarm sounding circuits and initiating and alarm sounding devices identified. The layout shall be done on the building floor plans.

14. TOOLS AND SPARE PARTS: All special tools or equipment necessary for the operation and maintenance of the equipment including testing shall be furnished. The items furnished will be new/unused items with packaging and manuals. One spare set of fuses of each type and size required, and 2 percent of the total number of each type of detector, but not less than two thereof, shall be furnished.

15. REPAIR OF EXISTING WORK: The work shall be carefully laid out in advance. Cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings or other surfaces as necessary for the proper installation, support, or anchorage of the conduit or other work shall be carefully done. Damage to buildings, piping or equipment shall be repaired and refinished by skilled mechanics of the trades involved.

16. TESTS: After all equipment for this system has been installed and made operational, and at a time directed by the Contracting Office, the contractor shall conduct tests to demonstrate that the installation and the system operation is in accordance with the plans and specifications. Testing of the system shall include remote annunciation of alarms and trouble conditions to the fire department. In addition to the request letter, the Contractor shall submit a test plan/procedure to the Contracting Officer to indicate his proposed method to demonstrate compliance with the plans and specifications. The contractor will also certify in writing that the work accomplished meets all contractual requirements. The government will provide one retest. Subsequent testing will result in reimbursement of expenses to the government. As-built drawings shall be furnished to the Contracting Officer two weeks prior to any initial inspections. Satisfactory operation of each of the following devices shall be demonstrated during the test:

- (a) Each automatic detector.
- (b) Each manual fire alarm station.
- (c) Each transceiver, all functions.
- (d) Each audible alarm device.
- (e) Each visual alarm device.
- (f) Supervision of each device such as; heat detectors, pull stations, smoke detectors, etc; and alarm zone circuits to include ground faults.
- (g) Satisfactory operations after loss of primary power supply.
- (h) Satisfactory operation of each device shut down circuit with correct zone correspondence. This shall not be simulated but shall actually be demonstrated by actual device/equipment shutdown.
- (i) All control panel functions, alarm and trouble, audible and visual indicators, silence switches and their resound function and alarm resound features of the control unit.
- (j) In each zone containing automatic smoke detectors, each detector will be put into the alarm mode and stay in that mode for 10 minutes after the last detector goes into alarm, to verify satisfactory operation of the detectors and the detector power supply module under alarm load. Smoke is expressly forbidden for this test.
- (k) Supervision of DC power on each automatic detector circuit.

17. TRAINING: qualified personnel who have been certified by the manufacturer will accomplish All training. The Contracting Officer will approve all training dates and times. All training will be done Monday through Friday between 0700 and 1600. The Contractor shall provide training on the operation and use of the system as required. The contractor shall furnish all literature, materials and training aids. Training will be conducted in the new facility. All training aids, schematics and literature will be supplied by the Contractor.

18. QUALITY CONTROL: The Contractor shall establish and maintain quality control for operations under the section to assure compliance with contract requirements, and maintain records of his quality control for all materials, equipment, and construction operations, including but not limited to the following:

18.1 Preparatory Inspection: (To be conducted prior to commencing work.)

- (a) Submittal of all materials and shop drawings necessary for accomplishment.
- (b) Have in hand equipment and wiring layout-showing sequence of wiring.
- (c) Qualifications of installing firm. Must be a Certified Alarm System Contractor.

18.2 Initial Inspection: (To be conducted after a representative sample of the work is complete.)

- (a) Check mounting heights, supports, and accessibility of all items.
- (b) Check temperature ratings of detection against ceiling temperatures anticipated at detector locations.
- (c) Check size of conduits, boxes, and wires for proper sizing in accordance with National Electrical Code and Contracts.

(d) After final acceptance by government authorized agent the contractor will provide UL certification of the fire alarm system.

18.3 Follow-Up Inspection: (To be conducted daily to assure compliance with results of initial inspection.)

(a) Determine that noted deficiencies are corrected.

(b) Make corrections for "as-built" fire alarm system drawings.

(c) Determine that all installed equipment is functional and in accordance with the contract requirements.

(d) Operational test performed.

(e) Damages or defects corrected.

A copy of these records and Contractor tests, as well as records of corrective action taken, shall be furnished the Government as directed by the Contracting Officer.

SECTION 16721: FIRE ALARM SYSTEM SPECIFICATION - ADDRESSABLE

PART 1 GENERAL

1.1 SCOPE & RELATED DOCUMENTS

A. The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations in connection with the installation of the Fire Alarm System as shown on the drawings and as herein specified.

B. The requirements of the conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.

C. The complete installation is to conform to the applicable sections of NFPA-72, 72E, and 90A, Local Code Requirements and National Electrical Code with particular attention to Article 760.

D. Additionally, the entire installed system and all integrated system operations shall be within the guidelines of [the BOCA Basic Building Code] [the SBCCI Standard Building Code].

E. The work covered by this section of the specifications is to be coordinated with the related work as specified elsewhere under the project specifications.

1.2 QUALITY ASSURANCE

A. Each type of item of the Fire Alarm System shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "UL" label. Partial listing shall not be acceptable. Items must be compatible with the installed fire alarm panel.

B. The equipment and installation supervision furnished under this specification is to be provided by a manufacturer (independent dealers and/or distributors will not be considered) who has been engaged in production of this type (software driven) of equipment for at least ten (10) years, and has a fully-equipped service organization within fifty miles of installation.

C. All control equipment must have transient protection devices to comply with UL864 requirements.

1.3 GENERAL

A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans; to be wired, connected, and left in first class operation condition.

The system shall use closed loop initiating device circuits with individual zone supervision, individual indicating appliance circuit supervision, incoming and standby power supervision. Include a control panel, manual pull stations, automatic fire detectors, horns, bells, remote annunciator, all wiring, connections to devices, outlet boxes, junction boxes, and all other necessary material for a complete operating system.

The fire alarm control panel shall allow for loading or editing special instructions and operating sequences as required. The system is to be capable of on site programming to accommodate and facilitate expansion, building parameter changes or changes as required by local codes. All software operations are to be stored in a nonvolatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory.

The ability for selective input/output control functions based on ANDing, ORing, NOTing, timing and special coded operations is to also be incorporated in the resident software programming of the system.

B. To accommodate and facilitate job site changes, initiation circuits shall be individually configurable on site to provide either alarm/trouble operation, alarm only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a non-latching circuit or a alarm verification circuit.

C. To accommodate and facilitate job site changes, indicating appliance circuits shall be individually configurable on site to provide upon activation a [fast march time, slow march time, temporal code, PNIS code or a master code] until [silenced] or [reset] upon any output circuit. The PNIS coded pulse on and off time may be selectable on site to provide 16 different duty cycles between 1/4 second and 5 seconds.

D. All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name on each component.

E. Equipment submissions must include a minimum of the following:

- Complete descriptive data indicating UL listing for all systems components.
- Complete sequence of operations of the system.
- Complete system wiring diagrams for components capable of being connected to the system and interfaces to associated equipment.
- Complete schematic diagrams showing the location, electronic component, complete labels, and parts breakdown with part number and price.
- A copy of the State of Florida Alarm System I Certification.

1.4 OPERATION

A. Under normal condition the front panel shall display a SYSTEM IS NORMAL message and the current time and date.

B. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory, or Trouble) shall flash. The panel audible signal shall pulse for alarm conditions and sound steadily for trouble and supervisory conditions.

C. The LCD shall display the following information relative to the abnormal condition of a point in the system:

1. 40 character custom location label
2. Type of device (i.e. smoke, pull station, waterflow)
3. Point status (i.e. alarm, trouble)

D. Two methods of acknowledgment for each abnormal condition shall be provided. (1) Pressing the appropriate acknowledge condition in the appropriate list (either alarm, supervisory, or trouble), and require another acknowledge button. Press to acknowledge only the displayed point. -or- (2)

Pressing the appropriate acknowledge button shall globally acknowledge every point in the list. These acknowledge functions may be passcode protected if the user has insufficient privilege to acknowledge such conditions. A message shall indicate insufficient privilege but allow the user to view the points without acknowledging them. Should the user have sufficient privilege to acknowledge, a message will be displayed informing the user that the condition has acknowledged.

E. After all the points have been acknowledged, the LEDs shall glow steady and the panel audible signal will be silenced. The total number of alarms, supervisory, and trouble conditions shall be displayed along with a prompt to review each list chronologically. An end of list message "END OF LIST" shall indicate the end of the list.

F. Alarm Silencing

1. Should the "Alarm Silence" button be pressed all alarm signals shall cease operation.
2. Signals shall not be silenced during alarm silence inhibit mode.

G. System Reset

1. The "System Reset" button shall be used to return the system to its normal state after an alarm condition has been remedied. The LCD display shall step the user thru the reset process with simple English language messages. Messages, "SYSTEM RESET IN PROGRESS", will first be displayed followed by the message, "SYSTEM RESET COMPLETED" and finally, "SYSTEM IS NORMAL", should all alarm conditions be cleared.

2. Should an alarm condition continue to exist, the message, "SYSTEM RESET IN PROGRESS", will be followed by the message, "SYSTEM RESET ABORTED", and the system will remain in an abnormal state. System control relays shall not reset. The panel audible signal and the Alarm LED shall be on. The display will indicate the total number of alarms and troubles present in the system along with a prompt to use the "Ack" keys to review the points. These points will not require acknowledgment if they were previously acknowledged.

3. Should the Alarm Silence Inhibit function be active, the "System Reset" key press will be ignored. The message, "SYSTEM RESET INHIBITED", will be displayed for a short time to indicate the action was not taken. As feedback to the operator, the message, "SYSTEM RESET NO LONGER INHIBITED" will be displayed when the inhibit function times out.

H. Function Keys

Additional function keys shall be provided to access status data for the following points:

1. Initiating device circuits
2. Indicating appliance circuits
3. Auxiliary relays
4. Feedback point status
5. I/O points

The following status data shall be available:

1. Primary State of Point
2. Zone, PID, and Card Type information
3. Class "A" Status
4. Current Priority of Outputs
5. Disable/Enable Status
6. Verification Tallies of Initiating Devices
7. Automatic/Manual Control Status of Output Points
8. Acknowledge Status

9. Relay Status

I. History Logging

The control panel shall have the ability to store three hundred (300) events in an alarm log plus three hundred (300) events in a trouble log. These events shall be stored in a battery protected random access memory (RAM).

The following Historical Alarm Log events shall be stored:

1. System Reset
2. Alarm Silence
3. Alarm Acknowledgment
4. Alarm Conditions
5. Alarm Historical Log Cleared

The following Historical Trouble Log events shall be stored:

1. Trouble Conditions
2. Supervisory Conditions
3. Trouble Acknowledgment
4. Supervisory Acknowledgment
5. Alarm Verification Tallies
6. Walk Test Results
7. Trouble Historical Log Cleared

Time and Date shall accompany all history event recording.

