

BASE FACILITY STANDARD  
HILL AIR FORCE BASE, UTAH  
3/20/2007

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1. This Base Facility Standard is intended to bring to the attention of - designers, design-build contractors, facility users, and others - the facility requirements that are peculiar to Hill Air Force Base. This standard is continuously being revised and updated as regulations and policies change. Caution should be taken to ensure the latest edition is used. This standard does not take precedence over newly published Federal Regulations or Department of Defense and Air Force policy directives but rather is intended to draw attention to, or supplement, those publications.

2. **Special Considerations:**

2.1 Base Location: Hill Air Force Base is located near Ogden Utah approximately 30 miles north of Salt Lake City at an elevation of 4900 Ft above sea level.

2.2 Construction Season Limitations: Earthwork can normally only be accomplished from 15 March to 15 November. Paving is normally accomplished from 15 May through 1 October. Structural work may generally be accomplished on a year round basis, but it must be protected from temperature extremes. Built-up roof construction is generally limited to the period from 15 May through 15 October.

2.3 Soil and Foundation Considerations: Typical soils range from sand to silty sand with thin discontinuous layers of silty clay and clayey silt being common. Potable wells have a static water level of approximately 500 feet below the surface. However, the perched water may be encountered at more shallow depths. The average soil pH is approximately 7.8. The soil resistivity ranges from 2,000 to 15,000 ohms/cm. Spread footings are the typical structural foundation. All footings shall be at least 3 feet below grade.

2.5 General Security Requirements: See Appendix A.

2.6 Construction Permits:

2.6.1 No excavation shall be done prior to receiving a Base Civil Engineering Excavation Permit. If excavation is started without obtaining a permit, the Contractor shall be held liable for repairs of any broken utility lines or other damage resulting from the broken lines. The Contractor shall request a permit 14 calendar days prior to scheduled start of digging. Hand digging shall be required to locate utilities shown on the contract drawings, Excavation Permit or 3 feet (1 meter) on either side of locations identified by Base Maintenance Shops.

2.6.2 Contractors must obtain a Utah Pollutant Discharge Elimination System (UPDES) storm water permit if the project disturbs of 5 or more acres of soil surface area. To obtain the

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permit a contractor must submit a Notice of Intent (NOI), Pollution Prevention Plan and the required fee to the State of Utah, Department of Environmental, Quality Division of Water Quality. Contractor shall submit and receive approval of the UPDES permit before starting construction.

2.6.3 Projects disturbing one to five acres of soil surface area will require submission of a sediment and erosion control plan to the project manager for subsequent review and approval by the Environmental Compliance Office 75 CEG/CEV. The contractor must receive approval of the plan and implement approved best management practices before starting construction.

2.6.4 Projects disturbing more than one acre of soil surface area will submit a plan for permanent stabilization of disturbed area to the project manager for subsequent review and approval by the Environmental Compliance Office 75 CEG/CEV. The contractor shall receive approval of the plan and implement approved best management practices before contract closeout. Examples of best management practices are available at the following web sites:  
[http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con\\_site.cfm](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm)  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/post.cfm>

2.7 Borrow and Disposal: Unless otherwise designated, all borrow shall be obtained off base at the contractor's expense. Clean excavation including soil/concrete, asphalt and wood may be separated and disposed of in one of the appropriate cells in the government landfill at the north end of Hill AFB. All other building demolition materials shall be legally disposed of by the contractor at an off-base landfill.

2.8 Utility Line Identification:

2.8.1 Contractor shall provide and install a trace wire of #6 insulated copper within one foot of all new utilities (except metallic or electrical lines) placed underground at Hill Air Force Base.

2.8.2 If length of new utility is 500 feet or less contractor shall install one terminal box of 2 1/2" diameter pipe at each end of the wire marking the utility location.

2.8.3 If length of new utility is greater than 500 feet, contractor shall place terminal boxes at 500 foot intervals.

2.8.4 Terminal boxes shall have a metal screw-on type lid mounted flush with pavement or raised above the existing ground elevation, as determined by the project manager. (Handley Industries or approved equal).

2.8.5 Contractor shall provide a 14-day notice to the Civil Engineering project manager of all utility line installations to allow the Air Force to survey and map all new utility lines.

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Contractor shall not backfill utility trenches until the lines have been surveyed and approval given.

2.9 Construction Identifications signs: Construction signs are required for all Military Construction (MILCON) Projects. Construction signage shall comply with AFPAM 32-1097 Sections 4.20, 12.24, 12.25 and Air Force ETL 02-09 except as specified below. All construction identification signs, including those on the Corps of Engineers (COE) projects, shall have "Dakota Brown" lettering on an adobe "Greystone" background. For COE jobs, a red castle on the sign is acceptable.

2.10 Explosive Site Plan Compliance: For projects within the Quantity Distance (QD) zone and in other hazardous areas, an Explosive Site Plan (ESP) is developed to ensure that the proposed project is compatible with the other operations within the area. The design of the project must comply with the required separations shown on the ESP and other criteria determined by the Weapons Safety Office (SEW). Any changes to the criteria set forth on the approved ESP must be resolved by the Base Master Planner, (CECX, Mr. Bert Whipple) and the Weapons Safety Office prior to completion of the design.

2.11 Asbestos and Lead-Based Paint (LBP): An asbestos and LBP survey will be required for any project that requires renovation or demolition. Any asbestos or LBP removal will be coordinated with Bioenvironmental Engineering, Civil Engineering's Asbestos & LBP Operations Officer and Environmental Management Asbestos & LBP Program Manager. Removal shall be done by qualified Civil Engineering personnel, IDIQ contract (75 CES/CEEV contractors) or through the base asbestos and LBP qualified contractors. Division of Air Quality rule R307-801-9: The asbestos project operator shall ensure that the structure or facility to be demolished or renovated is inspected for ACM by an inspector certified under the provisions of R307-801-6. An asbestos survey report shall be generated according to the provisions of R307-801-10. The asbestos project operator shall make the asbestos survey report available on site to all persons who have access to the site for the duration of the renovation or demolition activities. If no asbestos inspection is conducted, the operator shall ensure that all resulting demolition debris is disposed of as asbestos waste. "Asbestos project operator" means any asbestos contractor, any person responsible for the persons performing an asbestos project in an area to which the general public has unrestrained access. Project managers will perform responsibilities of the asbestos project operator listed above.

2.12 Testing: Design specifications shall require the contractor to engage an independent testing for all testing that is required including soils, asphalt, concrete, welding, etc. unless such testing is required by regulation to be performed by the government.

2.13 Bird Aircraft Strike Hazard (BASH): Design shall eliminate and not contribute to BASH conditions in accordance with AFPAM 91-212 and the Hill AFB BASH Plan 91-212.

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**3. Civil Considerations:**

3.0 Applicable Standards: Comply with American Public Works Association Manual of Standard Plan and Specifications. If in conflict with government standards then the government standards will take precedence.

3.1 Airfields:

3.1.1. General: Airfield pavements shall be designed in conformance with current Air Force Instructions and directives. Airfield pavements shall be designed for medium strength pavement loading unless specific circumstances dictate.

3.1.2. Design Parameters:

3.1.2.1 Air Field Type: medium load

3.1.2.2 Sub grade soil group- F2 (CBR 8-15).

3.1.2.3 Frost Depth design- 35 inch depth

3.1.2.4 Freezing index- 595 degree days.

3.1.2.5 Portland cement concrete pavement flexural strength- 700 psi at 90 days.

3.1.2.6 Portland Cement concrete slab size 15 feet X 15 feet minimum, 20 feet X 20 feet maximum except where matching existing structures.

3.1.2.7 Asphalt cement ductility- 50 at 32.9 degrees F.

3.1.2.8 Fuel proofing- Rubberized coal tar shall be placed over all bituminous concrete where fuel spills are anticipated.

3.1.2.9 Slurry seals- Slurry seals shall not be used on asphalt pavements.

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3.1.2.10 Shoulder areas- shoulder areas shall be designed for vehicle wheel loads.

3.1.2.11 Miscellaneous- All airfield design and construction must consider Federal Aviation Regulation, Part 77, Imaginary Surfaces; and comply with Tri-Service Unified Facilities Criteria (UFC) 3-260-02, "Pavement Design For Airfields."

3.1.3 Recycling: Bituminous concrete recycling shall be considered for each project where bituminous concrete is to be demolished.

3.2 Roads and Parking Lots:

3.2.1 Typical Maintenance Work:

3.2.1.1 Crack Filling: Rubberized asphalt crack sealing will normally be accomplished by in house forces.

3.2.1.2 Cold planning: Cold planning shall be used to correct surface irregularities and to match curb and gutter elevations prior to overlaying.

3.2.1.3 Heat scarifications: Heat scarification will be used to insure bonding of bituminous overlays where considered necessary by the Pavements Engineer, especially for thin overlays.

3.2.1.4 Slurry seals: Slurry seals will be used as one option to seal low volume surface roads.

3.2.1.5 Open graded plant mix seal coat: This seal coat will be used as one option to seal all roads and parking lots.

3.2.1.6 Coal tar treatment: Coal tar seals will be used to seal bituminous concrete in fuel spillage areas.

3.2.1.7 Overlays: Bituminous overlays will be used to rehabilitate bituminous concrete. It will normally be placed a minimum of 1 ½" thick. It will be the option of the Government's pavement Engineer as to whether any existing bituminous concrete will be removed prior to placing the overlay.

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3.2.1.8 Traffic control in construction areas: The contractor shall provide and maintain all construction traffic control devices. These devices and their layout shall conform to Part VI of the Manual of Uniform Traffic Control Devices or the Utah State Department of Transportation equivalent. The traffic control plan shall be submitted to the Base Traffic Engineer prior to implementation.

3.3 Potable Water:

3.3.1 Well drilling: All future wells shall be drilled by using the reverse rotary drilling method.

3.3.2 Pipe: Water pipe 4" through 12" dia shall be PVC –AWWA C 900. All pipe 12" dia and greater shall be AWWA C 901. Tracer wire and warning tape shall accompany any new water pipe installed.

