APPENDIX A

Systems Acquisition Management and Support (SAMS) Complex

Facility Requirements and Design Guide

Los Angeles Air Force Base

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1. PURPOSE

The purpose of this document is to provide the Offeror a basis for understanding the project requirements. It also provides the framework for defining facility construction performance requirements and expectations of the Air Force. The Air Force's intent is to provide Offerors with requirements for the building(s) without putting undue limitations or constraints on the creativity of the Offeror to produce a building design. For this reason, the Air Force has provided these requirements in a narrative and sketch format instead of a more structured specification. The Air Force seeks an innovative design that uses proven materials and systems, which follows the Los Angeles Air Force Base (LAAFB) Design Guide, complies with the other descriptions and specifications contained in this document, and that taps the creativity available in the architectural design community.

2. REFERENCES

2.1. The design and construction shall comply with all federal, state, and local codes, standards, regulations, and ordinances, except where specifically stated herein, including, but not limited to, the latest edition of all applicable codes, standards or guidelines published by the following organizations:

ADAAG	Americans with Disabilities Act Accessibility Guidelines, as amended to date
AFCEE/LA	AFCEE Design Guide – Landscape Design
AFSSI 3030	Air Force Systems Security Instruction 3030, Communications and Information Protected Distribution Systems
AFSSI 7003	Air Force Systems Security Instruction 7003, Protected Distribution Systems
AFSSI 7011	Air Force Systems Security Instruction 7011, Communications and Information Emission Countermeasures Review
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
ASHRAM	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
BHMA	Builders Hardware Manufacturers Association
BICSI	Building Industry Consulting Services International

BOMA	Building Owners and Managers Association, International
CFR	Code of Federal Regulations
CITES	Convention on International Trade and Endangered Species
CPSC	Consumer Product Safety Commission
DCID 1/21	Manual for Physical Security Standards for Sensitive Compartmented Information Facilities (SCIFs)
DOE	United States Department of Energy
EIA	Electronics Industries Alliance
EPA/CPG	United States Environmental Protection Agency, Comprehensive Procurement Guidelines
FCC	Federal Communications Commission
FM	Factory Mutual
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers, Inc.
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSTISSAM Tempest /2-92	Procedures for Tempest Zoning
NSTISSAM Tempest 2/95 & 2/95A	RED/BLACK Installation Guide
NWWDA	Window and Door Manufacturers Association (formerly National Wood Window and Door Association)
OSHA	Occupational Safety and Health Administration
SCS	Scientific Certification Systems
SDI	Steel Door Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
T24	California Administrative Code, Title 24, as amended to date
TCA	Tile Council of America, Handbook for Ceramic Tile Installation

TIA	Telecommunications Industry Association
UBC	Uniform Building Code, 1997
UL	Underwriters Laboratory
USAF/ACG	USAF Architectural Compatibility Guide
USAF/ERFG	USAF Environmentally Responsible Facilities Guide
USAF/FPDG	USAF Force Protection Design Guide
USAF/IDG	USAF Interior Design Guide
USAF/LFDG	USAF Legal Facilities Design Guide
USGBC	United States Greenbuilding Council, LEED Program
WARP	Woodworkers Alliance for Rainforest Protection
WBDG	Whole Building Design Guide
WIC	Woodwork Institute of California, Manual of Millwork Standards (latest edition)
	Air Force Architectural Compatibility Guide

3. PROJECT DESCRIPTION AND PHYSICAL REQUIREMENTS

3.1. The SAMS Complex project is the exchange of land for new facilities. The Air Force wishes to convey Area A (830,000 SF of facilities), the Lawndale Annex (30,000 SF facility) and the Sun Valley property (59,000 SF facility) and consolidate operations on Area B, but may accept alternate project concepts. Active missions on Area A and the Lawndale Annex will require replacement facilities equaling approximately 560,000 SF, consisting primarily of general-purpose office space. 1100 parking spaces will need to be located near these facilities. In addition, Building 240 in Area B will need to be demolished to make room for the replacement facilities, and this will necessitate the construction of a pre-engineered metal building, which will be utilized as a warehouse. The Sun Valley property is vacant and requires no replacement facilities.

3.2. The Air Force is open to considering reasonable alternatives to the above scenario on the condition that they still meet our requirements. The Air Force wants to encourage market innovation in this request for proposals.

3.3. The Facility Space Requirements table lists the gross square footage requirements for various categories of work and special purpose areas within the SAMS Complex. Common areas such as hallways, restrooms, and mechanical rooms etc. will be accommodated within these gross square footages.

Table 3.0 Facility Space Requirements

Space Type	Area (SF)	Remarks
Office Space/Conference/ Sensitive Compartmented Information Facilities (SCIF)	487,900	
Standard Office Space	*(443,510)*	
SCIF Space	*(44,390)*	Build IAW DCID 1-21
Conference Center	18,000	
Consolidated-Club	20,000	
Presentation room (RPC)	5,000	
Child Development Center	17,000	
Court Room	7,900	Per AF Design guide on court facilities
Command Post (DO)	4,200	
Total for Minimum project	**560,000**	
Temporary Pre-engineered Metal Building	20,000	
Total minimum including temporary building	580,000	
SAMS Additives		
ABG Phase I – Office Space	136,000	
ABG Phase II – Warehouse	43,000	
ABG Phase II – CE Shop Space	4,000	
ABG Phase II – Office Space	13,500	
Total Additives	**196,500**	
Total For Maximum Project	**776,500**	

3.4. The requirements for each type of space listed in the Facility Space Requirements table will be further defined within this document. In general, the facilities requirements will include architectural, electrical, mechanical, communications and other special or miscellaneous requirements as identified.

4. LAAFB DESIGN GUIDE

4.1. INTRODUCTION

4.1.1. Purpose

The Los Angeles Air Force Base Design Guide is intended to serve as a reference and guideline for Offerors working to provide new facilities for LAAFB, Area 'B'.

4.1.2. Background

LAAFB is presently comprised of multiple, non-contiguous parcels of land. The life-cycle costs of retrofitting the existing buildings located on the site known as Area 'A' (located south of El Segundo Blvd., east of Aviation Blvd., north of Redondo Beach Blvd. and west of the San Diego Freeway) for seismic safety has been determined to be greater than the life cycle costs of constructing new facilities. Operations currently housed in Area 'A' will be relocated and consolidated into Area 'B' in new buildings. Area 'B' currently houses Air Force facilities including the Commissary, Medical and Dental Clinic, Fitness Center, Child Care Center, and various other personnel, office and administration related activities. Area 'B'; is located east of Douglas St., north of El Segundo Blvd., and west of Aviation Blvd. in El Segundo, CA.