J. Walk Test with History Logging

The system shall be capable of being tested by one person. While in testing mode, the alarm activation of an initiating device circuit shall be silently logged as an alarm condition in the historical data file. The panel shall automatically reset itself after logging of the alarm.

The momentary disconnection of an initiating or indicating device circuitry shall be silently logged as a trouble condition in the historical data file. The panel shall automatically reset itself after logging of the trouble condition.

Optionally, the walk test sequence will have the capability of activating the alarm indicating appliances [for a maximum of 2 seconds] [to signal a unique code associated to the alarm zone]. IF this option is selected any momentary opening of an initiating or indicating appliance circuit wiring shall cause the alarm indicating appliances to sound for 4 seconds to indicate the trouble condition.

Should the walk test feature be on for an inappropriate [programmable] amount of time, it shall revert to the normal mode automatically.

The control panel shall be capable of supporting up to eight (8) separate testing groups whereby one group of points may be in a testing mode and the other (non-testing) groups may be active and operate as programmed per normal system operation. After testing is considered complete, testing data may be retrieved from the system in chronological order to ensure device/circuit activation.

Should an alarm condition occur from an active point, not in walk test mode, it shall perform all standard programmed alarmed sequences.

K. LED Supervision

All slave module LEDs shall be supervised for burnout or disarrangement. Should a problem occur, the LED shall display the module and the LED location numbers to facilitate location of that LED.

L. System Trouble Reminder

Should a trouble condition be present within the system and the audible trouble signal silenced, the trouble signal shall resound at preprogrammed time intervals to act as a reminder that the fire alarm system is not 100% operational. Both the time interval and the trouble reminder signal shall be programmable to suit the owner's application.

M. Access Levels

1. There shall be four (4) access levels with level 4 being the highest level. Level 1 actions shall not require a passcode. Passcodes shall consist of up to ten (10) digits. Authorized personnel shall only make changes to passcodes.

2. In order to maintain security when entering a passcode, the digits entered will not be displayed but a cursor will move along filling the position with an "X" to indicate that the digit has been accepted. All key presses will be acknowledged by local audible momentary tones.

3. When a correct passcode is entered, the message "Access Granted" shall be displayed. The new access level shall be in effect until the operator leaves the keypad inactive for ten (10) minutes or manually logs out.

4. Should an invalid code be entered, the operator shall be notified with the message, "ERROR...INCORRECT PASSCODE", and shall be allowed up to three chances to enter a valid code. After three unsuccessful tries, the message, "ACCESS DENIED", shall be displayed. The level shall not be altered, and the operator shall no longer be in the menu option.

5. Access to a level will only allow the operator to perform all actions within that level and all actions of lower levels, not higher levels.

6. The following keys/switches shall have access levels associated with them:

- Alarm Silence
- System Reset
- Set Time/Date
- Manual Control
- On/Off/Auto Control
- Disable/Enable
- Clear Historical Alarm Log
- Clear Historical Trouble Log
- Walk Test
- Change Alarm Verification

7. Acknowledge keys shall also require privileged access to acknowledge points. If the operator presses an "ACK" key with insufficient access, an error message will be displayed. The points will scroll with each "Ack" key press to view the points on the list, but the points will not get acknowledged in the database.

N. RS-232-C Output

The fire alarm control panel shall be capable of operating remote CRT's and/or printers. The output shall be paralleled ASCII from an EIA RS-232-C connection with an adjustable baud rate of 300, 1200, 2400, and 4800 to allow use of any commonly available CRT or printer.

Each RS-232-C port shall be capable of driving up to four (4) remote CRT displays or printers. Data amplifiers shall be used to increase CRT or printer capacity beyond four. Each

RS-232-C port may only communicate with one keyboard. The fire alarm control panel shall support up to five (5) RS-232-C ports.

[OPTION]

O. Fire Alarm Control System Network

Each Fire Alarm Control Panel shall operate as a proprietary local system with data communication to a higher order Central Processing Unit (CPU).

The Central Processing Unit shall monitor all alarms and troubles of each Fire Alarm Control Panel.

The CPU shall control each Fire Alarm Control Panel as listed in this specification.

All data communication wiring between the CPU and Fire Alarm Control Panel(s) shall be supervised for opens, shorts, and grounds.

1.5 ALARM SEQUENCES

A. The system alarm operation subsequent to the alarm activation of any manual station, automatic detection device, or sprinkler flow switch is to be as follows:

[ALL] [Selected] audible alarm indicating appliances shall sound a

[Option] continuous fire alarm signal until silenced by the alarm silence switch at the control panel [or the remote annunciator].

[Option] uniform code 3 temporal pattern until silenced by the alarm silence switch at the control panel [or the remote annunciator]. The temporal pattern is to consist of any appropriate sound, keyed ½ to 1 second "on", ½ to 1 second "off", ½ to 1 second "on", ½ second "off", ½ to 1 second "on" and 2 ½ seconds "off", with timing tolerances of plus/minus 25% repeated for not less than 3 minutes.

[Option] selective positive non-interfering successive zone code. Interference of this code shall not be permitted until a completed transmission of its assigned number of rounds. Should coding be completed a continuous master code or march time pattern is to sound until silenced by the alarm silence switch at the control panel [or the remote annunciator].

[Option] March time pattern until silenced by the alarm silence switch at the control panel [or the remote annunciator]. The march time pattern is to consist of [20] [120] pulses per minute.

[Option] Master Code until silenced by the alarm silence switch at the control panel [or the remote annunciator]. The Master Code will consist of a common code [e.g., 4-4-4] which is to be selected to produce a distinctive pulse so that building occupants know unmistakably that a fire condition exists. [The Master Code shall also activate the city circuit].

[Option] Digitized tone [and voice message] until silenced by the alarm silence switch [or individual circuit switch] at the control panel.

2. [ALL] [Selected] visual alarm indicating appliances [incandescent]

[Option] [Xenon Strobes] shall display a continuous pattern until [Extinguished by the Alarm Silence Switch] [System is reset].

[Option] shall display a uniform code 3 temporal pattern until [Extinguished by the Alarm Silence Switch] [System is reset]. The temporal pattern is to consist of any appropriate visual display, key ½ to 1 second "on", ½ to 1 second "off", ½ to 1 second "on", ½ second "off", ½ to 1 second "on" and 2 ½ seconds "off", with timing tolerances of plus/minus 25%, repeated for not less than 3 minutes.

[Option] shall display a selective positive non-interfering successive zone code until [Extinguished by the Alarm Silence Switch] [System is reset]. Interference of this code shall not be permitted until a completed transmission of its assigned number of rounds. Should coding be completed a continuous master code or march time pattern is to sound until silenced by the alarm silence switch at the control panel [or the remote annunciator].

[Option] shall display a march time pattern until [Extinguished by the Alarm Silence Switch] [System is reset]. The march time pattern is to consist of [20] [120] pulses per minute.

[Option] shall display a Master Code until [Extinguished by the Alarm Silence Switch] [System is reset]. The Master Code will consist of a common code [e.g., 4-4-4] which is to be selected to produce a distinctive activate so that building occupants know unmistakably that a fire conditions exists. [The Master Code shall also pulse the city circuit].

[Option] 3. Alarm [horns] [bells] [speakers] [lights] shall operate selectively [by floor] [floor above, fire floor, floor below] [by zone(s) or area].

[Option] 4. Alarm [and control] functions shall not operate until [two, 2] [three, 3] [four, 4] [etc] zones have been initiated, thus providing "Cross Zoning" of two or more zones.

[Option] 5. All doors normally held open by door control devices shall release. [After a ___ second time delay].

[Option] 6. A supervised signal to notify the local fire department is to be activated. To accommodate and facilitate job site changes the type of "city connection circuit" is to be on site configurable to provide either a "reverse polarity", "local energy", "shunt" or dry contact connection.

[Option] 7. The mechanical controls shall activate the air handling systems per life safety specifications, NFPA 101.

[Option] 8. The control panel shall provide on/off/auto switches. In the automatic mode the mechanical controls shall operate the air handling systems as required. The control panel shall indicate "on" or "off" status of the air handling system via separate and distinct "on" and "off" LED indicators. Manual control shall be provided to override the automatic functions. A "positive feedback" input is to be provided to indicate true "on" or "off" status from contact closure of the air handling system. This positive feedback indication is to take precedence in determining true "on" or "off" status.

[Option] The control panel shall provide on/off/auto switches. In the automatic mode the mechanical controls shall operate the air handling systems as required. The control panel shall indicate "on" or "off" status of the air handling system via separate and distinct "on" or "off" LED indicators. Manual control is to be provided to override the automatic functions. A "supervised feedback" input is to be provided to indicate true "on" or "off" status from a contact closure of the air handling system. This positive feedback indication is to take precedence in determining true "on" or "off" status.

NOTE TO ENGINEER: Provision should be made for normally open contacts in the air handling system and wired by the electrical contractor.

[Option] Upon reset of control panel air handling units shall sequentially start up to reduce electrical demand.

[Option] 9. The audible alarms shall automatically time out and switch off after ___ minutes of alarm operation.

10. An alarm is to be displayed on an 80-character LCD display. The top line of 40 characters is to be the point label and the second line is to be the device type identifier. The system alarm red LED shall flash on the control panel [and the remote annunciator] until the alarm has been acknowledged at the control panel [or the remote annunciator]. Once acknowledged, this same LED shall latch on. A subsequent alarm received from another zone after acknowledged shall flash the system alarm LED on the control panel. [And remote annunciator]. The LCD display shall show the new alarm information. A pulsing alarm tone shall occur within the control panel [and the remote annunciator] until acknowledge.

[Option] B. The alarm activation of any elevator lobby smoke detector shall, in addition to the operations listed above, cause the elevator cabs to be recalled according to the following sequence:

1. If the alarmed detector is on any floor other than the main level of egress, the elevator cabs shall be recalled to the main level of egress.

2. If the alarmed detector is on the main egress level, the elevator cabs shall be recalled to the predetermined alternate recall level as determined by the local authority having jurisdiction.

[Option] C. The activation of any system smoke detector shall initiate an Alarm Verification operation whereby the panel will reset the activated detector and wait for a second alarm activation. If within one (1) minute after resetting, a second alarm is reported from the same or any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within one minute the system is to resume normal operation. The Alarm Verification is to operate only on smoke detector alarms. Other activated initiating devices shall be processed immediately. The alarm verification operation is to be selectable by [zone] [device].

1. The control panel shall have the capability to display the number of times a zone has gone into a verification mode.

[Option] 2. Alarm verification zones shall have the capability of being divided into seven different groups whereby only two verification zones from a group will confirm the first activation and cause the panel to follow programmed alarm sequence.