3.3.3 Pipe depth: Water piping shall be installed a minimum of 4 feet below grade. Fire protection lines shall be installed a minimum of 5 ½ feet below grade

3.3.4 Pressure gages: Pressure gages shall be placed at the outlet of all well pumps; at the inlet and outlet of all pressure reducing valves, pressure sustaining valves and altitude valves; and at any other location where knowledge of pressure would be beneficial.

3.3.5 Valves: Valves shall be placed at all locations were it would be desirable to isolate the system for maintenance and repair. The number of valves shall not be kept to a minimum as a cost cutting measure. Valves will be placed in conjunction with fire hydrants. Air release valves shall be used at high points to allow the discharge of air in the water distribution system.

3.3.6 All new water lines and appurtenances shall comply with the standards set forward in the Utah Safe Drinking Water Regulations.

3.4 Non-Potable Water:

3.4.1 General: The Base has the right to utilize 139 acre-feet of non-potable irrigation water every year. This water is available for use from 15 April to 15 October each year. It is piped part way across the south boundary of the Base, entering at the southeast corner of the Base. A booster pump has been provided.

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3.4.2 Available pressure: The available pressure ranges from 40 to 50 psi without the booster pump and between 60 to 80 psi with the booster pump operating. Approximately 400 gpm must be flowing before the booster pump can be operated to prevent cycling.

3.4.3 Place of use: This non-potable irrigation water shall be used wherever possible along the south border of the Base, especially in large areas that can be irrigated with high flowing heads, such as athletic field and parks. Housing area lawns and the Child Care Facility shall not be irrigated with this water because of the possibility that children will ingest the water.

3.4.4 Irrigation systems: Design and construction of irrigation systems shall comply with the 75th Civil Engineer Squadron OI 99-2 entitled Sprinkler System Installation, Operation and Maintenance.

### 3.5 Sanitary, Storm and Industrial Waste Sewers:

3.5.1 The minimum and maximum velocity shall be design in accordance with AFM 88-11 Vol 1/TM 5-814-1 and AFM 88-5, Chap 4/TM 5-820-4, whichever is applicable for each case. Comply also with applicable section of the Utah Administrative Code where more stringent. The designer will consider the maximum flows during the early years of use to ensure that self-cleaning velocities are achieved. All industrial waste pipe shall be double walled high-density polyethylene (HDPE) with a low rate of thermal expansion, polypropylene or an other approved, chemically resistant pipe.

3.5.2 Horizontal Distance to water lines: Sanitary or industrial waste sewer lines shall not be closer than 10 feet horizontally from a water line, except where the bottom of the water pipe shall be at least 12 inches above the top of the sewer pipe. Then the horizontal spacing may be reduced to 6 feet. When is it necessary to install the pipes closer than directed above, the sewer pipe shall be encased in concrete at least 4 inches thick.

3.5.3 Transverse Distance to Waterlines: Where gravity flow sanitary or industrial waste sewer lines cross above waterlines, the sewer lines shall be constructed of suitable pressure pipe or fully encased in concrete at least 4 inches thick for a distance of 10 feet on each side of the crossing. When the sewer line is acceptable pressure pipe, non-concrete encasement is required, but the sewer line shall have no joint closer (horizontally) than 3 feet.

3.5.4 Plastic pipe: Plastic pipe shall not be used for storm or sanitary sewers larger than 12 inches in diameter or when the fluid temperatures are expected to exceed 100 degrees F, or for industrial waste sewers.

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3.5.5 Pipe laying: Lay sewer pipe proceeding upgrade with the spigot end of the bell and spigot pipe in the direction of flow. Place the tongue end of tongue and groove pipe pointing in the direction of the flow.

3.5.6 Manhole ladders: Manholes shall be provided with a ladder of approved materials when the depth from the top cover to the invert of the main sewer line exceeds 12 feet.

3.5.7 Mixing type of sewers: Only sanitary sewage shall be discharged and carried away in sanitary sewer lines. Only industrial sewage shall be discharged and carried in industrial sewage lines. Only storm drainage can be discharged and carried in storm sewer lines.

3.6 Industrial Waste Treatment: The industrial waste treatment plant decontaminates waste from the aircraft maintenance areas of the Base. The contaminants include toxic metals, complexing agents, and organic compounds. The entire system is approved by the Environmental Protection Agency. No new toxicants can enter the system and the system cannot be enlarged or expanded without notification and approval. All structural load assumptions shall be noted on the first sheet of the structural drawings. Drawings are seldom lost or destroyed but calculations often are misplaced.

3.7 Structural:

3.7.1. Soil Bearing Capacity: Major structures at Hill Air Force Base, Little Mountain Test Facility, or the Utah Test and Training Range shall have specific foundation studies performed. Minor structures at Hill AFB may use an allowable soil bearing pressure of 3000 psf. Check with the Base Civil Engineer for allowable pressures at Little Mountain Test Facility or Utah Test and Training Range.

3.7.2. Stair Tread Minimum Live Loads: The minimum live loads shall be 100 psf and a 300 lb concentrated load at the location of maximum stress (not simultaneous with the uniform live load.) The minimum concrete depth shall be 2 inches if filled pans are used. Design of metal stairs shall conform to the Metal Stair Manual published by the National Association of Architectural Metal Manufacturer's.

3.7.3. Design Frost Penetration: The design frost penetration shall be 36 inches for structures unless a geotechnical report allows a more shallow depth.

3.7.4. Concrete compressive strength: A minimum concrete compressive strength of 3000 psi at 28 days shall be for all applications except exterior slabs, which shall have a minimum compressive strength of 4000 psi at 28 days.

3.7.5. Reinforcing Steel Strength: A minimum yield strength (Fy) of 60,000 psi shall be used for reinforcing steel.

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3.7.6. Floor slab joints: Joints for slabs on grade shall be located so that the area between joints is square. If a square area between contraction joints is not possible, the length of the rectangular area shall not exceed one and one fourth (1 ¼) times the width. The saw depth for the contraction joints shall be as recommended by ACI standards but in no case less than one-fourth (1/4) of the slab thickness. For reinforced slabs the reinforcement bars shall be discontinued through slab joints and not used for load transfer. Load transfer shall be accomplished with dowel bars, keyed joints, thickened edge, or a combination thereof.

3.7.7. Procedure for attaching equipment and other objects to existing roof trusses, joints, beams, and other members of the roof structure: Use clamps instead of drilling or welding. The Base Structural Engineer prior to installation of these loads will give approval for attachment of equipment or other object from the existing roof structures.

3.7.8. Compaction: For cohesive soil under structures, building slabs, steps and paved areas, compact to a minimum of 95% of maximum density determined in accordance with Method 106 of MIL-STD-621 using CE55 compaction effort. For cohesionless soil, compact to a minimum of 100% of maximum density.

3.7.9. Steel Fabrication and Erection: Drill or punch all holes in steel members. Never allow holes to be burned with a torch.

3.7.10. Structural design loads for buildings and other structures shall be developed using the Unified Facilities Criteria (UFC) 1-200-01, Design: General Building Requirements. This UFC document references the International Building Code (IBC) with exceptions. Use UFC 3-310-01 Table 1 for applicable design values for snow, frost, and wind data.

### 3.8 Traffic Engineering:

3.8.1 Speed Limit: The Base Speed limit is set at 25 mph on the main arteries unless otherwise noted.

3.8.2 Lane Widths: All traveled lanes will be 12 feet in width. Where curb and gutter is not provided, a 3 foot wide paved shoulder will be provided. Storm drain grates will be selected to avoid presenting a hazard to narrow tires. Car pool and bus stop drop off lanes will be included where needed.

3.8.3 Parking: Parking stalls will be 9 feet wide measured normal to the vehicle and 13 feet wide for a handicapped stall. Allow 30 feet of road width between rows of parking stalls and 18 feet for stall depth. All new parking lots shall have curb and gutter placed around the perimeter. A 30-inch wide curb and gutter section will be used. Curbed islands and landscape planters will not be used if they make snow removal too difficult.

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3.8.4 Traffic signs and striping: All traffic signs and striping shall conform to the standards contained in the Manual of Uniform Traffic Control Devices. Striping will be included in all new projects and included when restriping is required. Signposts will be constructed of a 2-inch by 2-inch Dakota Brown steel tube section. The tubing will be mated with steel tube section that is driven into the ground. This will allow for the rapid repair of damaged signposts. The backside of all signs shall be Dakota Brown.

3.9 Landscaping: All soil areas disturbed by construction activities shall receive landscaping to prevent soil erosion and blowing dust & sand. As a minimum provide seeding with a drought-resistant grass mix.

3.10 Building Demolition: Demolition of buildings shall include all elements of the superstructure and substructure including footings and foundations. Utility lines may be abandoned in place if properly cleaned of domestic and hazardous waste.

#### **4. Architectural Considerations:**

##### 4.1 Architectural Compatibility:

4.1.1 General: The Hill Air Force Base Architectural Compatibility Standards Brochure shall be followed as a guide.

4.1.2 Colors: All exterior building finish colors shall conform to the above standard. The colors are taken from the Federal Standard 595B, Colors Used In Government Procurement. All exteriors shall be Federal Paint number 30099, Dakota Brown; or 23617, Greystone. No building shall have more than one color trim unless allowed by the Architectural Compatibility Officer. Factory pre-finished siding and roofing can match the manufacturer's standard, available color selection as long as the color matches the above colors as closely as possible. All selections are subject to the approval of the Base Architectural Compatibility Officer.

4.1.3 Facades: The majority of the permanent facilities at Hill AFB are brick. This standard should be maintained. Any other materials used shall complement the brick in making an aesthetically pleasing, traditional statement. Choices should conform to the Base Architectural Compatibility Standards. All new and remodeled facades shall blend with and complement the permanent construction of the installation.