4.1.3. Scope

The Design Guide addresses the issues of siting, vehicular, pedestrian and service movement, urban spaces, building scale, massing, fenestration, materials and colors for new construction on the base.

4.1.4. Goals

The Design Guide provides specific guidance for urban organization on base and for architectural development. This guidance is meant to provide a framework within which the Offeror uses his own creativity to meet the LAAFB aesthetic theme image. It is also the goal of LAAFB for the SAMS project to be developed into a "Class A" office environment, compatible with the highest level of private office development in the surrounding El Segundo area.

4.2. LAAFB URBAN AND BUILDING AESTHETIC THEME

LAAFB is part of the United States Air Force, the most formidable aerospace power in the world. LAAFB's primary mission revolves around its aerospace role and requires significant interaction with the corporate aerospace industry, which is located physically adjacent to the urban LAAFB site. LAAFB is also located in

close proximity to the Los Angeles Airport, an international hub of flight. Finally, the Base is within a region renowned for it's innovation in technology. All these factors lead to the logical conclusion and desire that the architectural and urban design image of LAAFB should reflect this forward thinking technology. This image should be consistently reflected throughout the urban site organization and building form, mass, material and color.

The overall image and translation into real projects shall also recognize that people occupy these buildings and urban spaces. These professionals require highly efficient and operational spaces for working, as well as restful, "urban sheltered" spaces for pedestrian access, casual discussions, and break times.

The architecture of LAAFB shall reflect not only the technological emphasis discussed above, but shall also be multi-use and functionally adaptable. The architecture shall be compatible with the newer existing facilities on the Base, i.e., Commissary, Medical/Dental Clinic, Fitness Center, yet the designs shall be appropriate to each new project's individual scale and function. The service requirements for the new facilities, technological as well as traditional service activities, shall be concealed to the greatest extent possible.

Due to the confines of the Area B site, development will need to be compact and clustered. This is an opportunity to create an urban neighborhood, one that is walkable, secure, active, scaled to the individual, and with a unified and exceptional character that unites the people of LAAFB in their common mission.

The temperate climate of coastal Southern California allows significant opportunity for outside spaces to be developed as non-programmed, yet functional areas of varying size, formality and type. Exterior spaces shall be designed to be pedestrian oriented without conflict between pedestrian routes and vehicular circulation. Once personnel arrive at LAAFB, they should not have any reason to need their vehicle again until they are ready to leave LAAFB. Clearly defined, pleasant and inviting pathways and comfortable seating areas shall be integrated throughout the areas of development. Landscape shall be abundant. Shade shall be provided at seating areas and throughout pedestrian areas. Consideration shall be given to the ability of the landscape to provide shade in the near future, without having to wait years for the trees and plants to mature. Maintainability of the landscape will be critical to the ongoing success of the design.

4.3. EXISTING INFLUENCES AND CONDITIONS

4.3.1. Mission of Los Angeles Air Force Base

Los Angeles Air Force Base supports the Space and Missile Systems Center (SMC). The goals of the SMC are:

- Make space mission execution, ground support, and launch affordable, reliable, and routine for the warfighter.
- Increase cooperation among the civil, commercial, intelligence, and military space sectors.
- Satisfy customers' needs in war and peace.
- Sustain technological superiority,
- Enhance the excellence of business practices.
- Enable people to excel.
- Operate quality installations.

LAAFB planning and facilities improvement strategy is based on fundamental Air Force goals. The following four goals form the basis for directing base development and facilities improvements in a logical and orderly fashion:

- Perform the Mission – Provide facilities that enable the System Program Offices (SPO) to accommodate program changes.
- Protect our Resources – Ensure protection, use and management of human, financial, natural, cultural, historical and man-made resources.
- Architectural Compatibility – Ensure architectural compatibility on base by using efficient and consistent style in all new structures. Also, enhance land use compatibility on base.
- Quality of Life – Promote the public health, safety, welfare and overall quality of life.
- De-institutionalize the face of LAAFB. Provide open spaces and landscaping. Improve roadways and traffic circulation.

4.3.2. Surrounding Community and Architecturally Significant Buildings

LAAFB is situated in an urban-industrial environment about one mile south of the Los Angeles International Airport in the South Bay area of Los Angeles County, California. This location provides immediate access to international, national and regional air transport, land and water transportation facilities and circulation routes.

Los Angeles Air Force Base, Area B; is located on the northeast corner of El Segundo Blvd. and Douglas Street. It is located within a community predominately comprised of commercial office buildings, many of which are located in campus-like environments. Much of the surrounding community is oriented to the aerospace industry with LAAFB having close working relationships with these commercial enterprises. The existing surrounding buildings are primarily Class 'B' office buildings, but newer development is more commonly being constructed as Class 'A', as land values continue to rise.

Many of these office buildings in proximity to LAAFB include various features which fit LAAFB's urban and building aesthetic theme, thereby, reinforcing the use of those features to give LAAFB community and neighborhood compatibility. These recommended features include:

- Buildings grouped or formed to create a campus-style setting.
- Simple, clean lines creating clarity of form but with an articulation of the building mass from the ground up, to provide uniqueness and reduce the visual volume of mid-rise buildings.
- Architectural features for bringing daylight into buildings.
- A proportioned use of solid materials, along with glass, to create architectural interest in facades and avoid an all-glass look which is incompatible to Area B's current and projected development.
- Quality materials, in content and image, which help express the professional nature of the activities in the buildings.
- Identifiable entries to the buildings with ample landscaping.
- Courtyards and glazed atriums providing protected "people places" for breaks, lunch, and casual conversation taking advantage of the climate in this coastal Southern California region.

The following are examples of Class-A office buildings in the local area.