D. The control panel is to have a dedicated supervisory service LED and a dedicated supervisory service acknowledge switch.

1. The activation of any standpipe or sprinkler valve tamper switch shall activate the system supervisory service audible signal and illuminate the LED at the control panel [and the remote annunciator]. Differentiation between valve tamper activation and opens and/or grounds on fire alarm initiation circuit wiring shall be provided.

2. Activating the Supervisory Service Acknowledge Switch will silence the supervisory audible signal while maintaining the Supervisory Service LED on indicating the tamper contact is still in the off-normal state.

3. Restoring the valve to the normal position shall cause the Supervisory Service Led to extinguish thus indicating restoration to normal position.

[Option] Restoring the valve to the normal position shall cause the supervisory service audible signal to pulse thus indicating restoration to normal position. Activating the Supervisory Service Acknowledge Switch will silence the audible signal and restore the system to normal.

[Option]

K. The alarm activation by either a manual or an electrically operated coded station shall pulse the signals to follow that code. The coded input signal shall take priority over all other input signals. All other inputs shall be processed accordingly after coding is completed. Control circuits for door release and air-handling systems shall not be delayed.

[Option]

F. A manual evacuation switch shall be provided to operate the systems alarm indicating appliances. Other control circuits shall not be activated. However, a true alarm shall be processed as described previously.

G. Activation of an auxiliary bypass switch shall override the automatic functions either selectively or throughout the system.

H. Alarm and trouble conditions shall be immediately displayed on the control panel front Alphanumeric LCD display. If more alarms or troubles are in the system the operator may scroll to display new alarms.

I. The system shall have an alarm list key that will allow the operator to display all alarms, troubles, and supervisory service conditions with the time of occurrence. This shall allow for the determination of not only the most recent alarm but also may indicate the path that the fire is taking.

[Option]

J. A voltmeter and ammeter shall be provided to indicate battery voltage and charging current.

K. All doors normally held open by door control devices shall release upon AC power failure.

L. The control panel shall be capable of supplying 5 AMPS @ 24VDC power output expandable to [total power req.] amperes.

[Option]

M. The alarm sequence is to be recorded with the time and date of all occurrences on the system printer[s].

1.6 SUPERVISION

A. The system shall contain up to ____ [Class 'B' (Style 'B')] [Class 'A' (Style 'D')] independently supervised initiation circuits so that a fault in any one zone shall not affect any other zone. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of other circuit.

[Option]

B. There shall be sprinkler supervisory initiation device circuits for connection of all sprinkler valve tamper switches to perform the Supervisory Service Operation. Wiring methods which affect any fire alarm initiation circuits to perform this function shall be deemed unacceptable; i.e.: sprinkler and standpipe tamper switches (N/C contacts) shall NOT be connected to circuits with fire alarm initiation devices (N/O contacts). This independent initiation circuit shall be labeled Supervisory Service and shall differentiate between tamper switch activation and wiring faults.

C. There shall be up to __ independently supervised and independently fused indicating appliance circuits for alarms [horns] [bells] [chimes] [and flashing alarm lamps]. Disarrangement conditions of any circuit shall not affect the operation of other circuits.

D. All auxiliary manual controls shall be supervised so that all switches must be returned to the normal automatic position to clear system trouble.

E. Each independently supervised circuit shall include a discrete LCD readout to indicate disarrangement conditions per circuit.

F. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel [and the remote annunciator]. A green "power on" LED shall be displayed continuously while incoming power is present.

G. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel [and the remote annunciator].

H. The System Expansion Modules shall be electrically supervised for module placement. Should a module become disconnected from the controls, the system trouble indicator must illuminate and audible trouble signal must sound.

I. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.

[Option]

J. Wiring to a hardwired (non-serial) remote annunciator shall be supervised for open and ground conditions. A separate annunciator trouble LCD Readout must be provided. It shall illuminate and an audible trouble signal shall sound at the control panel upon the detection of an open or ground condition.

[Option]

K. There shall be independent supervision for opens of the air handling on/off/auto switch control output wiring. A discrete trouble LCD Readout per output circuit will be provided for indication. A ground condition of the air handling control output wiring shall indicate a common ground trouble on the control panel.

1.7 POWER REQUIREMENTS

A. The control panel shall receive 120 VAC power (as noted on the plans) via a dedicated fused disconnect circuit ahead of main.

B. The systems shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of [four (4)] [twenty-four (24)] [sixty (60)] hours with ___ minutes of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.

C. All circuits requiring systems operating power shall be 24VDC and shall be individually fused at the control panel.

[Option]

1.8 MULTIPLE ADDRESSABLE PERIPHERAL NETWORK (MAPNET)

A. Communication with addressable devices: The system must provide communication with all initiating and control devices individually annunciated at the control panel. Annunciation shall include the following conditions for each point:

1. Alarm
2. Trouble
3. Open
4. Short
5. Ground
6. Device Fail/or Incorrect Device

B. All addressable devices are to have the capability of being disabled or enabled individually.

C. Up to 128 addressable devices may be multidropped from a single pair of wires. Systems that require factory reprogramming to add or delete devices are unacceptable.

D. Format

The communication format must: [be consistent with Simplex's communicating device protocol;] be a poll/response protocol to allow t-tapping of the wire to addressable devices; and be completely digital. A high degree of communications reliability must be obtained by using parity date bit error checking routines for address codes and check sum routines for the date transmission protocol. Systems that do not utilize full digital transmission protocol (i.e. that may use time pulse width methods to transmit data etc.) will not be acceptable since they are considered unreliable and prone to errors.

E. Identification of Addressable Devices

Each addressable device must be uniquely identified by an address code entered on each device at time of installation. The use of jumpers to set address will not be acceptable due to the potential of vibration and poor contact. Device identification schemes that do not use uniquely set addresses but rely on electrical position along the communication channel are unacceptable. These systems cannot accommodate t-tapping and the addition of an addressable device between existing devices requires reprogramming all existing electrically further devices.

F. Wiring Type, Distances, Survivability and Configurations

The equipment manufacturer will approve wiring types. Existing wiring will be utilized in retrofit applications. The system must allow up to 2,500 feet wire length to the furthest addressable device. [Class A (Style 6 Signaling Line Circuit as defined by NFPA-72A) communications will be provided where shown on the drawings. Wire will be so routed to maintain sufficient distance between the forward and return loop as called for by the Authority Having Jurisdiction (AHJ).] To minimize wire routing and to facilitate future additions, t-tapping of the communications channel will be supported except where Class A wiring is required.

[Option]

1.9 ONE-WAY VOICE COMMUNICATION

A. The system shall incorporate one-way voice communication and tone generating capabilities.

B. A central audio control module shall be provided for the necessary alarm message/tone generation, main and remote microphone connections, music inputs, and mixer/preamplifier circuits. Continuous supervision shall be provided along with specific information as to the type of failure should a problem occur (e.g. main microphone trouble, tone trouble, etc.). Audio outputs shall have individual gain control.

C. A hand-held, push-to-talk microphone shall be provided, recessed within a protective panel-mounted enclosure. The microphone shall be noise-canceling communications type with a frequency range of 200 Hz to 4000 Hz and shall be equipped with a self-winding five foot coiled cable. An LED indicator shall be provided to indicate the microphone push-to-talk button has been pressed and speaker circuits are ready for transmission. The microphone shall be supervised for disconnection.

D. An audio control switch module shall be furnished to provide manual access to audio operations for authorized personnel. The module shall include an "ALL Circuits" switch, "Aux Tone 1" switch, "Aux Tone 2" switch, tone generator stop switch, and "Audio Trouble Reset" switch. These switches and associated LED indicators shall be supervised for disarrangement or failure.

E. Audio power amplifiers shall be furnished with a self-contained filtered 24VDC power supply, transformer, and amplifier monitor circuits. The amplifiers shall provide a 25 Volt RMS output with a frequency response of 120 Hz to 12,000 Hz. Provide sufficient amplification to operate all system speakers simultaneously plus ten (10) percent spare capacity.

[Option]

F. In addition, provide at least one backup amplifier capable of automatically replacing any failed amplifier.

G. The speaker circuits shall be capable of supplying 25 Volt RMS audio power from the system amplifiers. Supervision for open, short, or ground fault conditions shall be provided. Individual and distinct trouble indications shall be provided for each fault. Provide [one circuit for each zone or area of distinct communication] [the circuits identified in the schedule on the plans].

H. Digitized tones for alarm or auxiliary requirements shall be provided. Tone requirements are as follows:

1. The Slow Whoop is to be a slowly ascending tone from 200 to 830 Hz in 2.5 seconds.
2. The Wail is to be an ascending and descending tone from 600 to 900 Hz.
3. The Beep is to be a 470 Hz tone. The time duration shall be 0.7 seconds on and 0.7 seconds off.
4. The Horn is to be a continuous 470 Hz tone.

5. The Stutter is to be a 470 Hz tone which is on the 100 milliseconds and off for 100 milliseconds.

6. The Chime is to be a 700 Hz tone with a 1.5 second delay time.

7. The Coded Horn is to be a 470 Hz tone designed specifically for use on a coded system.

8. The Hi/Lo is to be a free running tone with a high frequent of 544 Hz and a low frequency of 440 Hz. The "on time" (Hi) shall be 100 milliseconds while the "off time" (Lo) is 400 milliseconds.

9. The Temporal Whoop is to be quickly ascending tone from 600 to 1200 Hz in 1 second. This signal shall be a uniform Code 3 temporal pattern using any appropriate sound, keyed 1/2 to 1 second "On", 1/2 second "Off", 1/2 to 1 second "On", and 2-1/2 seconds "Off" repeated until acknowledged or reset.

[Option]

I. A pre-recorded digitized voice message capability is to be provided for automatic transmission to building occupants during alarm conditions. The automatic message player shall not rely on a tape or other mechanical means of transmitting the evacuation message. Systems that use tape players must provide, as a minimum, a backup type player designed to automatically operate (within 2 seconds) if the primary tape player jams or otherwise fails to operate. A standard evacuation message shall be provided under this contract, however, the message player must be capable of transmitting a custom message of up to five (5) minutes long. A self-contained speaker will provide testing of the message(s) without disturbing the occupants of the facility.

J. A pre-recorded digitized P.N.I.S. (Positive Non-Interfering Successive) "voice coding" capability shall be provided for automatic transmission to building occupants during alarm conditions. A separate "voice code" shall sound throughout the facility for each zone in alarm condition. Examples of "voice code" messages are as follows:

1. Doctor Firestone, please call two-three-two.
2. Doctor Firestone, please call five-four-seven.
3. Doctor Red, please call three-four-five.

[Option]

K. A remote microphone/annunciator command location as shown on the plans shall be provided to duplicate the manual voice transmission capability of the main fire alarm control panel.