4.2 Definitive Design: Refer to the AFMC Facility Quality Program Manual as a guideline for Air Force Standards.

##### 4.3 Interior Design:

4.3.1 Carpets: Comply with ETL 00-6. Carpets will contain a definite pattern and shall be suitable to the function area. All carpeting will meet the flame spread rating required in the Life Safety Code.

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4.3.2 Sound Attenuation: Any building design requiring reduction of exterior generated noises shall be done in accordance with the Uniform Building Code, Chapter 35. Also consult the Hill Air Force Base Air Installation Compatible Use Zone Report, amended April 1982, for further sound attenuation guidance.

4.3.3 Non combustible material: The installation of exterior finish material shall comply with the requirement that at least 75 percent of the total interior wall surface of any one room must be of non-combustible material, Class B. This material must have a flame spread of 75 or less. Wood paneling will not be used. Wall carpeting will have a smoke development rating of 25 or less.

4.3.4 Concealment: All wiring, piping, and ductwork will be concealed whenever possible.

4.3.5 Interior Graphics Systems: An interior graphics system will be used where appropriate to control message size and complexity, to establish a specific lettering style, establish a color scheme, and enhance the overall interior environment.

4.3.6 Systems Furniture: Comply with ETL 90-2. Systems furniture should be considered for installation in large open areas to condense personnel and optimize space utilization. It should not be used to cover window spaces or exterior fin tube heating. The cubicles should be appropriately for the use intended but under no circumstances should be less than 48 square feet. All systems furniture shall be equipped with eight conductor electrical circuits (three hot conductors, three neutral conductors, one ground conductor and one isolated ground conductor). For Right-Sizing requirements comply with AFH 32-1084.

4.3.7 Acoustical Ceilings: The standard size of ceiling panels is 2 feet by 2 feet.

4.4 Handicapped design: Any new building, addition or major renovation shall comply with the Uniform Federal Accessibility Standards (UFAS) and the Americans with Disabilities Act Accessibility Guidelines (ADAAG), whichever is more stringent. Handicapped design is not normally required in the upper floors of a facility that houses a totally military work force, but the ground floors will be made accessible.

4.5 Keying and Hardware:

4.5.1 Keying: Master keying shall be ASSA TWIN V-10, V-80600 Series with six pin tumbler removable cores. All locks shall be furnished with removable core cylinders. The cylinder will be capable of being removed through the face of the knob by means of a control key. All cores and keys will be purchased by the Civil Engineering lock shop. All cores will be pinned by the Base Lock Shop. All locks will be grand master keyed into the base system and shall be sub-mastered by the BCE locksmith.

4.5.2 Hardware: Locks and latches shall comply with (ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Security Grade (1) (2) (and) (ANSI/BHMA A156.2, Series 4000, Grade

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l). Latches shall be Falcon lever arm, Model T-511 or T-571, or Yale lever arm, Model 5407-LN , both with 2 ¾" backset, and Avalon inside handle, and Dane outside handle that accepts ASSA removable core #V-80600 with a 612 or 626 finish. Provide trim of wrought construction and of commercial plain design.

4.6 Sign Policy: All signs shall be in accordance with Air Force Pamphlet (AFPAM) 32-1097 and the base Architectural Compatibility Standards. All parking and traffic signs must be installed on a 2" by 2" quick punch type signpost installed in sleeves. All sign posts must be finished Dakota Brown. The back of all signs must be painted or covered Dakota Brown.

4.7 Insulation: Steel-Frame Walls and Roofs shall be constructed in a manner compliant with ASHRAE Standard 90.1 Tables A2.3 or A3.3. U-values used for energy analysis shall be as shown and will require continuous insulation, (uninterrupted by framing) as required by those tables. For example: a 6 inch steel framing depth, 16 inches on center, must include an additional R-10 continuous insulation in order to claim an R-19 wall assembly ( U-value .052)

4.7.1 As required under ASHRAE 90.1 2004, Insulation shall not be installed resting upon removable suspended ceilings. Nor shall it be installed in a manner which can contaminate clean rooms.

4.8 Painting: All large exterior equipment shall be painted unless a screen is provided for the equipment. Heat-generating electrical equipment such as transformers or switches shall be painted Federal Paint Number 23617, Greystone. The color of other mechanical and miscellaneous equipment shall be on a case by case basis and be painted either Federal Paint Number 23617, Greystone or 30099; Dakota Brown,. This includes, but is not limited to HVAC units, including exterior conduit systems. All architectural coatings must comply with the VOC limits established by the EPA in the Architectural Coatings Rule published under the authority of the Clean Air Act.

4.8.1 General: Painting for new surfaces will consist of a prime coat and two topcoats. Semi-gloss paint will be used in high traffic, interior areas. Treat any waste associated with removal of lead paint will be treated as a hazardous material. Removal of red lead on structures shall comply with the procedures detailed in local, state and federal regulations and procedures. If repainting is required, the surface will be spot primed and one finish coat will be applied. Spray painting is limited to water tanks; fuel tanks; interiors of unoccupied buildings; the underside of docks; overhangs of 800 series buildings or any other job where the massiveness and intricacy precludes brush or roller application. Any spray painting will be done with an airless spray gun. Do not specify spray-painting if over-spray will damage aircraft, vehicles, equipment or other facilities. Fire hydrants. PIV's, bollards, etc., shall be painted Dakota Brown.

4.8.2 Concrete Exterior Surfaces: These surfaces shall not be painted except to prevent water penetration, unless specifically approved by the Base Civil Engineer.

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- 4.9 Canopies: the Architectural Compatibility Officer shall approve all canopy designs.
- 4.10 Windows:
- 4.10.1 General: Because unique conditions at Hill Air Force Base such as close proximity to a runway and high canyon winds, the following conditions will apply:
- 4.10.1.1 All windows shall be heavy commercial class 40, (HC-40).
- 4.10.1.2 All windows and sash shall be capable of accepting 1" thick glazing units.
- 4.10.1.3 All window frames and sash shall be thermally broken.
- 4.10.1.4 All windows will be capable of withstanding a 90 mph wind velocity.
- 4.10.1.5 All window air leakage shall be not exceed 1.0 cfm/SqFt and shall be determined in accordance with the National Fenestration Rating Council and shall be so labeled and certified by the manufacturer.
- 4.10.2 Windows in administrative areas: In any facility not cover by Historic Preservation concerns windows will be "projected in" tilt sash style with bronze glass and a bronze anodized finish.
- 4.10.3 Dormitory windows: Provide single hung, non-tilt windows with bronze tinted glass and bronze anodized finish.
- 4.10.4 Housing Areas: These windows will be sliders, single hung style or projected in windows with clear glass and a white anodized or white vinyl finish.
- 4.10.5 Window glazings shall have factory applied, spectrally selective coating or coatings, chosen for performance in the particular application. Low e coatings and solar reflective coatings perform distinctly different functions and are not interchangeable. Selective coatings must be properly placed on the correct glazing surface in order to perform properly.
- 4.11 Dormitories and Billeting Facilities: The design of these facilities shall follow the guidance provided by AFMC, Guidelines for Facilities Excellence, 1996.
- 4.12 Roof Drainage: Provide gables at all entrances unless it is specifically unfeasible or has a canopy. Metal roofs shall be equipped with a snow management system. Use rain gutters only when gutters are the only feasible method available to channel runoff to the storm drain system or for safety considerations. Provide heat tape system with rain gutters.
- 4.13 1200 Zone Rest rooms: Alterations of 1200 Zone buildings will standardize the location of the rest rooms in the center of the buildings.

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4.14 Roofs:

4.14.1 General: Roofing may utilize conventional or unconventional materials.

4.14.1.1 Headquarters AFMC. The use of single ply roofing will be further restricted to ethylene propylene diene monomer (EPDM), fully adhered, and will be placed no higher than a single story height to minimize wind lift.

4.14.1.2 Conventional Roofing: Most projects will utilize conventional roofing materials for new and repair projects. Conventional materials are Built Up roof (BUR) including modified bitumen, asphalt shingles, or standing seam metal roofs. When specifying BUR, a 20-year guarantee is required and the installing contractor must be certified by the BUR manufacturer before their bid can be accepted.

4.14.1.3 Unconventional Roofing: Unconventional roofing such as single ply or sprayed on membrane must be approved by HQ AFMC prior to use. If large areas of roof standing seam roofing are required by any project, the design shall provide gable entrances over all entranceways to prevent sheets of snow from sliding off and injuring personnel or damaging equipment in the fall zone.

4.14.2 Drainage: Sloped roofs shall be used in lieu of flat roofs when possible. To avoid snow sliding into door entryways roof gables will be used to the maximum extent possible. Hill AFB is located in a cold region, and because of past experience with ice and snow damage, the use of external gutters shall be limited to entryways where a roof gable is not possible. Drainage will be provided with a roof designed to slope away from personnel activity. The use of roof overhangs that extend over sidewalks is encouraged. Metal roofs shall not have internal guttering. Horizontal roof drains in unheated attic spaces shall be kept to a minimum to prevent freeze-ups.

4.14.3 Corrugated Cement Asbestos Roofs: These type roofs exist on a considerable number of roofs in the West area of Hill AFB. When it necessary to repair this type roof consideration should be given to replace the entire roof; however, it may be overlaid with plywood and asphalt shingles. The majority of the asbestos roofs have been encapsulated. If the contractor needs to mount new equipment or disturb the roof, great care should be taken to not disturb the asbestos.

4.14.4 Heat Tape: Heat tapes are to be avoided whenever possible. They are a maintenance problem, and most often do not receive routine maintenance at Hill AFB due to the lack of funds and maintenance personnel.

4.14.5 Plywood Decking: Fire retardant treated plywood (FTR) is banned on all new and re-roofing projects. This type of plywood deteriorates when used as roof decking. Untreated exterior glued plywood will be used for decking.