Typical office buildings in the South Bay area

4.3.3. Aesthetic Theme of Existing Buildings

The Commissary (built in 1980's), the Medical-Dental Clinic (under construction) and the proposed Physical Fitness Center express the "hi-tech/aerospace" image LAAFB is seeking to build upon. They have been designed as a series of buildings, each building on the last, to strengthen that desired image. The specific elements that create this image are:

- The very simple, clean lines of the Commissary, capped by a rounded parapet cap and the streamlined look of its exterior metal skin panels, accented by a major curved shape to highlight the building's entry.
- The continued simple lines of the Dental Clinic clad in metal skin panels with rounded parapet cap. This streamlined look is accented using horizontal metal sunshade devices with articulated detailing created by their hi-tech suspension attachment system. Finally, the use of an aerodynamically curved-shape roof crowns the building and cascades over the entry atrium, making day lighting an integral part of the design.
- Similar use of the same vocabulary of shapes and materials on the Fitness Center with the introduction of a major new material (burnish-faced concrete masonry units) to create a richness in the full complement of new buildings and avoid monotony in the overall image. In all three buildings, individually and as a group, there is a consistency in their simple, clean lines accented by curved shapes, clarity of form and building entry and use of materials which convey a hi-tech, forward thinking image.

The following are examples of existing and proposed facilities in Area B

Commissary and rendering of new Medical/Dental Clinic

Rendering of proposed Physical Fitness Center

4.4. ARCHITECTURAL GUIDELINES

4.4.1. Theme

LAAFB's predominant aerospace role, requiring a highly professional and technological thinking workforce, requires buildings, which functionally accommodate and visually convey a dynamic image of this mission.

4.4.2. Composition

- Simple and clean but dynamic lines for building masses.
- Curved forms introduced to carry on the hi-tech, aerospace image and create uniqueness.
- Proportioned use of solid materials and glass for architectural richness and façade articulation.
- Architectural features to capture daylighting and detail sensitivity to controlling it.
- Building masses, from the ground up, which reduce the visual volume of mid-rise buildings.
- As more buildings develop, a campus-style approach to their combined configuration and the spaces created among them.

4.4.3. Building Materials

The approved and recommended architectural materials for LAAFB are:

- Metal skin panels similar to those on the Commissary, Medical-Dental Clinic and Fitness Center
- Stone Veneer
- Architectural pre-cast concrete panels
- Enhanced-finish concrete masonry units (Exposed aggregate or burnished finish)
- Exterior cement plaster
- Glass with clear anodized aluminum framing or a butt glass "frameless" system. Glazing shall be non-reflective
- Standing seam metal roofs for slopped and curved surfaces. Metal shall be factory-finish color with standing seams at maximum 18" o.c.

4.4.4. Colors

The approved and recommended exterior colors for LAAFB are:

- Colors such as off white and light gray shades shall be the predominate scheme for exterior wall surfaces.

- Glazing shall be clear or have minimal tint.
- Storefront systems shall be clear anodized, or similar to Kawneer Co. “Platinum Ice”.
- Use of accent features at locations such as primary entrances is encouraged. “Air Force Blue” color may be incorporated in limited quantity.
- Standing seam barrel roofs shall be similar in color to Berridge Manufacturing Co., “Zinc Grey”.
- Exterior site hardscape shall have integral color adequate to minimize glare and reflectivity.
- All colors shall be factory applied or integral to the material.
- Exterior cladding material shall be light in color.

4.5. URBAN DESIGN ANALYSIS AND GUIDELINES

4.5.1. Existing Site Plan Analysis

The existing site plan for LAAFB Area B has evolved over a period of more than 40 years, and is not orderly. Visitor areas are not clearly defined, nor are pedestrian routes. Existing building design is inconsistent, and most facilities are past their useful life and inappropriate for the current functions and operations of the Base.

As this Design Guide is being developed, construction is underway for a new Medical/Dental Clinic and a new Fitness Center. The Existing Site Plan diagram indicates the footprint of these two buildings (and required demolition) as if they were complete. When completed, these new buildings will begin to define a more orderly site plan for the northeast area of the base.

An entry courtyard with seating and landscaping will be located at the southeast corner of the Physical Fitness Center. That courtyard will ultimately be located diagonally opposite of the larger, formal plaza indicated on the Site Plan. The present visitor entrance to the Base is off of Douglas Street, south of the Medical/Dental Clinic. That entrance will remain in place until a new entrance and Visitor’s Center is constructed between the Fitness Center, and north of the Medical/Dental Clinic. As a date for design and construction of the new entrance has not been determined, the site design should accommodate either the existing, or the proposed location.

Service and personnel access for the Commissary, Medical/Dental Clinic, Physical Fitness, and all other Base operations shall be maintained during the construction of the SAMS project.

Phased demolition of various facilities will be required to accommodate the planned new construction. Activities and operations that are presently housed at Area B are required to remain in operation during construction. Functions and personnel housed in Area A can relocate after construction at Area B is complete.