[Option]

L. Should a two-way fire fighters telephone system be provided, a method for remote fire fighter's telephone patch-in to the one-way voice communication speakers shall be provided. Manual operation shall be controlled at the fire alarm control panel.

M. Automatic Voice Evacuation Sequence

1. The audio alarm signal shall consist of an alarm tone for a maximum of 15 seconds followed by automatic preselected voice evacuation messages. At the end of each voice evacuation message, the alarm tone shall resume. The alarm tones shall sound alternately until the alarm silence switch at the fire alarm control panel has been operated.

2. All audio alarm operations (speaker circuit) selection and alarm tone/voice message timing variations) shall be activated by the system software so that any required future changes to the evacuation sequence can be facilitated by authorized personnel without any component wiring.

N. Manual Voice Paging Sequence

1. The system shall be configured to allow selective voice paging. Upon activation of any speaker manual control switch, two (2) attention getting beeps shall sound over the speakers indicating an impending voice message will occur.
2. If any speaker manual control switches are activated, the control panel operator shall be able to make announcements via the push-to-talk paging microphone over the preselected speakers.
3. Facility for total building evacuation and paging shall be provided to allow for activation of all speakers. This shall be accomplished by the means of an "All Circuit" switch.

[Option]

1-10 TWO-WAY FIRE DEPARTMENT COMMUNICATION

- A. The system shall incorporate a two-way Voice Communications System between the Central Control and the Emergency [Phones] [and] [Phone Jacks]. All wiring between the Central Control and the remote units shall be continuously supervised. Any fault that occurs shall be reported visually and audibly at the Central Control.
- B. A master telephone control section is to be furnished to provide processing of all two-way communication functions. This module shall include an audible device for call and trouble signaling, a trouble silence switch with ringback, a trouble indication, and supervising monitor circuit.
- C. A master telephone handset with flexible-coiled self-winding five (5) foot cords shall be provided and recessed within a protective panel-mounted enclosure at the command center.
- D. Provide one line (talk) circuit for [each floor] [elevator cabs] [and stairwells]. Line (talk) circuit modules shall be furnished to electrically supervise for shorts, opens, and grounds of circuit wiring. Each line circuit shall provide "Call" and "Trouble" LED indications and a toggle switch to enable two-way voice communication between remote and master phones.

[Option]

- E. Provide "Call Out" capability where the master telephone operator can signal a remote phone location. Signaling shall be accomplished by operating the line talk circuit switch. The line talk circuit LED shall illuminate

(A buzzer shall sound and an) [An] LED shall illuminate at the remote phone location. [Removal of a remote phone from its normal hook position or the act of plugging in a portable phone into a remote phone jack shall cause the buzzer to turn off.

- F. The fire department communication system shall be capable of handling single or simultaneous conversations with all phones connected into the system. The phone system circuits shall be so designed to prevent static, hum, or other interference to clear, intelligible two-way conversation between all phones of the system.

- G. The system shall indicate to the person attempting to use a remote phone, by a busy signal, that the signal is being received at the central control station and that the lines are intact. Two or more phones shall be capable of being connected into the active conversation at the discretion of the central control station operator.

- H. The operation shall be as follows:

1. The act of plugging a handset into a emergency phone jack or removal of any phone from its normal hook position shall cause the appropriate phone location LED to flash and a distinctive audible device to sound at the control panel. The subsequent picking up of the master phone and acknowledgment of the proper phone circuit shall silence the pulsing tone and cause the phone location LED to stop flashing and remain on. This action shall couple the remote phone to the master phone to provide direct and private communications.

2. Attempting to use a subsequent phone on the same circuit shall not cause the pulsing tone to activate if any two-way communications are already established. Any new circuits activated shall, however, cause their discrete phone circuit LED's to flash until acknowledged.

3. The Two-Way Communications System shall provide the capacity to handle simultaneous use of multiple remote phones.

4. The act of unplugging all the handsets in use and replacement of all the remote phones to their normal hook position and returning all the related circuit acknowledgment switches to the normal position shall cause the restoration of all normal supervisory functions. If any remote phone is not hung up or unplugged the appropriate phone zone indicator LED shall flash and the pulsing tone shall resume at the control panel.

[Option] 5. Phone operations (with the exceptions of phone system trouble) shall not be recorded on the system printer. However, it shall be possible to print this operation if required.

[Option] 6. At the discretion of the control panel operator, the system shall allow for remote paging from any fire fighter's remote phone location via the system speakers as manually selected at the main controls.

[Option]

I. A remote Master Telephone Annunciator location shall duplicate the fire fighters telephone capability of the main fire alarm control panel.

The Master Telephones shall be capable of communicating to one another or to any remote fire fighter phone jack or phone station.

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANEL

A. Where shown on the plans, provide and install a Simplex type 4100 Fire Alarm Control Panel. Construction shall be modular with solid state, microprocessor based electronics. It shall display only those primary controls and displays essential to operation during a fire alarm condition. Although the keypad/keyboard can be used for control (fire fighter/emergency) of the entire system, it shall only be used for maintenance purposes. Keyboards or keypads shall not be visible or required to operate the system during fire alarm conditions.

A local audible device shall sound during Alarm, Trouble or Supervisory conditions. This audible device shall sound differently during each condition to distinguish one condition from another without having to view the panel. This audible device shall also sound differently during each keypress to provide an audible feedback (chirp) to ensure that the key has been pressed properly.

B. The following primary controls shall be visible through a front access panel:

1. Eight character liquid crystal display
2. Individual red system alarm LED
3. Individual amber supervisory service LED
4. Individual yellow trouble LED
5. Green "power on" LED
6. Alarm Acknowledge key
7. Supervisory Acknowledge key
8. Trouble Acknowledge key
9. Alarm Silence key
10. System Reset key

C. The following secondary control switches and LED's shall be available behind an access door:

1. City disconnect/connect
2. Manual evacuation
3. Elevator bypass

4. Door holder release bypass
5. Future

D. The control panel shall also provide the following functions, some of which may be essential during a fire emergency situation. An asterisk indicates these functions (*).

1. Setting of time and date
2. LED testing
- * 3. Alarm, trouble and abnormal condition current listing
4. Enabling and disabling of each control plant separately
- * 5. Activation and deactivation of each control plant separately
6. Change operator access levels
7. Walk Test enable
8. Run diagnostic functions
9. Display software revision level
10. Display historical logs
11. Display card status
12. Point listing

E. For maintenance purposes the following lists shall be available from the point lists menu:

1. All points list by address
2. Monitor point list
3. Signal/speaker list
4. Auxiliary control list
5. Feedback point list
6. Pseudo point list
7. LED/switch status list

F. Scrolling thru menu options or lists shall be accomplished in a self-directing manner in which prompting messages shall direct the user. These controls shall be located behind an access door.

G. Primary Keys, LED's and LCD Display

The Control Panel's 2-line X 40-character liquid crystal display shall be backlit for enhanced readability. So as to conserve battery standby power, it shall not be lit during an AC power failure unless an alarm condition occurs or there should be keypad activity.

The display shall support both upper and lower case letters. Lowercase letters shall be used for softkey titles and prompting the user. Uppercase letters shall be used for System Status Information. A cursor shall be visible when entering information.

H. Equipment Enclosures

Provide cabinet(s) of sufficient size to accommodate the aforementioned equipment. The cabinet(s) shall be equipped with locks and transparent door panel(s) providing freedom from tampering yet allowing full view of the various lights and controls.

[Option]

A. Where shown on the plans, provide and install an LED annunciator. The annunciator(s) shall have a [beige enamel] [stainless steel] finish and shall provide one alarm lamp [and one trouble lamp] per initiation device circuit. The annunciator shall communicate to the control panel over one twisted shielded pair of wire and operating power shall be 24VDC and be fused at the control panel. Point-wired annunciators will not be considered as equal.

[Option]

B. The serial annunciator shall provide a common alarm and trouble circuit consisting of:

1. Control pushbutton switches - for alarm silence, trouble silence, system reset and manual evacuation duplicating the control panel switches. A key "enable" switch shall be provided to activate or deactivate the control switches.

2. Tone Alert - Duplicates the control panel tone alert during alarm & trouble conditions.
3. System trouble LED.
4. Power on LED.

[Option 5]. To accommodate and facilitate job site changes the control switches shall have the capability to be programmed on site to provide for manual switch input operation other than their standard purpose.

[Option]

C. When shown on the plans, provide and install a graphic display annunciator showing a [site/building] plan. Annunciator (lamps/LED's [shall show the location of the alarm [and] [or] trouble conditions graphically. Graphic annunciator [site/building] plan drawing will be provided by the [owner] [architect] [engineer].

[Option] 1. The annunciator shall indicate each alarm-initiating device graphically. Alarm and trouble conditions shall be indicated for each alarm-initiating device.

[Option] 2. Manual Control Switches shall be provided for the following functions:

- System Reset
- Alarm Silence
- Trouble Silence
- Manual Evacuation

[Option] - Alarm Acknowledge [NFPA-72D]

[Option] - Trouble Acknowledge [NFPA-72D]

[Option] - Supervisory Service Acknowledge (NFPA-72D)

[Option] - Elevator Bypass [explanation required]

[Option] - AHU Control [explanation required]

[Option] - City Disconnect

[Option] - "Other" [explanation required]

2.3 PERIPHERAL DEVICES

NOTE: Items listed below are typical only.

A. Manual stations shall be single action and shall be constructed of high impact, red lexan with raised white lettering and a smooth high gloss finish. The break glass rod station shall have a hinged front with common screwdriver slot for access from top. Stations which utilize screwdrivers, allen wrenches, or other commonly available tools shall not be accepted. When opening for maintenance the station shall not activate an alarm. When the station is operated, the handle shall lock in a protruding manner to facilitate quick visual identification of the activated station.

or

A. manual stations shall be double action and shall be constructed of high impact, red Lexan with raised white lettering and a smooth high gloss finish. To minimize nuisance alarms, activation shall require two separate and distinct actions. The first action shall require a glass front to be broken exposing the pull lever. The second action requires the operating lever to be pulled down. Once pulled down, the lever shall remain at a 90 angle from the front of the station to provide a visual identification of the station in alarm. Reset shall require a common screwdriver. Pull station shall be by the same manufacturer to insure compatibility.

B. Furnish and install smoke detectors where indicated on the plans.

Detectors shall be listed to U.L standard 268 and shall be documented compatible with the control equipment to which it is connected. Underwriter's Laboratories Inc shall list detectors for this purpose. The detectors shall obtain their operating power from the fire alarm panel supervised

detection loop. The operating voltage shall be 24VDC (nominal). Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal to be generated at the control panel.

Each detector shall have a flashing status indicating LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady and at full brilliance. Actuating the control panel reset switch may reset the detector.