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4.14.6 Roof Penetrations: All roof penetrations will be kept to a minimum. The Base roofing engineer will be consulted prior to calling for penetrations in new and existing roofs. This coordination will answer questions on existing roof warranties and recommended penetration details for both new and existing roofs.

4.15 Landscaping:

4.15.1 General: An emphasis will be given to a desert motif using water resistant plantings. Landscaping will emphasize the architectural lines and features of adjacent buildings and areas, and will be designed to require little or not pruning. Landscaping will be designed with year-around consideration for human comfort. Passive solar cooling methods will be considered such as deciduous tree shading on the east, south and west exposures.

4.15.2 Shrubs and Trees: Shrubs and trees will be the most drought resistant varieties, and where possible will be placed without irrigation sprinklers. Large trees will be planted with enough space to facilitate growth and trimming, which will normally dictate that they be planted at least 20-feet apart.

4.15.3 Slopes: All slopes shall be no steeper than 3 to 1. Provide slope protection using recent technology for all slopes.

4.15.4 Lawns: Where lawns are used, they shall be provided with irrigation sprinklers, and will be sodded not begun from seed, except for dry land seeding applications. Irrigated lawns shall consider incorporation of a river-run rock or lava rock perimeter to preclude water over spray of sidewalks and pavements.

4.15.5 Restoration of Native Ground Cover: All native ground cover that is disturbed by construction and not scheduled for landscaping shall be re-seeded with drought resistant grasses and legumes. Mixtures of dry land alfalfa, fairway crested wheat grass and Indian rice grass will be used in good sandy, loam soils. Use sand drop seed with fairway crested wheat grass in gravelly soil. Machine drilling on generally level to mildly sloping ground is preferable. Hydro seeding should only be used on 3 to 1 slopes. This native ground cover seeding should take place in April, May, September and the first half of October only.

5 MANDATORY ENERGY AND WATER CONSERVATION REQUIREMENTS.

5.1 New facilities must comply with 10 CFR Parts 433, 434 and 435. Energy Conservation Standards for New Federal Commercial and Multi-Family High-Rise Residential Buildings and New Federal Low Rise Residential Buildings. Effective 3 January 2007 this federal regulation incorporates by reference ANSI/ASHRAE/IESNA Standard 90.1 – 2004 Energy

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Standard for Buildings Except Low Rise Residential Buildings. And the 2004 International Energy Conservation Code.

5.1.1 In order to ensure all readily available energy saving measures are considered in a design, new buildings must also be designed to achieve an energy consumption level that is at least 30 percent below the level achieved under the appropriate incorporated standard, if life cycle cost effective. If the additional 30 percent savings is not life-cycle cost effective, the designer must evaluate the cost effectiveness of alternative designs and successive decrements below 30 percent (e.g., 25 percent, 20 percent etc.)

5.1.2 Renovations and additions to existing facilities will comply with requirements of ANSI/ASHRAE/IESNA Standard 90.1 – 2004 Energy Standard for Buildings Except Low Rise Residential Buildings. The 2004 International Energy Conservation Code may alternatively apply in specific cases as appropriate.

## 5.2 Compliance Documentation.

5.2.1 Compliance documentation should be the standard forms provided in the ASHRAE Standard 90.1 2004 User's Manual correctly filled out and signed by a licensed engineer or architect. These forms are available from ASHRAE or from the Hill AFB engineering office. Alternate forms may be used but only if they provide the same information with the same level of clarity and detail.

5.2.2 For new construction the requirements of Appendix G in ANSI/ASHRAE/IESNA Standard 90.1 – 2004 shall be followed to establish the minimum allowable energy use levels. Energy calculations for comparing alternative building designs and energy conservation techniques or equipment must use simulation programs tested to ASHRAE Standard 140 and that integrate architectural features with air-conditioning, heating, lighting, and other energy producing or consuming systems. To be acceptable programs must be capable of simulating the features, systems, and thermal loads used in the design. The energy savings and any parasitic energy loads associated with the utilization of recovered energy, solar heat, solar photovoltaic energy and other renewable or waste heat applications must be included. Engineering Weather Data must be from established and authoritative weather data files. Programs should perform 8760 hourly calculations. Examples of acceptable programs are DOE2, BLAST and Energy Plus. The Department of Energy maintains a list of building energy and water conserving tools for design. A number of the programs may be of benefit in performing energy and water conservation calculations, comparing energy and water system alternatives and evaluating specific conservation measures. The web address for additional information is <http://www.energytoolsdirectory.gov/>.

5.2.3 Because a 30% reduction goal, software such as COMcheck is not sufficient to show compliance at Hill AFB.

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5.2.4 For renovations and additions the Simplified Approach Option described in ANSI/ASHRAE/IESNA Standard 90.1 – 2004 for HVAC Systems may be used to show compliance where the specific system and facility design meets all of the relevant criteria.

5.2.5 In accordance with Executive Order 13123, sustainable design shall be an integral part of every project. This requires an integrated and coordinated approach to the planning, design and construction of facilities and extensive use of environmentally preferable products, recovery and recycling of materials and waste reduction as well as an emphasis on the long-term quality and productivity of the built environment. Energy and water conservation are primary goals of sustainable design and development and are major requirements in complying with Executive Order 13123. Appliances, HVAC equipment and other energy consuming equipment shall have an energy efficiency rating in the upper 25 percent of that available as long as these efficiency requirements are nonproprietary and life cycle cost effective. In general, the Department of Energy and Federal Energy Management Program recommendations from the Buying Energy Efficient Products Guide and the Environmental Protection Agency Energy Star products program meet these requirements. The DOE recommendations are available on the web at [www.eren.doe.gov/femp/procurement](http://www.eren.doe.gov/femp/procurement).

5.2.6 Interpretation of terms used in ASHRAE Standard 90.1 are as follows:

Adopting Authority: The US Air Force.

Authority Having Jurisdiction (AHJ): The Contracting Officer or designated representative.

Building Official: The Contracting Officer's Representative.

Owner: Hill AFB

Permit Holder: The Contractor

5.3 Economic Analysis.

5.3.1 Analysis shall be performed based on the actual conditions expected over the life of the facility including anticipated occupancies, scheduled hours of operation and process loads. Realistic energy usage based on computer models, with equipment efficiencies, maintenance costs, repairs and renovations shall be included.

5.3.2 Designers may choose one of four methods listed in 10 CFR 436 to demonstrate life-cycle cost effectiveness. These methods include lower life-cycle costs, positive net savings, savings-to-investment ratio that is estimated to be greater than one, and adjusted internal rate of return that is estimated to be greater than the discount rate as listed by OMB Circular Number A-94 "Guide to Discount Rates for Benefit-Cost Analysis of Federal Programs. Additional information is available at [http://www.access.gpo.gov/nara/cfr/waisidx\\_o4/10cfr436\\_04.html](http://www.access.gpo.gov/nara/cfr/waisidx_o4/10cfr436_04.html)

5.3.3 The Life Cycle Costing in Design (LCCID) program is in full compliance with these regulations and is periodically updated to include the latest differential escalation rates, energy cost projections and similar economic factors. LCCID is available from the Building Systems Laboratory at the University of Illinois, <http://www.bso.uiuc.edu>, and from the Construction Criteria Base distributed by the National Institute of Building Science. Another life cycle

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costing program in full compliance with the Federal Regulation and updated with the latest economic factors is the Building Life Cycle Costing (BLCC) program available from the National Institute of Standards and Technology. The Department of Energy's building energy tools web site has a link to BLCC (under Energy Economics) and it can also be found at <http://www.eren.doe.gov/femp/techassist/softwaretools/softwaretools.html>. The appropriate cost and savings associated with the utilization of recovered energy, solar heat, solar photovoltaic energy and other renewable or waste heat applications shall be included.

#### 5.4 Meters.

5.4.1 A utility meter must be furnished at each building, for each utility serving the building in the normal units of the utility (i.e. kWh, cf, gallons, etc.), in accordance with the current requirements of the respective military service or DoD component agency. A water meter shall be provided for each facility where potable water demand is estimated to exceed 378 541 L (100,000 gallons) per year. Design and installation of all meters shall be capable of being easily connected to a base wide energy and utility monitoring and control system directly or via the building HVAC control system.

5.4.2 All utility meters shall be 100% compatible with the existing base-wide Energy Monitoring and Control System (EMCS) for remote collection of data. Recorded values for Electricity (kwh & kw), Natural Gas (cfpm), Steam (klbs), Water (gals) shall apply. The existing system is a Dorsett's, Inc. INFO-SCAN/MicroScan system manufactured by Dorsett's, Inc. 100 Woodlyn Drive, Yadkinville, NC 27055, Phone (800) 331-7605.

5.4.3 The consumption data shall be completely integrated into the EMCS in building 15. All communication connections will be made by the Contractor to government furnished communications media at the nearest telephone panel. Connection is via a dedicated 4-wire circuit modem link. The Government will furnish all pair assignments.

5.4.4 The EMCS integration shall include complete installation of all hardware and software if necessary. This shall include but not be limited to an INFO-SCAN database conforming to the I/O schedule, INFO-SCAN dynamic graphic displays, and all applications programming necessary to accomplish the specified sequences of operation. All points required for operation shall be provided in software and hardware.

5.4.5 The Contractor must be required to perform a complete point-to-point test of the completed EMCS Installation. The test shall be conducted by measuring the digital input pulse value with a test instrument twice as accurate as the device being measured. The test equipment shall be certified traceable to NIST standards. The value shall be calibrated in either hardware or software to the specified accuracy. Digital input pulse signal shall be tested by exercising the connected metering device with a simulated input condition. All test results shall be recorded and documented by the contractor and included in the Operation and Maintenance Manuals furnished to the Government.

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5.4.6 The telephone number for the EMCS Operations Manager (Mr. Steve Nalder) is (801) 777-3988. The Base Utility Manager (Mr. Dave Abbott) can be reached at (801) 777-5944.