EXISTING SITE PLAN

A. PROPOSED MEDICAL DENTAL CLINIC
B. PROPOSED PHYSICAL FITNESS CENTER

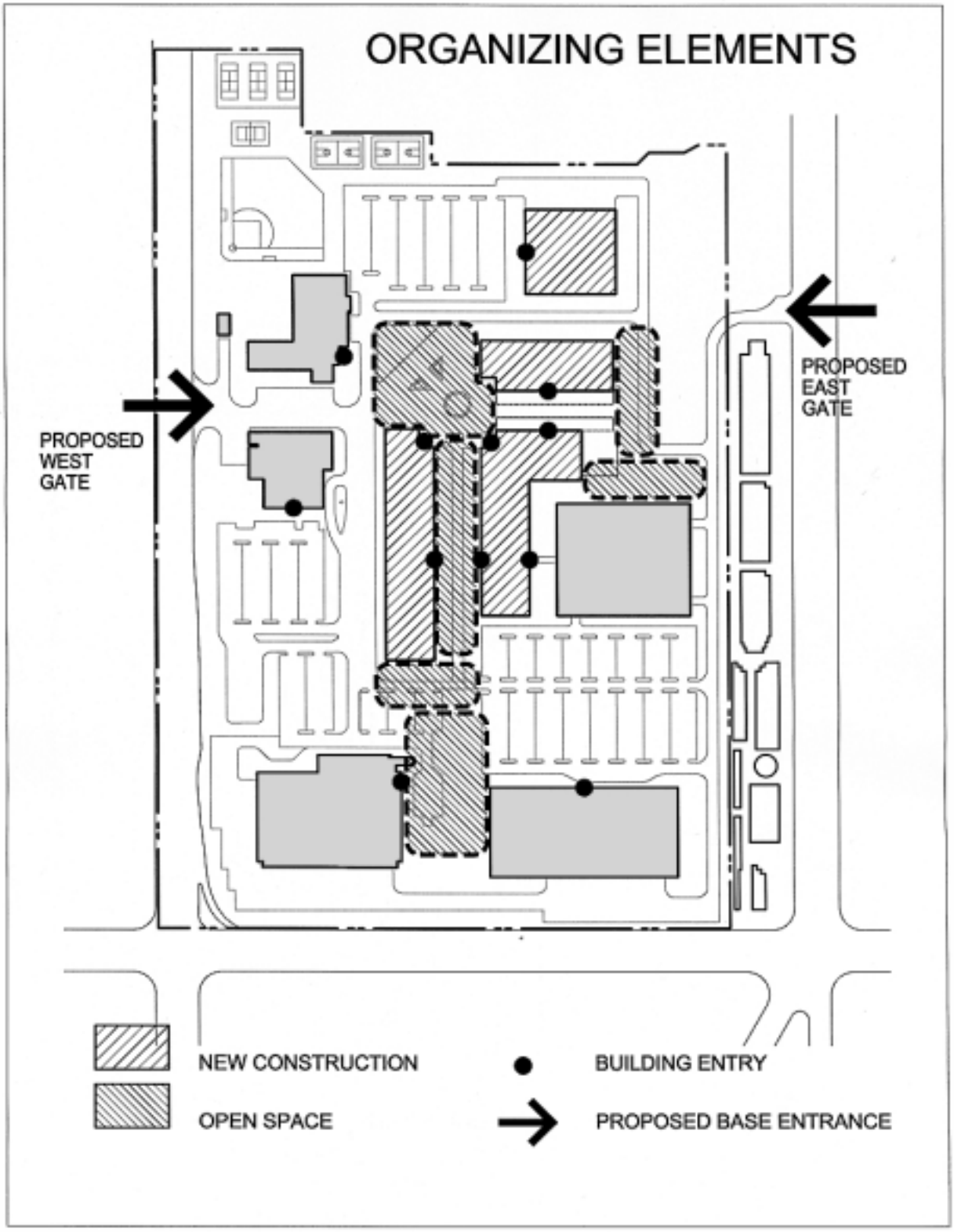
4.5.2. Organizing Elements

Elements that will provide organization to the evolving site plan for LAAFB include:

- Base Edges

The primary impression of the LAAFB for the general public is the appearance of the edges of Area 'B' along the major boulevards that comprise its perimeter. These edges are presently poorly defined, and do not serve as an amenity to the surrounding community. New site planning should provide higher visibility and better identity for the LAAFB.

- Circulation
  - Vehicular
  - Visitor and Base personnel entrances
  - Minimal intrusion into the Base by vehicles
  - Clearly defined routes and hierarchical access
  - Pedestrian
  - Walkable site, predominately pedestrian
  - Direct access from parking areas to building entrances
  - Service
  - Minimal intrusion into the site
  - Centralized loading dock
- Parking
  - Centralized Base personnel parking
  - Clearly identifiable visitor parking
- Security
  - Force protection as required by LAAFB
- SAMS Buildings
- Open spaces
  - Central formal plaza
  - Pedestrian mall central to site and buildings
  - Pleasant, functional outdoor seating areas
- Building Entrances
  - Located at pedestrian access points
  - Oriented to recognize Base personnel parking as well as visitor parking


ORGANIZING ELEMENTS
PROPOSED WEST GATE
PROPOSED EAST GATE
NEW CONSTRUCTION
OPEN SPACE
BUILDING ENTRY
PROPOSED BASE ENTRANCE

4.5.3. Allowable Building Sites

Utilizing the LAAFB General Plan, the Design Guide has identified specific allowable building sites for development of the SAMS Office Buildings, parking structure and open spaces.

Site density, building massing, pedestrian orientation, parking and arrival, and open space areas have all been considered in identifying options for site coverage and configuration. As the building architect develops the actual building configuration and resulting footprint and mass, it is anticipated that the concept of the siting, massing, arrival, pedestrian areas, and setbacks will primarily follow the Design Guide.

The allowable building sites are defined by the following criteria:

4.5.4. SAMS Minimum Project Scope

This is defined by the area just south of the east gate, continuing west to the eastern edge of the drive on the east side of the Physical Fitness Center. The boundary continues south to align with the "mall" to the north of the SAMS project. The southern boundary continues east and terminates at the eastern property line of the site.

The buildings contained within the minimum project scope include the SAMS complex including a portion of the central plaza and secondary mall spaces, the parking structure and associated spaces between the parking areas and the SAMS complex.