To minimize nuisance alarms, voltage and RF transient suppression techniques shall be employed as-well-as a smoke verification circuit and an insect screen. The detector design shall provide full solid-state construction and compatibility with other normally open fire alarm detection loop devices, (heat detectors, pull stations, etc.). The detector head shall be easily disassembled to facilitate cleaning.

Remote LED alarm indicators shall be installed where indicated.

C. Automatic Heat Detectors

Automatic heat detectors shall be combination rate-of-rise and fix-temperature type. When the fixed temperature portion is activated, the units shall be non-restorable and give visual evidence of such operation.

D. Horns

Alarm horns shall be polarized and shall be operated by 24 VDC. Each horn assembly shall include separate wire leads for in/out wiring for each leg of the associated signal circuit. T-tapping of signal device conductors to signal circuit conductors shall NOT be accepted. The alarm horns shall be suitable for rear mounting. The white lexan lens shall have the word "FIRE" in red lettering on the sides and shall be pyramidal in shape to allow for side viewing.

E. Bells

Bells should be polarized and shall be operated by 24 VDC. Each bell assembly shall include separate wire leads for in/out wiring for each leg of the associated signal circuit. T-tapping of signal device conductors to signal circuit conductors shall NOT be accepted. Bells shall be [vibrating, single stroke] type with a minimum sound pressure level output of 90 dB at 10 feet. Bells shall be [] inch diameter, finished to match the color of the wall on which it is applied and be UL listed for fire alarm use. Bells shall be suitable for surface or semi-flush mounting and be suitable for use within combination audio/visual units.

F. Chimes

Chimes shall be polarized and shall be operated by 24 VDC with a minimum of 82 dB at 10 ft. Adaptors shall allow surface, semi-flush, weather resistance, or audio/visual mounting as shown on the plans. Chime shall have field adjustable volume control. It shall provide 4 connections to insure properly supervised in/out system connection. Chime motor shall be capable of accepting chime kit or bell gong without replacement of entire unit. Chime shall be UL Listed for its intended purpose.

G. Visual Flashing Lamps (Xenon Strobe)

Visual indicating appliances shall be comprised of a Xenon flashtube and be entirely solid state. These devices shall be UL listed and be capable of either ceiling or wall mounting. The LEXAN lens shall be pyramidal in shape to allow better visibility. Visual units shall be of the stand-alone type or be incorporated as part of the (Horn, Bell) unit.

H. Audio/Visual Alarm Indicating Appliance

Audio/Visual units shall provide a common enclosure for the fire alarm audible and visual alarm devices. The housing shall be designed to accommodate either horns, bells, chimes or speakers. The unit shall be complete with a tamper resistant, pyramidal shaped lexan lens with "Fire" lettering visible from 180 field of view. The front panel or bezel, which is constructed of UL Listed Noryl, may be inverted so that the lens is below the audible device. The lamp assembly shall incorporate a built-in reflector for more efficient light propagation and a special shock-mounting arrangement to resist bulb failure due to vibration. Lamp shall provide 4-wire connection to insure properly supervised in/out system connection. Unit shall be complete with all mounting hardware including backbox. Audio/Visual unit shall be UL Listed for its intended purpose.

I. Audio/Visual Alarm Indicating Appliances

Audio/Visual units shall provide a common enclosure for the fire alarm audible and visual alarm devices. The housing shall be designed to accommodate either horns, bells, chimes or speakers. The unit shall be complete with tamper resistant, Pyramidal shaped lexan lens with "Fire" lettering visible from a 180 field of view. The front panel or bezel, which is constructed of UL Listed Noryl, may be inverted so that the lens is below the audible device. Integral Xenon strobe shall provide 8000 peak candle power and be adjustable from 1 to 3 flashes per second. Xenon strobe shall provide 4-wire connection to insure properly supervised in/out system connection. Unit shall be complete with all mounting hardware including backbox. Audio/visual unit shall be UL Listed for its intended purpose.

J. Waterflow switches

Waterflow switches shall consist of a cast aluminum pipe saddle which houses an electromechanical device to which is attached a corrosion-free, flexible, low-density polyethylene paddle. The paddle conforms to the inside diameter of the sprinkler pipe and senses all water movements. To prevent false alarms, the flow switch shall incorporate an adjustable time delay mechanism between the paddle-operated stem and the alarm initiating contacts. A tapped ½" conduit connection shall be provided. Flow switch shall be UL Listed for its intended purpose.

K. Sprinkler Valve Tamper Switches

Sprinkler valve tamper switches shall consist of acid treated cast aluminum with nickel-plated parts to resist corrosion. Cover removal shall be supervised. Switch shall be provided with either one or two sets of S.P.D.T. micro switches as required. Tamper switch shall be UL Listed for intended purpose.

L. Door Holders

Magnetic door holders shall have an approximate holding force of 35 lbs. The door portion shall have a stainless steel pivotal mounted armature with shock absorbing nylon bearing. Unit shall be capable of being either surface, flush, semi-flush or floor mounted as required. Door holders shall be UL Listed for their intended purpose and powered by DC voltage provided by the fire alarm panel.

M. Duct Smoke Detectors

Duct smoke detectors shall be of the solid state photoelectric type and shall operate on the light scattering photodiode principle. The detectors shall be designed to ignore invisible airborne particles or smoke densities that are below the factory set alarm point. No radioactive materials shall be used. Detector construction shall be of the split type, that is, mounting base and head shall be of the bifurcated type using spring-type, self-wiping contacts. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control panel. Detector design shall provide full solid state construction and compatibility with other normally open fire alarm detection loop devices, (heat detectors), (pull stations, etc.). Duct housing couplings shall be slotted to insure proper alignment of the sampling and exhaust tubes. Detector shall have an

alarm LED visible through a transparent front cover. Detectors shall obtain their operating power from the supervised current in the fire alarm loop. Installation must comply with NFPA-90A.

[Option] Remote alarm LED indicator.

[Option] Remote alarm LED indicator/key test switch.

[Option] Remote alarm/power LED indicator & key test switch.

N. Furnish and install where indicated on the plans. Photoelectric Projected Beam Detectors. The detectors shall be Underwriters Laboratories (UL) Listed #268. The separate transmitter/receiver shall be capable of long-range coverage of up to 328-ft (100M), and have seven (7) sensitivity settings. Automatic compensation for lens contamination shall be incorporated. The detectors shall include a normal status indicator (Green Pulsing LED), and alarm indicator (Red LED) and a trouble indicator (Amber LED). The detectors shall obtain their operating power from a Simplex UL Listed fire alarm panel. The operating voltage shall be 24VDC (Nominal).

[Option]

2.4 ADDRESSABLE DEVICE TYPES

A. General

The system control panel, over its two-wire multidrop channel, must be capable of communicating with the types of addressable devices specified below. [Addressable devices will be located as shown on the drawings.] [The location of addressable devices will be selected along with conventional devices to optimize the system layout in order to provide the level of protection, zone identification and control as shown on the drawings.]

B. Addressable Detector Base

All addressable smoke and heat detector heads as specified below will be plugable into their bases. The base will contain electronics that communicate the detector status (normal, alarm, and trouble) to the control panel over two wires. The same two wires shall also provide power to the base and the detector. Different detector heads (smoke or heat) must be interchangeable. Upon removal of the head, a trouble signal will be transmitted to the control panel.

C. Ionization Detector Heads

1. The ionization type detector shall be a plug-in unit, which mounts to a twist-lock base, and shall be UL listed.

2. In order to provide stability over wide changes in environmental conditions such as temperature, humidity, and pressure, ionization detectors will be dual chamber: one chamber for sampling and one chamber for reference. They will be sealed against rear airflow entry.

3. There shall be no limit to the number of detectors, stations, or Zone Adaptor Modules, which may be activated or "in alarm" simultaneously.

4. The detector shall fit into a base that is common with both the heat detector and photoelectric type detector and shall be compatible with other addressable detectors, addressable manual stations, and addressable Zone Adaptor Modules on the same circuit. The detector shall also fit into a non-addressable base that is capable of being monitored by an addressable Zone Adaptor Module.

5. If field conditions so require, the smoke detection devices shall be covered with plastic bags after installation to maintain cleanliness. The bags shall be red for quick visual identification for removal at time of occupancy.

D. Photoelectric Detector Head

1. The Photoelectric type detector shall be a plug-in unit which mounts to a twist lock base, and shall be UL Listed.

2. The detectors shall be of the solid state photoelectric type and shall contain no radioactive material. They will use a pulsed infrared LED light source and be sealed against rear airflow entry.

3. The detector shall fit into a base that is common with both the heat detector and ionization type detector and shall be compatible with other addressable detectors, addressable manual stations, and addressable Zone Adapter Modules on the same circuit. The detector shall also fit into a non-addressable base that is capable of being monitored by an addressable Zone Adaptor Module.

4. There shall be no limit to the number of detectors or Zone Adaptor Modules, which may be activated or "in alarm" simultaneously.

E. Addressable Thermal Detector Head

Thermal detector heads must be UL Listed. They will be a combination rate-of-rise and fixed temperature (135 F) type, automatically restorable.

F. Addressable Pull Stations

1. Addressable pull stations will contain electronics that communicate the station's status (alarm, normal) to the control panel over two wires, which also provide power to the pull station. The address will be set on each station. The stations will be manufactured from high impact Lexan. Lettering will be raised and painted white. The station will mechanically latch upon operation and remain so until manually reset by opening with a common screwdriver. Pull stations will be [single action] [double action] [and [identified for local use by raised white LOCAL lettering] [as identified by the schedule on the prints].

2. The front of the station is to be hinged to a back plate and must be opened with a common screwdriver to reset the station. Stations, which use allen wrenches, keys or special tools to reset, will not be accepted. The station shall consist of high impact Lexan, red in color.

3. The addressable manual station shall be capable of field programming of its "address" location on an addressable signaling line circuit.

4. There shall be no limit to the number of stations, detectors, or Zone Adaptor Modules, which may be activated or "in alarm" simultaneously.

5. The addressable manual station shall be Underwriters Laboratories Inc. listed.

G. Addressable Photoelectric Duct Detector

1. The detector shall be non-polarized 24VDC type which is compatible with the Fire Alarm Panel and obtains its operating power from the supervisory current in the fire alarm detection loop.

2. Detectors shall be of the solid state photoelectric type and shall operate on the light scattering photodiode principle. To minimize nuisance alarms, detectors shall have an insect screen and be designed to ignore invisible particles or smoke densities that are below the factory set point. No radioactive material shall be used.

3. The detector head shall be directly interchangeable with an ionization detector type. Actuating the control panel reset switch may reset the 24VDC detector.