## 6. MECHANICAL SYSTEMS DESIGN

### 6.1 General:

6.1.1 HVAC equipment sizing shall be based on commercially available computer load calculation software. Rule-of-thumb sizing is not permitted. The modular nature of commercial equipment will provide sufficient safety factors. The use of additional sizing safety factors is discouraged. Ambient design air conditions shall be 3 °F winter heating and 96DB/62WB °F summer cooling. Equipment selection shall account for a site elevation of 4,900 ft above sea level, and equipment schedules shall indicate "site elevation" capacity. Cooling tower design shall be based on 70 WB °F. Indoor design temperatures for comfort cooling shall be not lower than 75 °F or higher than 78 °F. For general comfort areas the indoor design specific humidity should not exceed the outdoor design specific humidity. For humidified areas for the control of static discharge the design relative humidity should be 40%. Only under very specific cases shall the indoor design relative humidity be as high as 50%. The indoor design temperature provided by evaporative cooling or comfort mechanical ventilation will be 80 °F. The indoor design temperature for comfort heating will be 68 °F in areas with low levels of physical activity, and 55 °F in areas of moderate to high levels of physical activity. The indoor design temperature for freeze protection will be 40 °F. Humidification systems when required shall not use industrial steam directly or introduce corrosion inhibiting chemicals commonly found in central steam systems into the breathing air. Humidifier equipment shall only discharge potable water or potable steam.

6.1.2 Fan systems served by VFD's shall have a pressure relief door installed in the supply main, set to relieve duct over-pressure when the VFD fails to full speed, and thereby protecting the duct seams downstream of the fan. The approved door shall have a 12 gauge frame and door, and polyurethane foam seals around the door perimeter.

6.1.3 Design air distribution systems for central HVAC systems to maintain a slightly positive pressure within the area served in order to reduce or eliminate infiltration unless there is a valid need to maintain a negative pressure in that area. Each system shall provide adequate air quantities for cooling even though cooling may not initially be provided. Air velocity shall be less than 50 fmp in the occupied zone, and at RC values which do not exceed current ASHRAE limits found in ASHRAE Systems, Sound and Vibration Control.

6.1.4 Infrared heating system designs shall be reviewed and approved by the equipment manufacturer and submitted designs must include a letter so certifying.

6.1.5 Cooling and Heating Systems mounted outdoors or with components potentially exposed to freezing temperatures shall be protected with a 40% glycol/water mix. Glycol shall

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be industrial type inhibited propylene glycol. Automotive type ethylene glycol shall not be used. Include automatic feeder. Chemical Treatment shall be provided as required by the equipment manufacturer.

6.1.6 Adequate maintenance clearance around all mechanical equipment, piping, valves, fittings, and accessory items must be provided. In addition, Provide adequate clearances to allow for removal and re-installation of filters, coils, tubes, tanks, etc. In no case shall clearance be less than 24 inches. Provide unions and valves to permit disassembly of piping and equipment without draining the system.

6.1.7 Flow control devices shall be provided at all major terminal devices such as coils, converters, etc. Flow control devices are to have marked memory stops and handles are to be removed after balancing. Additional isolation valves shall be required to prevent the use of flow control devices as shut-off valves.

6.1.8 Mechanical rooms with equipment containing refrigerants shall be ventilated and alarmed and shall comply with ASHRAE Standard 15, Safety Code for Mechanical Refrigeration. Mechanical rooms containing refrigerant compressors, coils, tanks, piping, etc. shall not be used as return air plenums. Mechanical rooms which contain mechanical refrigeration shall not have devices which produce an open flame.

6.1.9 Ventilation shall conform to the latest edition of ASHRAE Standard 62 Provide a complete ventilation analysis in each HVAC design analysis in accordance with UFC 3-410-01FA. Ventilation for VAV systems will ensure proper ventilation rates at low and high system airflows. Provide a ventilation schedule on the drawings. Air intakes shall be located a minimum distance of 30 feet from foul air sources (i.e. near cooling towers, exhausts, vehicle emissions, garbage dumpsters, etc.) Where possible, locate intake and exhaust on different building faces. Design of dormitory HVAC systems shall comply with ETL 97-13. All restrooms shall have the exhaust system ducted to the outside of the building. Restroom ventilation volume flow rate shall be a minimum of 2 cfm per square foot of floor area but in no case less than 300 cfm total and design must include a means of providing make-up air. Restroom ventilation should be linked with the lighting system.

6.1.10 Commissioning procedures shall be detailed in specification sections with required checklists included. Air Force Engineering Technical Letter 90-10 provides a minimum standard only.

6.1.11 Drawings shall comply with current Hill AFB CAD standard.

6.1.12 Basis for Design: Mechanical drawings shall list the buildings calculated loads for heating, ventilation, cooling, and electrical service. Design occupancy levels shall be listed separately along with design internal equipment and lighting loads. Equipment capacities shall be listed in equipment schedules with clear description of capacity as measured at sea level or at 4,900 feet elevation and shall include estimated excess capacity if applicable

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6.2 MOTORS.

6.2.1 Motor selection shall comply with Air Force Pamphlet 32-1192. Should motor efficiency conflict with requirements of ASHRAE 90.1 2004 the most stringent shall apply.

6.3 NOISE.

6.3.1 Noise control and vibration design shall comply with Unified Facility Criteria UFC 3-450-01

6.2 INDUSTRIAL VENTILATION

6.2.1 Industrial ventilation design shall comply with Unified Facility Criteria, UFC 3-410-04N as a minimum. Improve where new technology warrants.

6.3 SEISMIC DESIGN OF MECHANICAL SYSTEMS AND PIPING

6.3.1 Seismic bracing of mechanical systems shall comply with UFC 3-310-03A. Bracing and anchoring details shall be shown on the drawings. Statements which place responsibility for seismic design with the contractor is not permitted.

6.4 HVAC CONTROL DESIGN:

6.4.1 Controls shall be Direct Digital (DDC) and allow for installing contractor to choose between BACnet compliant system or Dorsett's compatible system. (Dorsett's, Inc. INFO-SCAN/MicroScan system manufactured by Dorsett's, Inc., 100 Woodlyn Drive, Yadkinville, NC 27055, and Phone (800) 331-7605). Damper and valve actuators shall be electronic with a control signal of either 0-10 VDC or 4-20ma. Pneumatic Devices shall not be used unless required for explosive environments or interfacing to existing devices in remodeled areas

6.5 STEAM DISTRIBUTION LINES:

6.5.1 Steam Distribution and condensate lines shall be located above ground when possible. When the lines must be placed in an underground system, they should be installed in a utility trench. Install steam meters on all new facilities or when steam mains to existing facilities are replaced.

7 Fire Protection Considerations:

7.1 Fire Suppression Systems:

7.1.1 All sprinkler systems shall be hydraulically designed. Pipe sizes, sprinkler locations, and data for hydraulic calculation sign shall be shown on the drawings.

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7.1.2 The design shall be in compliance with Unified Facilities Criteria (UFC) 3-600-01. Fire Protection for Facilities Engineering, Design, and Construction, Engineering Technical Letter (ETL) 01-2: Fire Protection Engineering Criteria - New Aircraft Facilities, Engineering Technical Letter (ETL) 98-8: Fire Protection Engineering Criteria - Existing Aircraft Facilities, Engineering Technical Letter (ETL) 01-18: Fire Protection Engineering Criteria - Electronic Equipment Installations, Air Force Instruction (AFI) 32-1066: Plumbing , National Fire Protection Association (NFPA 13): Installation of Sprinkler Systems.

7.1.3 The project specifications shall include an edited version of Section 13916 – Fire Sprinkler Systems from the Civil Engineering library.

7.1.4 All new dry/wet fire suppression systems connected to potable water supplies and using water only as a fire suppressant shall have an approved double check valve backflow preventer and test station. All new dry/wet fire suppression systems connected to potable water supplies and using water with antifreeze or other chemical as a fire suppressant shall have an approved reduced pressure principle backflow preventer and test station. Installation of a backflow preventer in a vertical position shall be approved by the by the State of Utah. Install valves and piping as needed to allow the backflow preventer to be forward flow tested (piping sized for sprinkler system demand flow) on a periodic basis. Piping shall be directed to the building exterior in an area where pavement exists to minimize erosion during flow testing. Piping at the exterior wall shall terminate with a threaded hose connection(s) and a threaded cap that has labeling to identify the port function as flow testing of the backflow assembly.

7.1.5 All aboveground sprinkler piping shall be Schedule 40 black steel pipe, Schedule 40 galvanized steel pipe, or Type ‘K’ copper tubing.

7.1.6 All fire suppression control valves including post indicator valves (PIV’s) require tamper switches. Control valves associated with the riser shall be butterfly type with integral tamper switch; OS & Y type valves are not to be used at the riser.

7.1.7 Each riser shall have a separate flow switch for each floor level and each riser.

7.1.8 Fire sprinkler piping shall be located in a heated area or in an insulated attic where temperatures are assumed not to drop below 40 degrees F.

7.1.9 HALON and CO2 type fire suppression systems shall not be used.

7.1.10 Location of inspector test valve as required by NFPA 13 shall be coordinated with the architectural requirements of the building including but not limited to concealed access boxes of adequate size with cover plate painted to match surroundings and located in a manner compatible with the architectural and furniture configuration of the building. Code required signage shall be provided. Additional piping and finishes on both the exterior and interior may be required. Details shall be coordinated through the shop drawing process. Wet type sprinkler systems shall have the inspector test valve installed at the riser, downstream of the flow switch.

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7.2 Water Supply

7.2.1 New fire hydrants shall include a Storz type nozzle on the 4-inch pumper port. The nozzle shall be an integral part of the hydrant.