4.5.5. SAMS Additive (ABG Phase I)

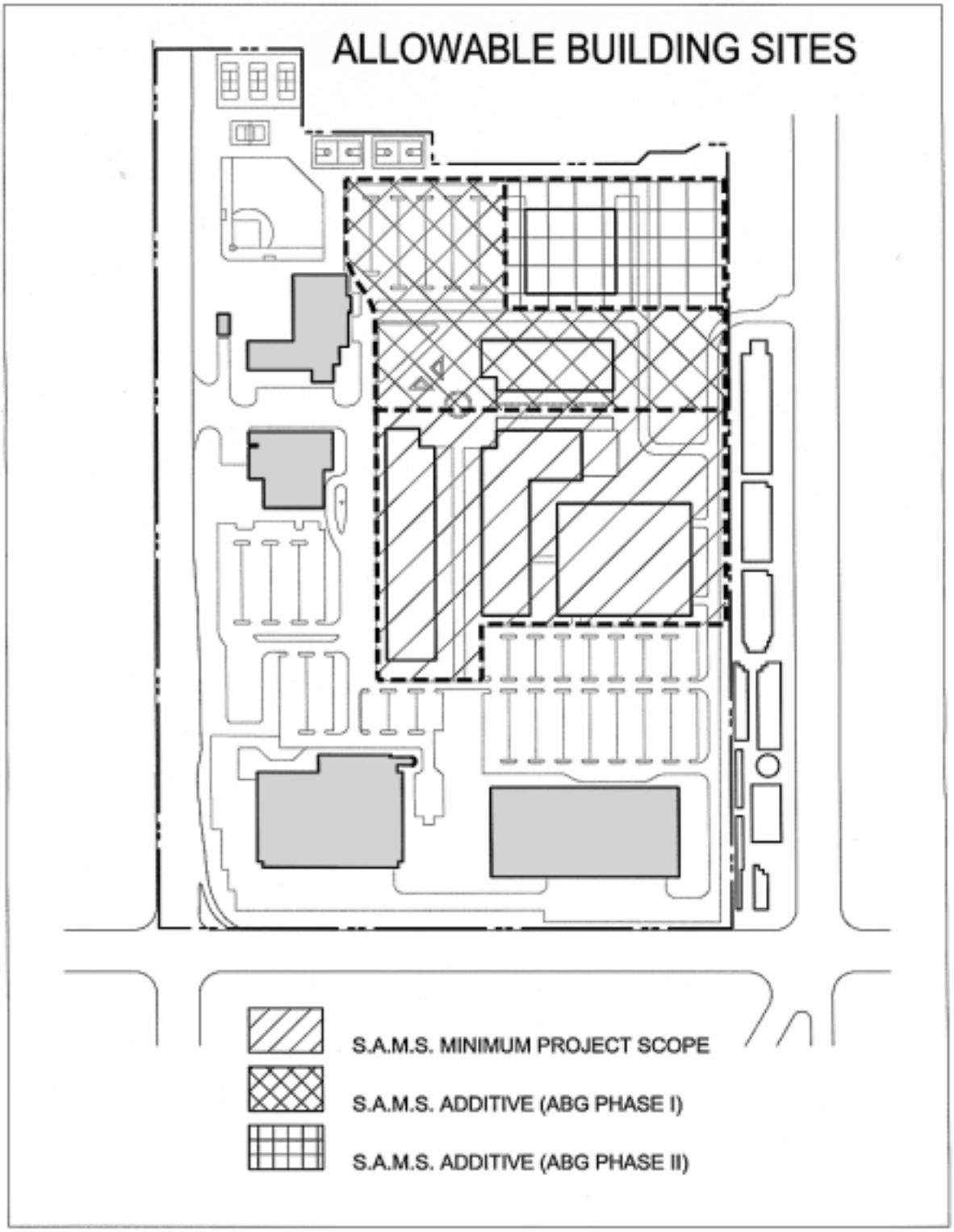
This area is defined by the east entry gate continuing west to the eastern boundary of the north parking lot, continuing north to the northern property line, continuing west to the eastern edge of the proposed softball/baseball field. The boundary continues south along the eastern edge of the Physical Fitness Center, to the northern edge of the SAMS complex, continuing east to the eastern property line.

The buildings contained in the ABG Phase I would include the ABG Phase I building, the completion of the central plaza and the drive to the north of the ABG Phase I building. (See allowable building sites on next page)

4.5.6. SAMS Additive (ABG Phase II)

This area is defined by the east entry gate heading north to the north property line, continuing west to the eastern edge of ABG Phase I, continuing south to the drive and terminating at the east gate. (See allowable building sites on next page)

The building contained in the ABG Phase II would be the ABG Phase II building, and the area between that building and the eastern property line.



4.5.7. External Vehicular Circulation

LAAFB, Area B is served by the 405 freeway to the east. Access is primarily from El Segundo Blvd., with the main base visitor entrance located on Douglas Street. A proposed Visitor Processing Center will be constructed with a new Main Base Entrance further north on Douglas Street at a future date. Vendors and deliveries will also utilize this entrance. Until the proposed entrance is completed, the existing entrance location will also need to accommodate the current circulation plan.

Primary access and egress for Base personnel will be from Aviation Blvd. on the east. Since Base operations scheduling results in peak arrival and departure times, all off-site and on-site roads, drives and entrances should be designed to accommodate anticipated maximum traffic counts.

Force Protection shall be discussed with LAAFB and incorporated into all circulation planning.

4.5.8. Internal Vehicular Circulation

Control of visitor vehicular access for security and traffic purposes should be considered as the vehicular access and parking is designed. Visitor vehicular way finding from the location of the interim Douglas Street entrance (as well as the proposed entrance further north on Douglas Street) to designated visitor parking should be clearly defined by roadway improvements, landscaping and signage. Visitor vehicular way finding should be clearly defined from the location of the interim entrance to visitor parking, and readily adaptable to a new circulation route when the proposed entrance location is completed.

Primary access and egress for staff will be from Aviation Blvd. on the east leading directly to the parking areas to the south. Peak load access and egress should be anticipated in the design of the entrances and the surface parking lots, as many staff will be commuting on a similar daily schedule. Security control access will need to be provided at this entrance.

Minimizing on-site vehicular use is vital to supporting the pedestrian oriented aspect of the new site plan. Convenient, pleasant and logical pedestrian access from the staff parking areas to each of the employment centers is a critical design issue. Staff should not be required to walk around buildings or to walk through parking areas for any significant distance, or inappropriate shortcuts and compromised safety may result.