4. Detector construction shall have a mounting base with a twist-lock-detecting head that is lockable. The locking feature must be field removable when not required. Contact between the base and head shall be of the bifurcated type utilizing spring type, self-wiping contacts. Removal of the detector head shall interrupt the supervisory current of the fire alarm detection loop and cause a

trouble signal at the control panel. Detector design shall provide compatibility with other normally open fire alarm detection loop devices (heat detectors, pull stations, etc.).

5. It shall be possible to alarm the duct housing by using a test switch. This must be a true test of the detector. A test switch that shorts across the initiating circuit is unacceptable.

6. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.

7. To minimize false alarms, voltage and RF suppression techniques shall be employed as well as a smoke signal verification circuit and an insect screen.

8. Auxiliary SPDT relays and/or remote LED alarm indicators and key operated test stations shall be installed where indicated.

H. Addressable Ionization Duct Detector

1. The detector shall be non-polarized 24VDC type which is compatible with the Fire Alarm Panel and obtains its operating power from the supervisory current in the fire alarm detection loop.

2. The detector head shall be directly interchangeable with a photoelectric detector type. The 24VDC detector may be reset by actuating the control panel reset switch or when the alarm verification feature functions.

3. Detector construction shall have a mounting base with a twist-lock-detecting head that is lockable. The locking feature must be field removable when not required. Contact between the base and head shall be of the bifurcated type utilizing spring type, self-wiping contacts. Removal of the detector head shall interrupt the supervisory current of the fire alarm detection loop and cause a trouble signal at the control panel. Detector design shall provide compatibility with other normally open fire alarm detection loop devices (heat detectors, pull stations, etc.).

4. It shall be possible to alarm the duct housing by using a test switch. This must be a true test of the detector. A test switch that shorts across the initiating circuit is unacceptable.

5. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.

6. To minimize false alarms, voltage and RF suppression techniques shall be employed as well as a smoke signal verification circuit and an insect screen.

7. Auxiliary SPDT relays and/or remote LED alarm indicators and key operated test stations shall be installed where indicated.

I. Zone Adaptor Module

Zone Adaptor modules shall be used for monitoring of waterflow, valve tamper, Halon Control Panels, non-addressable detectors, and for control of evacuation indicating appliances and AHU systems.

1. An addressable interface module shall be provided for interfacing normally open direct contact devices to an addressable signaling line circuit. The device shall be a Simplex type Zone Adaptor Module (ZAM).

2. ZAMs will be capable of mounting in a standard electric outlet box. ZAMs will include cover plates to allow surface or flush mounting. ZAMs will receive their 24VDC power from a separate two wire pair running from an appropriate power supply.

3. There shall be two types of devices:
Type I: Monitor ZAM

Type 2: Control ZAM

4. For Type I above:

a. For conventional 2-wire smoke detector and/or contact device monitoring with Style B or Style A (NFPA-72A initiating device circuit) wiring supervision.

This type of addressable device module will provide power to and monitor the status of a zone consisting of conventional 2-wire smoke detectors and/or N/A contact devices as specified elsewhere [and identified in a schedule on the plans]. The supervision of the initiating device circuit wiring will be [Style B] [and/or] [Style D] [as also identified in the schedule on the plans]. These ZAMs will communicate the zone's status (normal, alarm, and trouble) to the control panel.

b. For conventional 4-wire smoke detector and/or contact device monitoring with Style B or Style A (NFPA-72A initiating device circuit) wiring supervision.

This type of addressable device module will provide power to and monitor the status of a zone consisting of conventional 4-wire smoke detectors and/or N/A contact devices as specified elsewhere [and identified in a schedule on the plans]. The supervision of the initiating device circuit wiring will be [Style B] [and/or] [Style D] [as also identified in the schedule on the plans]. The ZAM will provide detector reset capability and a 2 amp fuse to provide over-current power protection for the 4-wire detector. These ZAMs will communicate the zone's status (normal, alarm, and trouble) to the control panel.

5. For Type 2 above:

a. For alarm indicating appliances, speakers, fire fighter phones and jacks, and other device control with Style Y or Style Z wiring supervision.

This type of addressable device will provide double pole throw relay switching that can be used to connect through easily replaceable 2 amp fuses: a circuit of alarm indicating appliances to a power source; speakers to [an] audio source[s]; fire fighter [phones] [and] [jacks] to a communications channel; or activate a variety of controlled devices. The module will be available in either a Style Y or Style Z supervision version. In the Style y version, an end-of-line device will supervise the wiring. In the Style Z version, the wiring will be looped back and connected to the module to allow continual operation of the controlled devices even if the wiring sustains a single break. [Style Y] [and/or] [Style Z] addressable devices will be provided [as identified in a schedule on the plans]. These ZAMs will communicate the supervised wiring status (normal, trouble) to the fire alarm control panel and will receive a command to transfer the relay from the fire alarm control panel.

b. For non-supervised control.

This type of addressable device will provide double throw relay switching for loads up to 120VAC. It will contain easily replaceable 2-amp fuse, one on each common leg of the relay.

6. The ZAM shall be supervised and uniquely identified by the control panel. Device identification shall be transmitted to the control panel for processing according to the program instructions. Should the ZAM become non-operational, tampered with, or removed, a discrete trouble signal, unique to the device, shall be transmitted to, and annunciated at, the control panel.

7. The ZAM shall be capable of being programmed for its "address" location on the addressable device signaling line circuit. The ZAM shall be compatible with addressable manual stations and addressable detectors on the same addressable circuit.

8. All devices will be supervised for trouble conditions. The system control panel will be capable of indicating the type of trouble condition (open, short, device missing/failed). Should a

device fail, it will not hinder the operation of other system devices. Should a problem occur on a particular wire run, it will not affect other wire runs.

[Option]

2.5 ALARM SIGNALS

A. Provide Audio/Visual Units with Flush Trims and Backboxes for all wall mount audiovisual unit locations as shown on the plans.

B. Provide Speakers with Mounting Plates for all locations requiring surface mounted audio devices only

C. Provide Speakers and Visual Alarm Signals for all locations requiring ceiling mounted audiovisual alarm signals as shown on the plans.

[Option]

2.6 EMERGENCY PHONE JACKS

A. Provide Emergency Phone Jacks as shown on the plans. Each jack shall be mounted on a stainless steel single gang plate with the words "Fire Emergency Phone" screened on each.

B. Provide Emergency Phone Jacks for installation in each elevator car by the elevator contractor. Required wiring from elevator controls to each elevator car shall be furnished and installed by the elevator contractor.

[Option]

2.7 EMERGENCY PHONE STATIONS

A. Provide Remote Phones in break rod cabinets for installation where shown on the plans. Emergency phones shall be constructed of red cyclac and shall be equipped with an armored cable.

B. Provide Emergency Phone Stations for installation in each elevator contractor. Required wiring from elevator controls to each elevator car shall be furnished and installed by the elevator contractor.

[Option[]

2.8 EMERGENCY PHONES

Provide a minimum of five (5) Pluggable Emergency Phones within a storage cabinet to be mounted at the central control station.

[Option]

2.9 PRINTERS AND/OR CRT's

A. Where shown on the plans, provide and install a printer and/or CRT. Printer(s) shall receive English language text from the fire control panel in an industry standard ASCII format via an EIA RS-232-C connection.

B. Printer(s) shall be capable of printing the following:

1. Log in/out
2. Alarm and trouble historical logs
3. Current Alarms, troubles, and supervisory conditions
4. Acknowledging of alarms, troubles, and supervisory conditions
5. Alarm silencing
6. System reset

C. All printed information shall include time and date.

[Option]

D. Strip printer shall be thermal head, silent operation, with automatic paper take up, and shall receive printed messages in the 80 column format but shall print each message on multiple lines. The strip printer shall have secondary battery capability should the primary power source fail.

[Option]

E. A desktop 80-column printer shall provide a hard copy record of system events. The printer assembly shall incorporate the following features:

1. 120 VAC input power
2. 180 character per second print speed
3. 3 kilobytes buffer capability
4. Impact dot matrix
5. Bi-directional printing for faster response
6. Cartridge type ribbon for ease of replacement
7. 2 million character minimum ribbon life
8. Friction feed for cut forms
9. Tractor feed for continuous 9-1/2" pin-to-pin fanfold paper
10. UL 864 listing (UOXX)

[Option]

F. A desk top CRT (Cathode Ray Tube) with detachable keyboard shall provide an English language display with time and date of system events. CRT shall be a tilt/swivel, 14-inch monitor with a capability of displaying 24 lines of information. The display shall be easy-to-read non-glare green phosphor. The CRT shall include a composite video output to drive slave CRTs.

CRT's with keyboards shall provide the following functionality:

1. Acknowledgment of alarms, troubles, and supervisory conditions
2. Alarm silence
3. System reset

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide and install the system in accordance with the plans and specification, all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of NEC - Article 760 A and C, Power-Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with NEC-Article 760 A and

B. Upon completion, the contractor shall so certify in writing to the owner and general contractor.

All junction boxes shall be sprayed red and labeled "Fire Alarm". Wiring color code shall be maintained throughout the installation.

B. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.

C. The contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.

D. The manufacturer's authorized representative shall provide on site supervision of installation.

3.2 TESTING

A. Testing completed fire alarm system shall be fully tested in accordance with NFPA-72H by the contractor in the presence of the owner's representative and the Local Fire Marshal. Upon completion of a successful test, the contractor shall so certify in writing to the owner and general contractor.

3.3 WARRANTY

A. The contractor shall warrant the completed fire alarm system and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of first beneficial use.

B. The equipment manufacturer shall make available to the owner a maintenance contract proposal to provide a minimum of two (2) inspection and tests per year in compliance with NFPA-72H guidelines.

SECTION 16721 - FIRE ALARM & SMOKE DETECTION SYSTEM - PAGE 27A

2.5.1. True Alarm system.

A. The smoke sensor shall be a smoke density-measuring device having no self-contained alarm set point. The control panel shall determine the alarm decision for each sensor. The control panel shall determine the condition of each sensor by comparing the sensor value to stored values.

B. The control panel shall maintain a moving average of the sensors smoke chamber value. Systems that do not automatically maintain a constant smoke obscuration sensitivity for each sensor by compensating for environmental factors and are deemed unacceptable

C. The system shall automatically indicate when an individual sensor needs cleaning. When a sensor's average value reaches a predetermined value, a "Dirty Sensor" trouble condition shall be audibly and visually indicated at the control panel for the individual sensor. Additionally, the LED on the sensor base shall glow steady giving a visible indication at the sensor location.

If a "Dirty Sensor" is left unattended, and its average value increases to a second predetermined value, an "Excessively Dirty Sensor" trouble condition shall be indicated at the control panel for the individual sensor.