7.2.2 Buried fire protection water service lines shall be buried at least 5 1/2-feet below grade

7.3 Fire Alarm Detection System:

7.3.1 The design shall be in compliance with Unified Facilities Criteria (UFC) 3-600-01: Design: Fire Protection Engineering For Facilities; Engineering Technical Letter (ETL) 02-15: Fire Protection Engineering Criteria - New Aircraft Facilities; ETL 98-8: Fire Protection Engineering Criteria - Existing Aircraft Facilities; ETL 01-18: Fire Protection Engineering Criteria - Electronic Equipment Installations, and National Fire Protection Association (NFPA 72: National Fire Alarm Code.

7.3.2 The project specifications shall include an edited version of Section 13852--Fire Alarm Systems from the CEC Specification Library.

7.3.3 All new systems shall use Class "A" initiating device circuits, signaling line circuits and notification circuits. Signaling Line Circuits (SLC) shall be Class A, Style 6 or Style 7. Initiating Device Circuits (IDC) shall be Class A, Style D. Notification Appliance Circuits (NAC) shall be Class A, Style Z.

7.3.4 All new fire alarm control panels shall be capable of receiving, annunciation and transmitting alarm, supervisory and trouble signals.

7.3.5 Audio notification appliances shall have a 3 pulse temporal pattern (90-99dB). All appliances in one room shall be synchronized.

7.3.6 Visual notification appliances shall be 75-100 candelas. All visual appliances in one room shall be synchronized.

7.3.7 The following fire alarm control panels are approved for installation at Hill AFB: Fire Control Instruments (FCI) 7200 series, FCI model E3, Siemens model FS 250, Edwards Systems Technologies (EST) model III, Notifier AFP series (200, 400, 1010, 2020). There will be no exceptions to this list.

7.3.8 Provide audio/visual notification appliance in all public areas.

7.3.9 Install duct smoke detector in supply air stream and fan shutdown circuit for air handlers between 2,000 cfm and 15,000 cfm. Install duct smoke detectors, one in supply air and one in return air, and fan shutdown circuit for air handlers over 15,000 cfm. The fire alarm

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control panel will shut the air handler down if smoke is detected. The fire alarm control panel will be configured such that reset of the smoke detector can be done manually from the panel (and not at the detector).

7.4 Fire Alarm Reporting Systems:

7.4.1 The design shall be in compliance with Unified Facilities Criteria (UFC) 3-600-01: Design: Fire Protection Engineering For Facilities; Engineering Technical Letter (ETL) 00-12: Fire Protection Engineering Criteria - Conversion of Fire Alarm Radio Systems to Narrowband Technology, and National Fire Protection Association (NFPA 72: National Fire Alarm Code.

7.4.2 The project specifications shall include an edited version of Section 13852--Fire Alarm Systems from the CEC Specification Library

7.4.3 At Hill AFB including UTTR and Little Mountain the radio fire alarm transceiver shall be a Monaco BT2-7NB, BT2-8NB (16 zone) or BT2-8NB (32 zone) compatible with an existing Monaco D-21 Radio Fire Alarm Monitoring Systems. The transceivers shall operate on a frequency of 141.000 MHz. Provide a tamper switch on the transmitter housing and Fire Alarm Control Panel, which will transmit a Monaco Tamper Message when the switch is tripped. Provide antenna and lightning protection as recommended by Monaco. Each transmitter and interface device shall be the manufacturer's current commercial product completely assembled, wired, tested at the factory, and delivered ready for installation and operation. At Hill AFB the Monaco D-21 central receiving stations are located in Bldg 9 & Bldg 1151. At UTTR the receiving station is located in Bldg 40030 and for Little Mountain the receiving station is located in Bldg 4301.

8. NATURAL GAS AND LPG.

8.1 General Design: Natural Gas distribution systems design and installation shall follow UFC 3-430-05FA. Distribution pressures at HAFB will vary with location but are typically 35 psi.

8.2 Line Location. Gas distribution system lines shall never be installed or allowed to remain under buildings. They shall not be laid in the same trench with other utilities to preclude the possibility of leaking gas following along or collecting in other pipe lines or conduits. For the same reason, gas lines will be placed above other utilities whenever they cross, if practicable. Gas lines shall not be laid under paved streets or in other locations subject to heavy traffic whenever practicably avoidable. Whenever it is necessary to locate gas lines in such locations, the lines must be protected by suitable casing and by burying to a depth to provide at least 2 feet of cover over the top of the pipe. Sufficient clearance must be maintained between plastic mains and steam, hot water, power lines, and other sources of heat, to avoid temperatures in excess of 60 degrees C (140 degrees F) for thermoplastics or 66 degrees C (150 degrees F) for thermo-setting epoxy resin pipe. Natural gas lines should be buried deep enough to provide no less than 30 inches of cover and shall have a metallic tracer wire coiled loosely around the pipe with warning tape buried 24 inches above.

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8.3 All new pipe must be inspected before concealment.

8.4 Gas meters shall be installed for each building with pressure regulators. Gas meters serving dormitories or other residential type structures shall have earthquake sensitive automatic shut off valves or excess gas flow shut off valves. Earthquake valves shall automatically shut bubble tight within five seconds when subjected to a horizontal sinusoidal oscillation having a peak acceleration of 0.3 gravity with a period of 0.4 seconds. Specify three piece dielectric unions where applicable. Include in the specifications a requirement that the valve shall allow short duration nuisance bumps without disturbing the gas supply (not first generation). The manifold assembly must be designed with supports and appropriate barriers to isolate the valve. Recommended manufacturer is KOSO. In addition to the pressure regulating devices, all newly installed meters regardless of location shall have suitable protective devices to prevent accidental over pressurizing. Suitable protective devices are as follows:

- (a) Spring-loaded relief valves conforming to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
- (b) Pilot-loaded back pressure regulators used as relief valves and designed so that pilot system or control line failure will open the regulator.
- (c) Weight-loaded relief valves.
- (d) A monitoring regulator installed in series with the primary pressure regulator.
- (e) A series regulator installed upstream from the primary regulator and set to continuously limit the pressure on the inlet of the primary regulator to the maximum allowable operating pressure of the distribution system, or less.
- (f) An automatic shutoff device installed in series with the primary pressure regulator and set to shut off when the pressure on the distribution system reaches the maximum allowable operating pressure, or less. This device must remain closed until reset manually. It should not be used where it might cause an interruption in service to a large number of mains or service lines.
- (g) Spring-loaded diaphragm type relief valves.

8.5 Controlling and limiting pressure in low pressure gas distribution systems. Each low pressure distribution system or low-pressure main supplied from a gas source which is at a higher pressure than the maximum allowable operating pressure for the low-pressure system will be equipped with pressure regulating devices of adequate capacity. Other devices will be designed to meet the pressure, load, and other service conditions under which they will have to operate. In addition to the pressure regulating devices, a suitable protective device to prevent accidental over pressurizing must be provided and may include:

- (a) A liquid seal relief device that can be set to open accurately and consistently at the desired pressure.
- (b) Weight-loaded relief valves.
- (c) An automatic shutoff device as described above.
- (d) A pilot-loaded back pressure regulator as described above.
- (e) A monitoring regulator as described above.

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8.6 Liquefied Petroleum Gas. LPG usually includes butane, propane or mixtures of both which can be stored as liquids under moderate pressures of 80-250 psig at ambient temperature. Use of LPG gas systems is discouraged and must be preapproved. LPG gas distribution systems when used will be designed to comply with the requirements of NFPA 58 instead of ANSI B31.8. Polyethylene and fiberglass pipe will not be used in LPG systems.

9. ELECTRICAL REQUIREMENTS:

9.1 Exterior Distribution:

9.1.1 Primary Voltage: The Primary voltage at Hill AFB is 12,470 volts.

9.1.2 Transformers: All new transformers shall be 3-phase pad mounted. Primary voltage is 12470/7200 volts grounded delta primary. Transformers shall have loop feed with elbow arrestors, dead front, bushing wells with inserts installed, 4 hole spades, 3-phase gang operated on/off loadbreak switch, bayonet fusing, top level oil temperature gages, liquid level & pressure vacuum gages, drain valve with sampler, copper windings and two each 2-1/2% taps above and below normal. This will assure that the user voltage can be regulated within proper limits. All transformer manufacturers selected will have an authorized rewind shop within 50 miles of Hill Air Force Base.

9.1.3 Buried High Voltage Cable: All buried high voltage cable (over 600 volts) shall be placed in conduit with a minimum of 3-inches of concrete encasing around the conduit. Depth of burial shall be 36 inches below grade. A 6-inch wide, red plastic marker tape with the words "Danger-Buried High Voltage Cable" shall be placed directly over the high voltage line at a depth of 12 inches below finished grade or 6 inches below the top of sub grade whichever is deeper. Maximum spacing between manholes or equipment shall be 500 feet.

9.1.4 Buried Conductors Below Traffic: All conduit containing conductors of any voltage including communication circuits that run under streets or parking lots shall be concrete encased 3 inches thick on all sides.

9.1.5 Only RGS 90 degree elbows and RGS conduit shall be used when making the transition from underground to overhead high voltage power line.

9.1.6 Support Structures: All power poles, steel support structures and their foundations shall be rated for a 100 mph wind load.

9.1.7 All new high voltage cable shall be 15 KV, 133 percent insulation, shielded, with E P insulation.

9.1.8 Watt-hour meters shall be installed on all facilities requiring new service and modifications to existing facility power requirements. ASHRAE Standard 90.1 2004. Recommend using model "Sentinal" manufactured by Schlumberger.