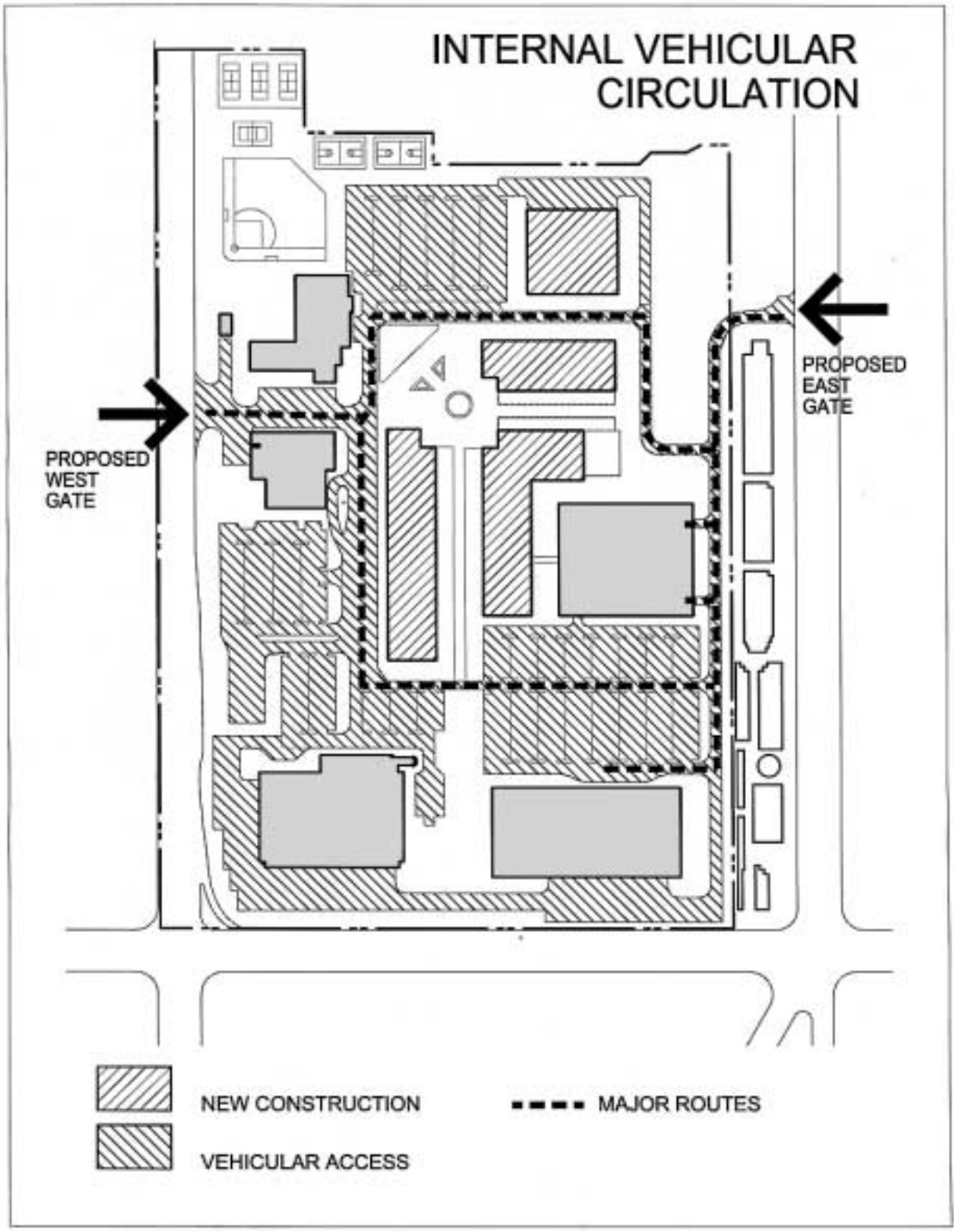
Surface parking lots should have their visual impact reduced by landscape screening and generous placement of shade trees within the parking lot.

The number of parking spaces for specific buildings / areas on Area B have been estimated in the table below. All of the parking requirements below for the facilities other than the SAMS complex are surface parking spaces. Although a parking structure for the SAMS complex is permissible, it is highly beneficial to minimize or eliminate this structure on Area B.

Area B Parking	Spaces
SAMS Complex	1100
ABG Phase I	275
Child Development Center	34
Medical Clinic	86
Fitness Center	8
Base Exchange	400
Commissary	288
Visitor's Center	11
GOV	60

The Aerospace Corporation has recently acquired the 3.6-acre parcel of land adjacent to the eastern boundary of Area B. The intended use of this property is sur-

face parking for Aerospace and Air Force employees. Therefore, the 3.6-Acre parcel intended for surface parking can be utilized as part of the 1100 space requirement for the SAMS Complex.


INTERNAL VEHICULAR CIRCULATION
PROPOSED WEST GATE
PROPOSED EAST GATE
NEW CONSTRUCTION
VEHICULAR ACCESS
MAJOR ROUTES

4.5.9. Security Perimeter

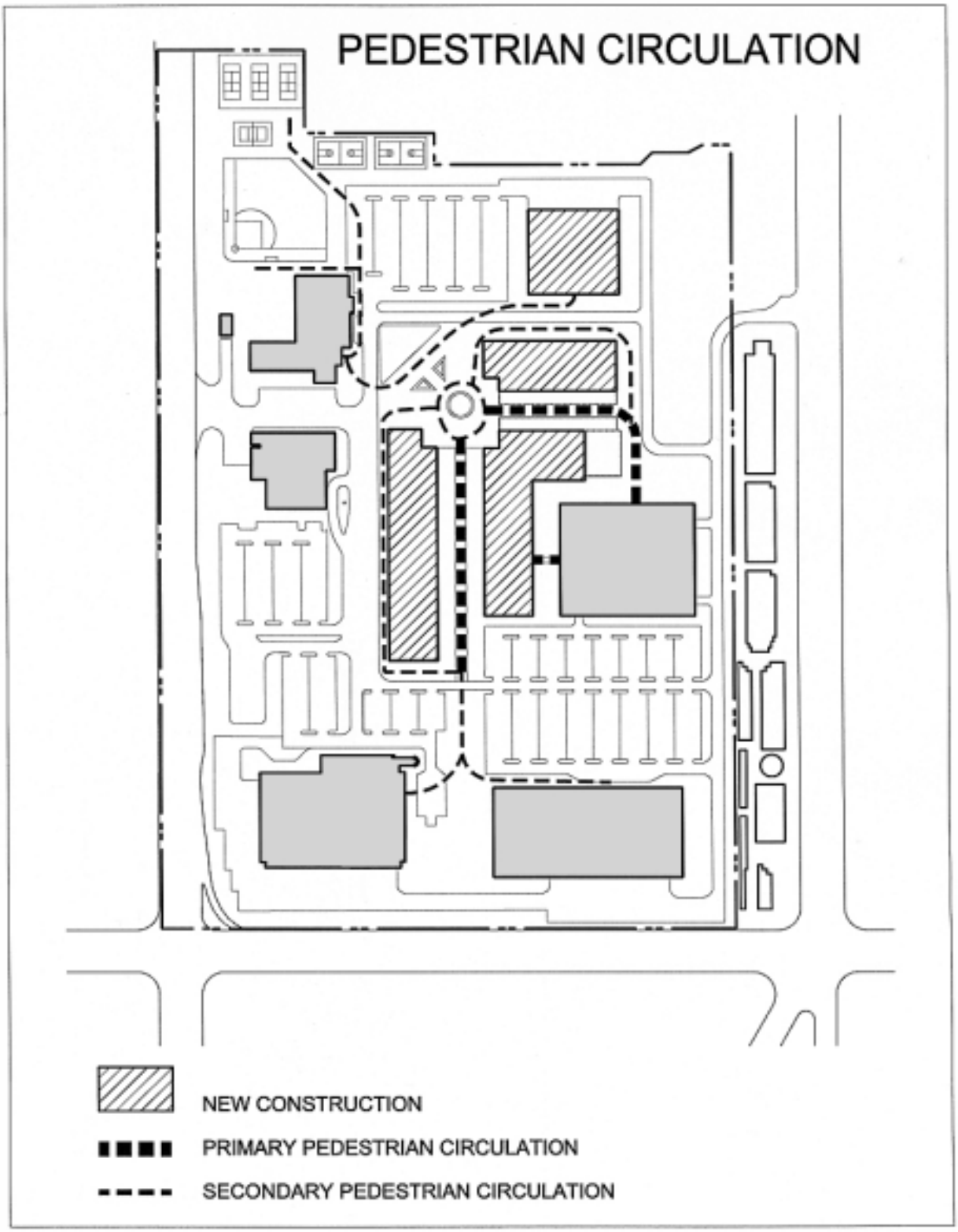
Force Protection shall be incorporated into the planning and architectural design of the LAAFB. A security perimeter will be required, as will more specific considerations as design of the facilities progress. LAAFB shall be consulted throughout the project so that security requirements can be integrated into the design in an appropriate and inconspicuous manner.