D. The control panel shall automatically perform a daily self-test on exact sensor. Checking the electronics in the sensor's base ensures the accuracy of the values being transmitted to the control panel. A sensor which fails the self-test will cause a "Self Test Abnormal" trouble condition at the control panel. A sensor self-test, which must be manually initiated by the operator, shall not be acceptable.

SECTION 16721 - FIRE ALARM & SMOKE DETECTION SYSTEM

E. An operator at the control panel, having a proper access level, shall have the capability to manually access the following information for each sensor:

1. Primary status
2. Device type
3. Present average value
4. Present sensitivity selected *
5. Peak detection values *
6. Sensor range (normal, dirty, etc)

* Values shall be in "percent of smoke obscuration" format so that the operator requires no interpretation.

F. An operator at the control panel, having a proper access level, shall have the capability to manually control the following for each sensor:

- a. Clear peak detection values
- b. Enable or disable the point
- c. Clear verification tally

d. Control a sensor's relay driver output

G. It shall be possible to program the control panel to automatically change the sensitivity settings of each sensor based on time-of-day and day-of-week. (For example, to be more sensitive at during unoccupied times and less sensitive during occupied periods.) There shall be seven sensitivity settings available for each sensor.

H. The control panel shall have the capability of being programmed for a pre-alarm or two-stage function. This function allows an indication to occur when, for example, a 3% sensor reaches a threshold of 1.5% smoke obscuration.

I. At least 500 individually identified sensors as well as conventional initiating device and indicating appliance circuits shall be supported within a single control panel.

J. For increased smoke detection assurance, all individually addressed smoke sensors shall be provided with alarm verification. Only a verified alarm shall initiate the alarm sequence operation.]

SECTION 16721 - FIRE ALARM & SMOKE DETECTION SYSTEM - PAGE 27C

2.5.2. True Alarm smoke sensor and addressable sensor bases

A. The addressable smoke sensors shall be of the photoelectric type and shall communicate actual smoke chamber values to the system control panel.

B. The sensors shall be listed to UL Standard 268 and shall be documented compatible with the control equipment to which they are connected. The sensors shall be listed for both ceiling and wall mount applications.

C. Each sensor base shall contain an LED that will flash each time it is scanned by the control panel (once every 4 seconds). When the control panel determines that a sensor is in an alarm or a trouble condition, the control panel shall command the LED on that sensor's base to turn on steady indicating the abnormal condition. Sensors, which do not provide a visible indication of an abnormal condition at the sensor location, shall not be acceptable.

[Sensor bases, as shown on the plans, shall be provided with a relay driver output that is to be controlled either automatically or manually from the control panel.]

D. Each sensor shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.

E. Each sensor shall be scanned by the control panel for its type identification to prevent inadvertent substitution of another sensor type. The control panel shall operate with the installed device but shall initiate a "Wrong Device" trouble condition until the proper type is installed or the programmed sensor type is changed.

F. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.

COMMUNICATIONS SPECIFICATIONS

In the past, the communications squadron has requested to use different conduits (3/4") for telephone and LAN systems. In order to eliminate costly duplication of conduit, we request to use one (1), 1" conduit for LAN and telephone systems. The 2"x4" wall plate cover will consist of four (4) ports, with Category 5 rated, 8 conductor, RJ-45 jacks. Also with this new requirement, it is imperative that there be a telephone backboard, a LAN backboard, and that the LAN cable be blue in color. The telephone cable needs to be punched down on its backboard and LAN to its backboard.

1. Telephone Wiring System:

A. General: All telephone wiring system for newly projected facilities to be constructed or renovated shall comply with the Electronic Industry and Telecommunication Industry Association standards 568-1991(Residential and light commercial telecommunication standards).

B. Telephone Service Entrance Ducts: Facility entrance ducts shall be a minimum of four each 4", schedule 80 (or schedule 40 rigid) PVC conduits (1-conduit for Tel, 1-conduit for LAN, 2-Spare for Tel & LAN) entering through the floor with a 90 degree sweep. Entrance ducts shall be buried at a minimum of 36 inches. Conduits shall extend a minimum of 5' past the outside edge of the building. Note: In situations that obstructions such as sidewalks, parking lots etc., that block access - the conduit it will extend 5' past the obstruction.) Nylon pull ropes 1/4" thick shall be installed in all telephone facility entrance conduits. Stubout conduits shall be capped (but easily removable) to protect from foreign debris. The government will run outside feeder cable from manholes and terminate at TBB. When manholes are within 250' distance, tie entrance ducts into nearest manhole.

C. Grounding: Each Telephone Backboard in newly constructed or renovated facilities shall be provided with a six (6) AWG insulated ground wire from the facility, site or building ground to terminal locations (Leave 10' feet slack). The resistance to ground (Of ground wire and the grounding electrode system) must be five (5) OHMS. Accomplish work in accordance with T.O. 31.10.24, Part two, Chapter 6 and (NEC) sections 250-81, 250-83 and 250-86. This also applies to existing facilities.

D. Telephone Backboard Entrance Conduits: The conduits shall be approximately 2" inches away from the wall, extended 2" inches above the finished floor, and located on the left side of the backboard, with a minimum of 3 feet allocated space for incoming cable. Ends of incoming conduit will be fitted with bushings to prevent damage to the incoming cable. All conduits, stub outs, and ducts **shall** be validated for serviceability by having test Mandrel ran through the conduit run. The test Mandrel shall be 1" inch less than the inside diameter of the conduit. Ref: (FM 11-486-5/T.O. 31W3-10-22).

E. Telephone Backboards: Telephone backboards shall be 4x8 feet, 3/4 inch thickness with two (2) coats of insulating fire retarding varnish. The backboard shall be mounted in a horizontal position two (2) feet above finished floor. There will be one telephone backboard for each floor. Each floor will have a communications room, at a minimum of 6x8 feet. One grounded electrical power outlet will be provided in each terminal room, mounted beneath TBB.

F. Telephone Cables: Telephone cables must be 24-gauge solid copper, color coded cable with an overall insulated vinyl jacket. Each cable must be continuous in length from the outlet to the terminal backboard (TBB) indicated on the drawings. Splicing of cables will NOT BE ACCEPTED. Outlets mounted 18 inches above finished floor shall be serviced by two (2) four-pair, 100 OHM, twisted pair UTP type cable. Terminate cable on 66M1-50 type connecting blocks at the TBB and on the modular jack outlets using the color code provided by the Contracting Officer. Cables at the TBB shall be terminated in numerical order. No reference to the room number is required. These telephone outlets shall be located according to the "6 foot" rule, which states that a duplex outlet will be located every 6 feet, or at a minimum of 1 per wall.

G. Telephone Outlets: All outlets shall comply with REA specification, PE-76, Modular Telephone Set Hardware and FCC Rules and Regulations Part 68, Subpart F.

a. Standard 18" AFF outlets: Will have two Category 5 rated, eight conductor (eight-position/eight pin), RJ-45 jacks (these two will be part of the 4-port wall plate). The flush mounted cover shall be stainless steel (plastic on small jobs -ivory in color). There shall be a telephone modular outlet wherever there is an electrical 110 VAC outlet. Each outlet shall be numbered to correspond with number on the telephone backboard. A Blueprint showing each numbered outlet and its location shall be provided to the Contracting Officer. See Attachment 1.

b. Wall phone 48" AFF outlets: Outlets shall be single modular, eight-position/eight pin (RJ-11c) outlet having a push-in/slide-down type backplate (EIA/TIA 570-1991, figure 9). For Wall mounted phones, the wall mount jack shall be mounted 48 inches above the finished floor, the first two pairs will be terminated and the last two pairs will be spared. A Blueprint showing each numbered outlet and its location shall be provided to the Contracting Officer. See Attachment 1.

H. Crossconnect Blocks: Type 66M1-50 blocks shall be provided with 89B standoff brackets to terminate all subscriber lines. The blocks shall be attached starting 36" from the left side, working left to right of the telephone backboard in vertical rows spaced approximately six (6) inches apart with all station cabling routed behind the brackets. When terminating the cable, six (6) cables (with all conductors utilized) shall be terminated on the 66M1-50 blocks, with the last two (2) pins on each side of the block vacant. See Attachment 2/2A.

I. Auxiliary Devices: All auxiliary devices such as D-rings, A-rings, Mushroom spindles, Wire ties, etc. which are not shown on drawings but are required for high grade installation shall be provided.

J. Systems Furniture: All systems furniture should include punch out panels for maintenance of wall jacks. All facilities whose furnishings will include system type furniture/modular workstations shall be wired to provide two (2) 100 OHM twisted pair UTP type premise cables to each person's workstation. Provided at the workstation will be two (2) RJ-45, Category 5, eight conductor outlets. All station cables must be run from the TBB to the greatest distance in the section slated for installation. This will allow enough length to travel throughout the furniture. Prewiring system furniture for electricity, telephone outlets, and LAN jacks will be included in the contract. When remodeling an existing facility, the communications system shall be rearranged, if needed, to meet the requirement listed before.

K. Qualifications for System Installer: an experience installer regularly engaged in the installation of telephone systems must install the system. The Contracting Officer may reject any proposed installer who can't show evidence of such qualifications. The contractor shall install 10% of the complete system for inspection by the government representative to show compliance with contract documents. If the contractor fails the inspection, the contractor shall bear the liability of procuring the services of an installer who can install per contract documents.

L. Testing Requirements: All premise wiring pairs shall be tested for shorts, grounds, and opens. All telecommunication outlets shall be toned out from the outlet to the distribution device using a line tester to ensure continuity. All telecommunication outlets shall be toned out from the outlet to the distribution device using a line tester to ensure continuity.

LAN Wiring System:

A. General: Local Area Network (LAN) cabling systems shall comply with the Electronic Industry and Telecommunication Industry Association standards. A star topology with each workstation connected to a communications closet situated no more than 90 meters of actual cable length to the work area. Direct connections between closets are allowed to accommodate bus and ring configurations.

B. Wiring Closets: The wiring closets shall have the following: four (4) duplex 110/120 VAC minimum filtered dedicated power circuits; Environmental controlled (AC/HVAC) ambient temperature not to exceed 70° Fahrenheit; access secured; free standing open type 19" equipment rack will be bolted to floor leaving a minimum distance of 3' feet separation from wall; 1-RJ11 1- wall mounted outlet for installation of one telephone instrument. Equipment rack should also align

respectively with distribution cabling conduit (exact placement will be specified by 16 CS Project Manager).

C. Patch Panels: Patch Panels will be used in the wiring closet cabinets to terminate all distribution cables. Specifications will comply with T568A (AT&T) wiring patterns and provide supports for a minimum of 48 ports per panel. Additional patch panels will be provided as node requirements dictate. The modular RJ45 will comply with all FCC, ISO, UL and CSA requirements. Patch panel installations shall contain a retaining trough between every 100 pair termination panel.