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- 9.1.9 Exterior equipment shall not be placed-near the drip lines of roof overhangs or rain gutters.
- 9.2 Interior Distribution: Do not use aluminum conductors or bus bars inside any facility at Hill AFB. Only copper conductors and bus bars should be used.
- 9.2.1 All new building wiring systems shall be designed using 277/480 volts unless uneconomical to accomplish and shall be in rigid conduit or central open raceways.
- 9.2.2 Lighting shall be installed using 277 volts if available.
- 9.2.3 Do not use any polystyrene lenses in light fixtures.
- 9.2.4 Comply with federal energy requirements when designing lighting systems. See section 5 Mandatory Energy and Water Conservation Requirements above.
- 9.2.5 In office buildings or other buildings that will have a considerable amount of computer equipment installed, or will have systems furniture:
- a. Run oversized neutral conductors from the transformer to service equipment, and from service equipment through the distribution panels to the branch circuit panels (double sized neutral conductors are recommended).
  - b. From the branch circuit panel boards, run eight conductor circuits (three hot conductors, three neutral conductors one ground conductor, and one isolated ground conductor) to all receptacle outlets, including those receptacle outlets in pre-wired systems furniture.
  - c. Run all other circuits as per the National Electric Code requirements.
- 9.3 Exterior Lighting:
- 9.3.1 Light Poles: All light poles and foundations shall be rated for a 100 mph wind load.
- 9.3.2 Type of Lights: Comply with federal energy requirements when designing lighting systems. See section 5 Mandatory Energy and Water Conservation Requirements above. Use high-pressure sodium vapor lights for exterior lighting wherever possible.
- 9.3.3 Photoelectric Controls: Use photoelectric controls on exterior lighting where possible to save energy. Where practical fixtures shall be grouped together using contactors, which are controlled by a single photocell.
- 9.4 Interior Lighting: Lighting level shall comply with ANSI/ASHRAE/IESNA Standard 90.1 – 2004 *Energy Standard for Buildings Except Low Rise Residential Buildings* .

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9.5 Auxiliary Power: Use four-pole transfer switches when GFP schemes are used. By doing so, when power is switched from the utility to the backup generator, the neutral is also switched. This prevents problems in the ground fault detection circuit.

9.6 Power Continuation Conditioning and Interface Equipment (PCCIE):

9.6.1 Validation of Requirement: All requirements will be validated by each user through his major command. Civil Engineering does not validate requirements.

9.6.2 Design: The design of all PCCIE for Hill AFB is accomplished by OO-ALC/LIPC, 775-5576.

9.7 Communications: Comply with Air Force ETL 02-12 except as indicated by the 75 CS supplement to the ETL. See Appendix B. Comply also with the 75th CS Telecommunications Installation Criteria (Tab K) available at <https://hillnet.hill.af.mil/itms/Bob/>.

9.8 TEMPEST: All Electromagnetic Interference related problems should be referred to the Base Electromagnetic Emissions Security Officer, Lori Prendergast, 75 CS/SCBS, 777-0362.

9.9 Special Protection for Rotating Electrical Equipment: Three-phase electrical motors shall have phase failure and ground fault-protection when such protection costs are equal to or less than one-fourth the cost of the motor. This protection will be in addition to all protective devices required by the National Electric Code. Where there are a number of smaller three-phase motors within a particular building, the building will be protected at the service entrance with phase failure protection.

9.10 Lightning, Static & Surge Protection

9.10.1 Provide a complete lightning protection system as required by NFPA 70, NFPA 780, Mil-HDBK-419, AFMAN 91-201, DOD 6055.9, AFI 32-1065, LPI-175, and UL 96A. The system shall be installed by a certified lightning protection installer who is listed with the National Recognized Testing Laboratory (NRTL) and is actively engaged in the installation of UL Master Labeled lightning protection systems or who is certified by the Lightning Protection Institute (LPI) as a master Installer/Designer and be so listed by the Lightning Protection Institute and by Underwriters Laboratories, Inc. For the complete scope of the installation of a lightning protection system the installer shall provide a UL certification stating compliance with AFI 32-1065 and if applicable a UL Master Label.

9.11 Intrusion Detection Systems

9.11.1 Vindicator Technologies is the only authorized IDS supplier. All requests for IDS must be coordinated with SFOS and CEZS.

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10 LIQUID FUELS STORAGE AND DISTRIBUTION.

10.1 Tanks: Fuel storage tanks shall comply with applicable standards of American Petroleum Institute and be aboveground with a concrete lined containment area. Exceptions to the above ground installation must be approved by OO-ALC/EM. If tanks must be placed underground they shall be double walled Plasteel (steel inner wall and fiberglass-coated steel for the outer wall) and have leak monitoring equipment installed, which meets all Environmental Protection Agency (EPA) requirements.

10.2 Piping: All underground fuel piping shall be double walled pipe. The carrier pipe shall be schedule 40 black steel and the outer layer shall be fiberglass.

10.3 Valves: All valves in liquid fuel systems shall have fire rated seals to shut off bubble tight in case of fire.

10.4 Grounding: Fuel system grounding shall comply with the National Fire Protection Association (NFPA) 30, Flammable and Combustible Liquids Code.

10.5 Tank Cleaning. Cleaning of fuel storage tanks shall comply with AFMAN 32-10105.

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11. PLUMBING:

11.1 Plumbing Design General: Comply with UFC 3-420-01FA. The International Plumbing Code and other Federal, State and local regulations pertaining to safe drinking water laws also apply where they are more stringent. Acceptable materials for service connections shall be ductile iron, type K copper, and PVC plastic pipe. Acceptable material for interior piping is type L copper. A back-flow preventer shall be installed on all systems where cross contamination is possible, and before any industrial process plumbing except for non-potable water systems. Water lines shall be inside the buildings thermal envelope. Piping and drinking fountains shall not be placed in or on outside walls to prevent freezing. Avoid placement near outside air vent opening.

11.2 Determine Plumbing fixture requirements by number of occupants using UFC 3-420-01FA.

11.3 Horizontal roof drains shall be kept at a minimum to prevent freezing. Roof drains shall not be less than 3 inches diameter.

11.4 Cross connections (any connection or arrangement of piping between two otherwise separate piping systems, one of which contains potable water and the other non-potable water or industrial fluids of questionable safety) may cause non-potable fluid to enter the potable water system by either backflow, backpressure, or back-siphonage, and shall not be allowed without implementation of an adequate approved method of protection by means of internal plumbing controls. The internal plumbing control method involves the installation of the appropriate device at the point of EACH potential cross connection. This requires the use of air gaps, vacuum breakers, etc., at each plumbing fixture, equipment, tank, sink, etc., to protect the potable water system from backflow.

11.5 Water injecting trap primers shall not be installed on Hill AFB. Experience has shown the tendency for these devices to be improperly installed. This creates an unchecked cross-connection with potential water contamination. If a sewer gas problem exists, installation of a waterless trap device with a self-coiled internal rubber hose mechanism (equal to a Trap Guard) is allowed to seal off sewer gas but permits water to drain.

11.6 Provide sufficient space and access, 24 inches where possible, for maintenance of fixtures, valves, and piping.

12. COMPRESSED AIR

12.1 Economic Analysis: Use life cycle economic analysis to select between multiple individual compressors at each work site or a single centrally located compressor.

12.2 Moisture and Contaminant Removal: The design of a compressed air system shall include a means to properly remove moisture and contaminants from the system. This includes

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after coolers, air dryers, filters, automatic drains on the storage receiver, drain valves at all points, etc.

12.3 Other Considerations: Additional items which will be Considered for a compressed air system are: The compressor should be sized for anticipated future expansion. Provide noise suppression to keep compressor noise within Occupational Safety and Health Administration (OSHA) limitations. Reclaim exhausted heat to supplement space or water heating.

12.4 Piping: Piping used for compressed air systems shall be schedule 40 black steel or copper pipe. If the piping is to be placed underground it shall have a factory installed 50-mil polyethylene coating, and shall be cathodically protected.

### 13 CORROSION CONTROL:

13.1 Cathodic Protection: Cathodic protection is required for the following items: Any ferrous material that comes in contact with the earth. This includes but is not limited to the exterior surface of underground pipes. The interior surface of water storage tanks.

13.2 Water Treatment: The following items shall be included as part of water treatment for HVAC facilities: Conductivity meters and chemical feed equipment for condenser water systems on chillers (Open loop system with cooling tower). A pot feeder for closed loop hydronic systems (both hot and chilled water systems). Conductivity metering and chemical feed equipment for boiler water. A bleed-off line with an adjustable flow meter on evaporative coolers. This includes direct as well as multiple stage evaporative cooling units. Sampling ports for the analysis of water conditions.

### 14. PROJECT DOCUMENTATION.

14.1. As Built Drawings: A minimum of one set of Record Drawings in electronic format must be provided on all new construction and all major renovations. Drawings must be complete, accurate and comply with current Hill AFB CAD standard.

14.2 Basis of Design: At least one electronic set of all design and construction related information not shown in the record drawings must be provided. As a minimum include engineering calculations, structural load assumptions and calculations, energy calculations, equipment sizing, test reports, including HVAC test and balance reports, commissioning reports, and any other related similar information.

14.3 Equipment Operations and Maintenance (O&M) manuals: At least two hard copy sets and at least one electronic set in Adobe pdf format must be provided. Requirements for O&M manuals will be detailed in project specifications and must require as a minimum:

(a) A complete parts list and source of supply for each piece of equipment, and marked with model, size and plan symbol.

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- (b) Performance curves for all pumps and fans marked with model, size and plan symbol.
- (c) Wiring diagrams
- (d) Maintenance checklists provided by the manufacturer –or- if not available then checklists adapted from those in the Federal Energy Managers Program (FEMP) O&M Best Practices Guide.

15 COMPUTER AIDED DESIGN AND DRAFTING (CADD)/ GEOGRAPHICAL INFORMATION SYSTEM (GIS):

15.1 General:

15.1.1 CADD drawings shall be developed in accordance with the A/E/C CADD Standard which was produced by the CADD/GIS Technology Center. The CADD standard is available at <http://tsc.wes.army.mil> and GIS standard is available at <http://www.sdsfie.org/>. Development and manipulation of drawings and reference files along with file naming methodology shall follow the standard. All drawings shall be digitized and must be delivered in printed form and on machine-readable media. The number, and type of materials for printed copies required for construction documents as-built and other uses will be specified by Hill AFB. All changes made to the design during construction must be posted in the electronic files. File names must comply with the Hill AFB CADD Standard.