4.5.10. Pedestrian Circulation

Provide pedestrian circulation routes that are safe, orderly and attractive. Way finding may be augmented by signage, but should be primarily intuitive by the design of the site, the landscape, open spaces and the buildings and entrances.

The central mall and plaza will be oriented exclusively to pedestrians. These important areas should be nodes within a network of pedestrian routes that serve the entire site and ultimately the entire Base. This will allow outdoor areas that can be used not only for traversing the Base from one building to another, but as a pleasant and stimulating additional space for thought, breaks and formal or informal discussion. Special paving materials, colors and patterns should be incorporated into the design. This same open space, viewed from the windows of the offices above, will provide pleasant, quiet vistas internal to the site. A water feature shall be included in the formal plaza area, and smaller water features may be included in the mall. Both the mall and plaza shall incorporate seating areas for small groups of people. Shading devices in the form of shade trees and trellis elements should enhance the area.

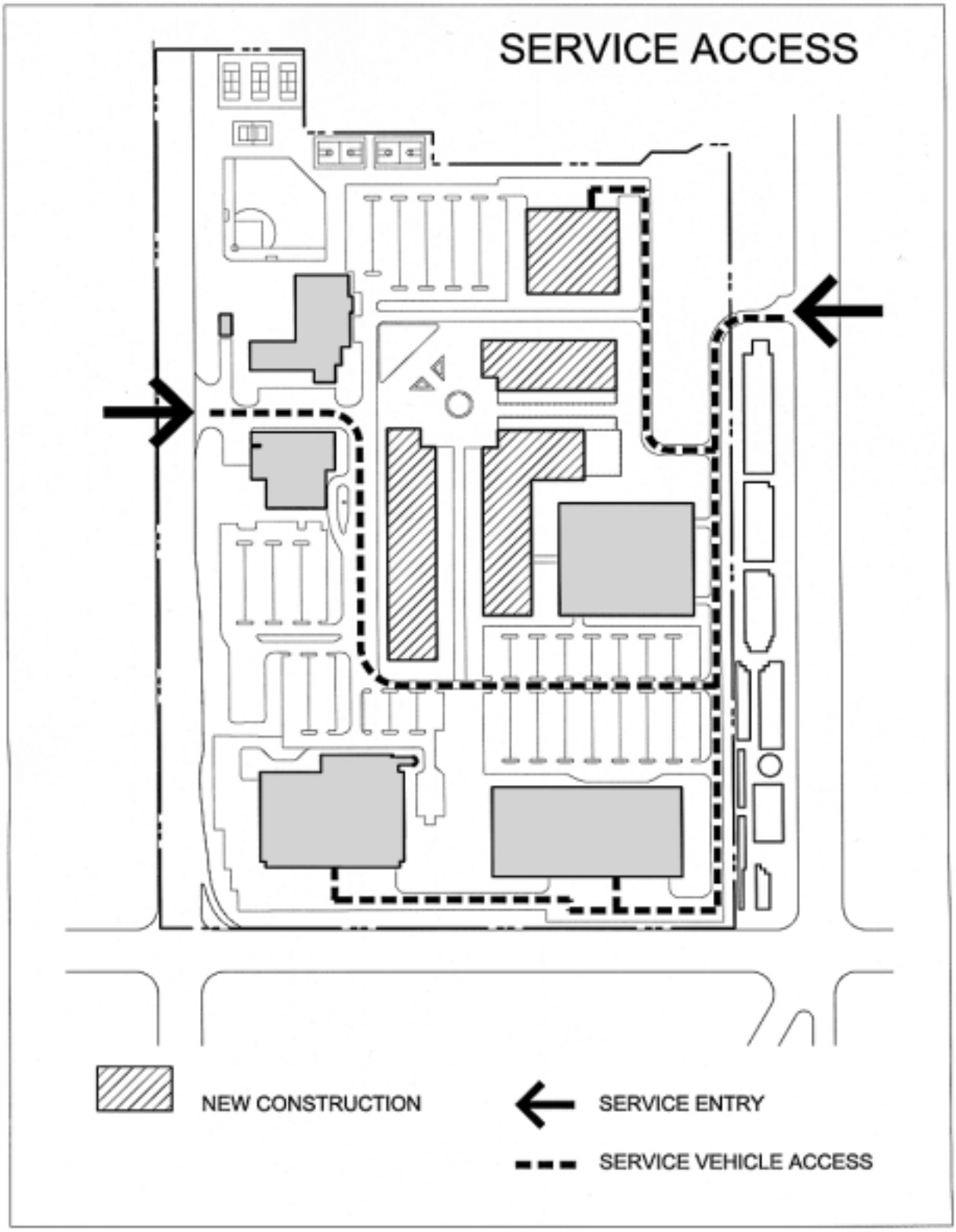
Pedestrian circulation from the new facilities to other areas of the site including the Medical/Dental Clinic, Fitness Center, Commissary, etc. should also be developed with the same care, as those paths will also be highly utilized. Personnel should have no reason to move their vehicle from one part of the Base to another once they have parked for the day if the site planning and amenities design is sufficiently walkable, efficient and clearly directed.