- Termination Type: Insulation displacement, dry, gas tight
- Wire Insertion Force (24 AWG): 13-28 lbs. (59-127 Newtons)
- Wire Pullout Force (24 AWG): 2.2 lbs. (9.7 Newtons)
- Wire Retention Force (24 AWG): Horizontal 8 lbs.; Vertical 2 lbs.
- Design Life: 30 years
- Temperature Range: Storage -40° to +70° C; Operational -10° to +70° C
- Humidity: 95% Maximum

D. Conduits: A 1" inch galvanized conduit starting at the workstation outlet location and extending back to the wiring closet. Continuous conduit runs installed by the contractor should not exceed 100 feet or contain more than 2 90° bends without utilizing appropriately sized pull boxes. Conduit will extend no more than 10" down from the ceiling with an angle no greater than 90 degrees. All individual distribution cabling runs (Workstation outlet to patch panel termination point) will be comprised of one continuous section of cable. **NO SPLICES IN CABLING WILL BE ACCEPTED!!!**

E. LAN Outlets: Two (2 of the four port), Category 5, eight conductor jack, black in color, will be provided at each workstation. These data jacks will be mounted on a 4-port faceplate of stainless steel (plastic for small jobs- ivory in color), and labeled according to cable number at LAN Backboard. Modular outlets (or inserts) will be based on the 110 style block termination, with non-keyed 4-pair RJ45 jacks (T568A Compliant) color coded black labeled LAN, and category 5 rated. These data jacks shall be located according to the "6 foot" rule which states that a duplex jack be located every 6 feet or at a minimum of 1 per wall.

Electrical Specifications:

- Insulation resistance: 500 M Ω minimum
- Dielectric withstand voltage 1,000 VAC RMS, 60Hz minimum, contact-to-contact and 1,500 VAC RMS, 60 Hz minimum from any contact to exposed conductive surface.
- Contact resistance: 20m Ω maximum
- Current rating: 1.5A at 68° F (20°C) per IEC Publication 512-3, Test 5b.
- UL Listed
- ISO 9001 Certified Manufacturer
- UL VERIFIED FOR EIA/TIA ELECTRICAL PERFORMANCE
- Comply with FCC Part 68

Mechanical Performance:

- Plug insertion life: 750 insertions
- Contact Force: 3.5 oz (99.2g) minimum using FCC-approved modular plug
- Plug Retention Force: 30-LB (133 N) minimum between modular plug and jack
- Temperature Range: -40° to 150° (-40° to 66°C)

F. Distribution Cabling: All outlets shall be supported by 2ea four (4) pair 100 OHM unshielded 24 AWG (UL CMP rated) solid conductor twisted-pair (UTP) Category 5 plenum type distribution cable, blue in color to distinguish LAN data cable from other cable. All distribution cabling will be labeled with floor, room, and node number. The installer listing all distribution cabling according to floor, room, location, node, status and length will provide a master cable document. All Category 5 cables shall conform to EIA/TIA Commercial Building Telecommunications Cabling Standard, Horizontal Cable Section.

Electrical Specifications:

- DC resistance per lead: 28.6 Ω /1,000 ft (9.38 Ω /100 m), maximum
- DC resistance unbalanced: 5% nominal

- Mutual Capacitance: 14 nF/1,000 ft (4.59nF/100m), maximum
- Capacitance Unbalanced (pair to ground): 400-pF/1,000 ft (131.2 pF/100m)
- Characteristic Impedance: 100? ? 15%, from 1 to 100 MHz

The length of each individual run of horizontal copper cable from the telecommunication closet to the information outlet shall not exceed 295-ft (90m). The contractor shall observe the bending radius and pulling strength requirements of the 4 pair UTP/fiber optic cable during handling and installation. In suspended ceiling or raised floor areas where walker duct, cable trays or conduit are not available, the contractor shall bundle station wiring with plastic ties snug, but not deforming the cable geometry, at appropriate distances. "J" hooks attached to the existing building structure and framework shall support the cable bundling. Plenum cable will be used in all appropriate areas. If the interior walls are not obstructed, the contractor shall conceal horizontal distribution wiring internally within the walls. If such obstructions exist, contractor shall secure approval from the customer prior to the use of an alternate method.

G. Distance Limitations: Distances between closets and the main crossconnect are dependent on backbone cable types, and applications. The length of each individual run of horizontal copper cable from the telecommunication closet to the information outlet shall not exceed 295-ft (90m). Where work stations exceed the 90 meter cable distance limitations, multiple wiring closets (multi mode 8 count 62.5/125 micron fiber connectorized with ST-Type connectors, mounted in a fiber optic distribution panel) will be used to interconnect hub equipment. Fiber optic cabling will be routed between closets in a 1" conduit or innerduct. Where node requirements exceed the program capacity of the hubs, fiber will be utilized to interconnect the hubs in a collapse backbone topology.

H. LAN Cable Specifications: Category 5 plenum will be used where distribution cable cannot be routed inside of approved conduit system. All category 5 cordage shall be round 24 AWG data cables, insulated with polyvinyl chloride (PVC) and jacketed with PVDF-CP, tightly twisted into individual pairs. The cordage shall meet or exceed the electrical specifications listed below:

Electrical Specifications:

- DC resistance per lead: 28.6? /1,000 ft (9.38? /100 m), maximum
- DC resistance unbalanced: 5% nominal
- Mutual Capacitance @ 1kHz: 14 nF/1,000 ft (6.6nF/100m), maximum
- Characteristic Impedance: 100? ? 15%, from 1 to 100 MHz
- Worst Pair Near End Cross Talk, dB/1,000 ft (305m)

I. LAN Testing: The testing of all distribution cabling and components will be certified & documented in accordance with standards listed in previous sections of this specification prior to acceptance by a designated 16 Communications Squadron Official. The installer listing all distribution cabling according to floor, room, location, node, status length and test data will provide a master cable document.

Testing of wiring shall be performed prior to system cutover. 100% of the UTP horizontal and riser pairs shall be tested for opens, shorts, polarity reversals, transposition and presence of AC voltage. UTP data wiring pairs shall be tested to EIA/TIA 568A from the information outlet to the telecommunication closet and from the telecommunication closet to the information outlet. The Project Manager & SCS System Manager shall perform on-going inspections during the construction and the following points will be examined:

- Is the design documentation complete?
- Have all terminated cables been tested for continuity and shorts?
- Is the cable type suitable for its pathway?
- Have the pathway manufacturer's guidelines been followed?
- Have the contractors avoided excessive cable bending?
- Have potential EMI sources been considered?
- Is cable fill correct?
- Are hanging supports within 5 feet (1.5 m)?
- Does hanging cable exhibit some sag?
- Are telecommunication closet termination's compatible with applications equipment?
- Have patch panel instructions been followed?

- Are Category 5 connectors properly turned right side up in the panels / faceplates without cables wrapped or twisted around the mounting collars?
- Are the correct outlet connectors being used?
- Is the jacket maintained right up to the punch?
- Is the blue pair tightly twisted and straight across the punch?
- Are the final pairs cleanly routed across the punch and directly terminated without open loops?

Electrical Specifications:

- DC resistance per lead: 28.6 Ω /1,000 ft (9.38 Ω /100 m), maximum
- DC resistance unbalanced: 5% nominal
- Mutual Capacitance @ 1kHz: 14 nF/1,000 ft (6.6nF/100m), maximum
- Characteristic Impedance: 100 Ω \pm 15%, from 1 to 100 MHz
- Worst Pair Near End Cross Talk, dB/1,000 ft (305m)

J. Systems Furniture: All systems furniture should include punch out panels for maintenance of wall jacks. All facilities whose furnishings will include system type furniture/modular workstations shall be wired to provide two (2) 100 OHM twisted pair UTP type premise cables to each person's workstation. Provided at the workstation will be two (2) RJ-45, Category 5, eight conductor outlets. All station cables must be run from the TBB to the greatest distance in the section slated for installation. This will allow enough length to travel throughout the furniture. Prewiring system furniture for electricity, telephone outlets, and LAN jacks will be included in the contract. When remodeling an existing facility, the communications system shall be rearranged, if needed, to meet the requirement listed before.

K. Qualifications for System Installer: an experience installer regularly engaged in the installation of LAN systems must install the system. The Contracting Officer may reject any proposed installer who can't show evidence of such qualifications. The contractor shall install 10% of the complete system for inspection by the government representative to show compliance with contract documents. If the contractor fails the inspection, the contractor shall bear the liability of procuring the services of an installer who can install per contract documents.

APPENDIX A			
PIPING MATERIAL REQUIREMENTS FOR HURLBURT FIELD, FL (MARCH 1999)			
PLUMBING-WATER DISTRIBUTION PIPE			
	APPLICATION	MATERIALS	SCHEDULE/RATING
1	Pipe, Interior, Above Ground, Conditioned Spaces	Copper	Type K, hard
2	Pipe Interior, Above Ground, Unconditioned Spaces	Copper	Type K, hard
3	Pipe, Under Buildings	Copper	Type K, hard
4	Pipe, Underground Outside Building	PVC	Schedule 40
5	Pipe, Above Ground Outside Building	Galvanized	
PLUMBING, WATER SERVICE PIPE			
	APPLICATION	MATERIALS	SCHEDULE/RATING
1	Pipe, Above Ground	Galvanized	
2	Pipe, Underground	PVC	C-900
PLUMBING-SANITARY DRAINAGE PIPE			
	APPLICATION	MATERIALS	SCHEDULE/RATING
1	Pipe, Gravity Draining, Above Ground Within Buildings and Pipe in Raceways or Tunnels	PVC	Schedule 40
2	Pipe, Gravity Draining, Underground, Within Buildings	PVC	Schedule 40
3	Pipe, Pressurized, Above Ground Within Buildings and Pipe in Raceways or Tunnels	PVC	Schedule 40
4	Pipe, Pressurized, Underground, Within Buildings	PVC	Schedule 40
PLUMBING - BUILDING SEWER PIPE			
	APPLICATION	MATERIALS	SCHEDULE/RATING
1	Pipe, Gravity Flow, Underground	PVC	Schedule 40
2	Pipe, Pressurized, Underground	PVC	Schedule 40

PLUMBING - STORM DRAINAGE PIPE			
	APPLICATION	MATERIALS	SCHEDULE/RATING
1	Pipe, Inside Conductors Including Above Ground Storm Drains	PVC	Schedule 40
2	Pipe, Building Storm Drain Connected to Combined or Sanitary Sewers	DO NOT CONNECT TO SANITARY	STORM DRAINS SEWERS!
3	Pipe, Underground Building Storm Drains	PVC	Schedule 40
4	Pipe, Building Storm Sewers	PVC	Schedule 40
5	Subsoil Drains	PVC	Schedule 40
6	Building Subdrains	PVC	Schedule 40