15.2 Drawing Format.

15.2.1 Drawings can be produced on AutoCAD or MicroStation but files must be submitted in DWG or DXF format only using a Projection of UTM Zone 12 and datum of NAD27. Any drawings not using said projection and datum will not be accepted.

15.3 Media Format.

15.3.1 Compact Disk. Machine-readable data may be submitted on a Compact Disk. Must be compatible with latest CD writers and readers. Each CD must have an external label indicating the format, density, company/organization name, and creation date.

15.4 Documentation and metadata:

15.4.1 A documentation handbook must be submitted with the machine-readable media. This handbook shall contain the specifics of the database, the file names, reference file names, stroked plotter files, and cell library names. All other pertinent information used in constructing and managing the drawings and database, shall also be included. Metadata allows the CADD files overlay the GIS data and be easily incorporated into the database.

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16. Cost Estimating:

16.1 General: All cost estimates shall be based on recent documented bid data or the latest edition of Building Construction Cost Data as published by the Robert Snow Means Company, Inc. All estimates for the Military Construction Program (MCP) shall be based on the latest edition of the Military Pricing Guide or as directed by the Civil Engineer. Use 15 percent overhead and 10 percent profit.

16.2 Procedures: All estimates shall be based on unit costs. Single line item estimates shall not be used. All estimates for change orders and the 8(a) Program shall be prepared in detail on an Air Force Form 3052, and shall include labor hours, material, and bonding costs.

17. "OTHER CONSIDERATIONS":

17.1 Space Allocations: For Right-Sizing requirements comply with AFH 32-1084.

17.2 Ban on Use of OLDs: Effective 01 July 1992, the Air Force is banning the use of ozone layer depletion substances. These are generally found in HALON type fire suppression systems and in air conditioning refrigerants.

17.3 Pest Management Mitigations: Ensure that pest management mitigation measures are taken into effect, including but not limited to bird screens, rodent proofing, and chemical pre-treatment of wood to prevent termite infestation.

DEPARTMENT OF THE AIR FORCE  
75TH SECURITY FORCES SQUADRON (AFMC)  
HILL AIR FORCE BASE, UTAH

30 Jan 2002

MEMORANDUM FOR GENERAL SECURITY REQUIREMENTS

FROM: 75 SFS/SFO and 75 CEG/CEC

SUBJECT: General Security Requirements for Contractors/Contracts at Hill AFB and its Off

Base Sites.

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1. All contractors will coordinate with their contracting officer and/or contracting engineer:
    - a. Concerning obtaining the paperwork for their contractors identification badge AFMC Form 496.
    - b. In order to gain access to a restricted area. The contractor must submit the necessary paper work for a security clearance, through prescribed channels. If additional information is necessary contact your contracting officer/engineer for further guidance.
    - c. In order to gain access to a controlled area the contractor must under go a local files check. This request is submitted through the contracting officer/engineer for the project, to 75 SFS/SF.
  2. Report to Pass and Registration, West Gate Visitor Center to obtain vehicle pass.  
Note: All vehicles will comply with State of Utah inspection, emission standards, and insurance requirements prior to requesting vehicle decals.
  3. Any digging or work, which may affect the communication lines/alarm system lines, removal or changing of security fixtures respectively for the base, must be cleared through
    - a. 775 CES/CEZS, Mr. Gary Cordon, Base Civil Engineering, ext. 7-2177
    - b. 75 SFS/SFOXS, Mr. John Jenkins ext. 7-5532
- A notice of intent, minimum of one week prior to commencement of work, will be on file with the respective offices.
4. Any construction, which may affect the base traffic flow pattern, must be coordinated through 75 SFS/SFOJ, ext. 7-8086.
  5. Any facility construction or remodeling which affect any enhanced security measures must be coordinated with the owner/user and the Security Forces, one week prior to commencement of work. Point of contact is 75 SFS/SFOA, Mr. Paul Wagner, ext. 5-2709, SA Mark Baros Det 113 AFOSI, ext.7 1852, and MSgt Kieser, 75 SFS/SFOS, ext. 7-7133.
  6. It is the responsibility of the contractor to secure all property within the construction site. If government property is included the contractor must secure it also, and notify the contracting officer/engineer as soon as possible.
  7. If during any contract course of work it becomes necessary for the contractor to enter any unmanned base entry gate, they must first contact 75 SFS/SFO at ext. 7-5531. If the contractor assumes custody or control of a particular gate they will ensure:

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- a. Only cleared contractor personnel for that respective project gain access to the base through that gate.
  - b. Lock and Key Control will be established in such a manner as to clearly define an audit trail of who have keys to the gates and the times the gates are opened and closed, 24 hours a day.
8. All newly remodeled or new construction of facilities must adhere to current standards set forth for resource protection, antiterrorism, information security and industrial security requirements in:
- a. AFI 31-101, The Air Force Installation Security Program, (OPR: 75 Security Forces)
  - b. AFI 31-210, (This will change to AFI 10-225 within the near future Jan 02, time frame) The Air Force Antiterrorism/Force Protection Program Standards, (OPR: 75 Security Forces) Interim Department of Defense Antiterrorism/Force Protection Construction Standards, Dated 16 December 1999.
  - c. AFI 31-401, Information Security Program Regulations, (OPR: 75 Security Forces)
  - d. AFI 31-601, Industrial Security Program Management respectively. (OPR: 75 Security Forces)
  - e. Further guidelines are included in Military Handbook 1013/1A, Design Guidelines for Physical Security of Fixed Land-Based Facilities or the Civil Engineering Facility Manuals (OPR: 75 Security Forces and Civil Engineering)
  - f. Any buildings, which will house assets, which are classified, contain funds, precious metals, Arms, Ammunition or Explosives or controlled substances must have an initial and follow-up security standard inspection prior to operation.
9. The guidelines for Antiterrorism/Force Protection should include as a minimum:
- a. Coordinate with 75 SFS/SFOSA, Det 113 AFOSI & 75 CE, for Antiterrorism/Force Protection stand off and facility requirements.
  - b. "Construction shall be IAW Interim DoD Antiterrorism/Force Protection Construction Standards dated 16 Dec 99. Reference AP2 Appendix 2 for specific setback/separation Security Engineering Standards".
  - c. Any landscaping within the above mentioned area should not be of such nature as to provide hiding places for devices utilized by terrorists such as briefcase bombs, boxes etc; 50lb explosive.

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10. Intrusion Detection System: If a IDS system is necessary it must include sufficient levels of protection as per AFI 31-101 or AFI 31-401 for the respective asset. It must also include the following features:

- a. All IDS equipment must include line supervisory capability equal to the value, sensitivity and technical sophistication of the resource.
- b. The alarm system must have dedicated communication cable pairs for transmission of the encoded system. Refurbished or freight damaged equipment cannot be used. All equipment and parts must be new, in their original container.
- c. The alarm system must be able to register any malfunction positively, and have a malfunction rate that does not exceed one malfunction per each 24 hours, for each sector or protected zone.
- d. The alarm system must be able to protect large or small areas with little modification and cost difference.
- e. When acquiring an alarm system it must include an all-encompassing maintenance contract or a written agreement must be signed with the base civil engineering alarm maintenance personnel. The agreement must stipulate their agreement to maintain the system.
- f. All motion devices must include dual detection capability, with both passive infrared and microwave sensors, providing the area with complete volumetric protection.
- g. The alarm system must be programmable/compatible with the existing base alarm system. All hookups must be completed prior to the final survey. This includes all necessary bridging, wiring, conduit, tamper provisions, and computer programming to insure connection and successful communication of the building to Building 1219, Security Forces Central Control. After verification by 775 CES, that the system is ready, a 72-hour test must be accomplished with 75 SFS/SFOXs, Mr. Jenkins. A final survey of the building will be accomplished at this time prior to normal operation starting.
- h. Lightning protection for the complete alarm system is necessary to protect the system from lightning strikes and extreme power surges.
- i. All alarm systems will utilize an Automated Entry Control System, which will report the event and individual initiating the event, to the security forces alarm monitor.

NOTE: Per AFI 31-101, paragraph 25.10. "In addition to IDE protection for unattended storage of funds, accounting and finance cashier cages will be equipped with a duress alarm. The ISC may determine the need for additional duress alarms."

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11. The following equipment is required for locks, hasps etc:

Padlocks: Key Actuated

Low Security: MIL SPEC P-17802

American 200 or 5200 Series

Medium Security: MIL SPEC 43951

S&G 826 Series, Models A, C, and D,

High Security: MIL SPEC 43607

S&G 833

S&G 831B

Hi-Shear LK 1200

Tufloc Model X-60 Series

Hasp: Natick Hasp, MIL SPEC H-43905, For Secret Classified  
NAPEC 0950 Hasp, MIL SPEC H-20181, For Secret Classified  
High Security Hasp NSN 5340-00-158- 0019/DLA 500-85-C-

0303

Built In Combination Locks, Authorized Group 1R:

Mas-Hamilton X-07, Electronic Lock

S&G 8400 Series, (Butter Fly, Key Change)

S&G 8500 Series, (Push in dial, key change)

Mosler MR/MRK 302

LaGard 1980-ARL (key change version)

NOTE: Built In Combination Locks not recommended for exterior doors in extreme change in weather conditions. (Four Season Areas)

12. If it becomes necessary to establish a free zone for the contractor the installation commander must approve it in writing. The free zone must have clear defined boundaries. The contractor and other authorized personnel recommend. The free zone must be closed during non-duty hours. The boundaries of the free zone must be under surveillance by the OPR for the area or designated responsible activity. See AFI 31-101, paragraph 3.7. for further guidance.

13. Any special security requirements needed for the contractor should be coordinated through Mr. Mike Smith, 75 SFS/SFA, 7-5489.

14. No Foreign Nationals maybe employed by the contractor without first clearing through the Foreign Disclosure Office, ext. 7-6858.