PEDESTRIAN CIRCULATION
NEW CONSTRUCTION
PRIMARY PEDESTRIAN CIRCULATION
SECONDARY PEDESTRIAN CIRCULATION

4.5.11. Service Access

Consideration should be given to service vehicle access. Vehicles of varying sizes, from 18 wheels to panel trucks, will need to have access to the site. A single, primary loading dock shall be located at a point that keeps intrusion into the site by large delivery vehicles to a single location. Secondary service access for smaller vehicles should be limited to clearly defined and appropriately scaled access routes and delivery points that do not require use of pedestrian ways, and are not readily visible or noisy to those working on the Base. Access for emergency vehicles can be limited in areas to emergency use only by use of breakaway bollards, decorative but vehicle supporting paving, or other traffic controlling devices.

Special consideration should be given to fuel vehicle access. These government vehicles require access to generator locations supporting all SAMS facilities. The site layout and design, circulation plan, force protection plan and physical limitations such as hose lengths all need to be coordinated into the master plan.


SERVICE ACCESS
NEW CONSTRUCTION
SERVICE ENTRY
SERVICE VEHICLE ACCESS

4.5.12. Open Space

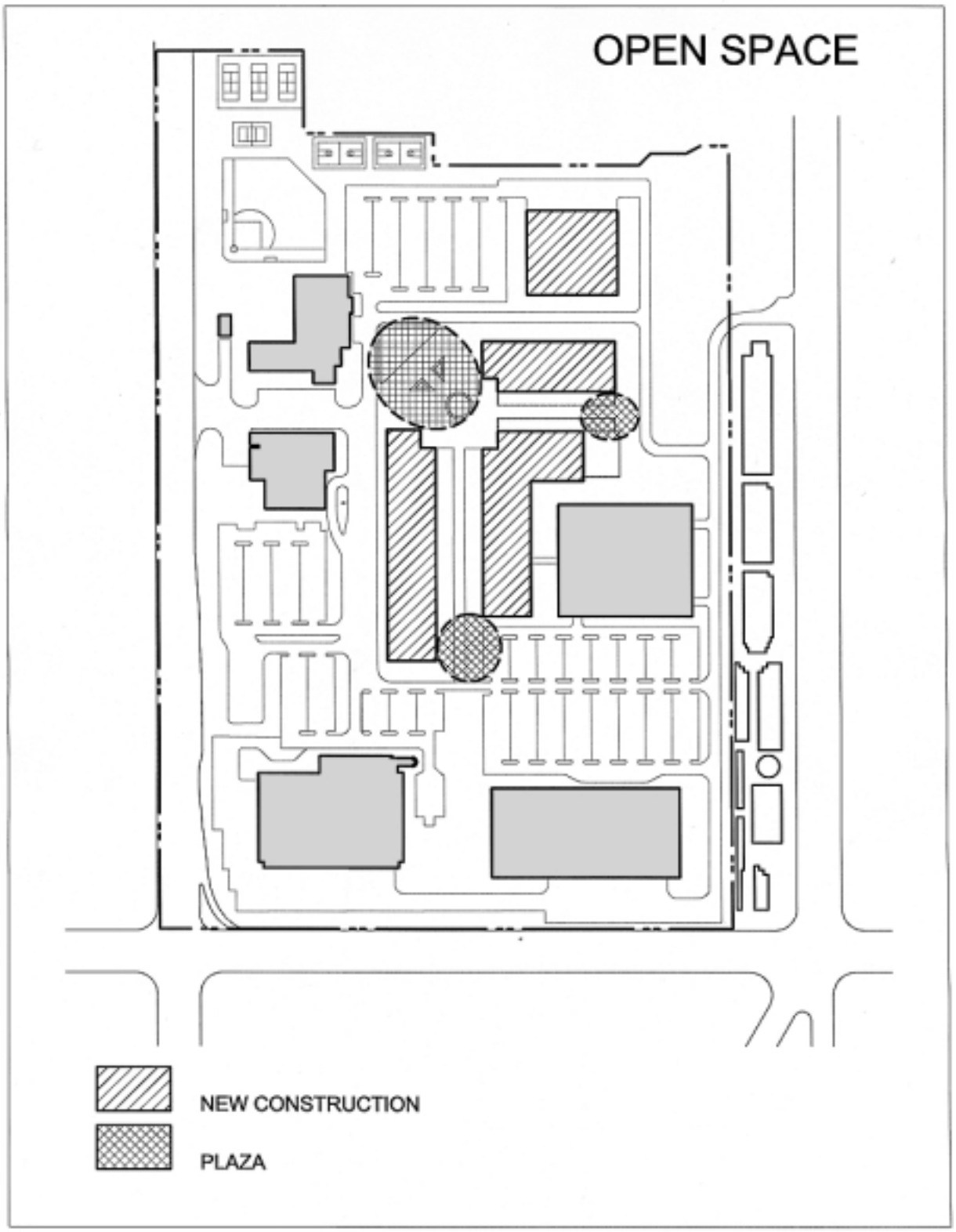
Open spaces will serve to define the LAAFB site. Open spaces will range from the formal plaza with flags at the northwest end of the SAMS site area to smaller courtyards resulting from the definition of the mass of the buildings. The center mall of the SAMS development is the main organizing element of that portion of the Base, and needs to be carefully designed to assure activity and functional sitting areas of varying sizes and configurations.

Buildings should be arranged and massed to achieve spatial articulation and emphasis of building entrances and forms. The buildings should provide the enclosing framework for the people oriented "spaces between."

Protection from wind, as well as sun is required. Care shall be taken that wind and shade patterns altered by the building mass be anticipated so that the spaces between the buildings can successfully function as desirable and usable outdoor seating areas at all times of the day and through all seasons.

Open space also includes the pedestrian ways from parking to the building entrances. These areas need to be designed to be pleasant and passively secure.

A monument sign as well as Air Force displays may be incorporated into the plaza.


OPEN SPACE
NEW CONSTRUCTION
PLAZA

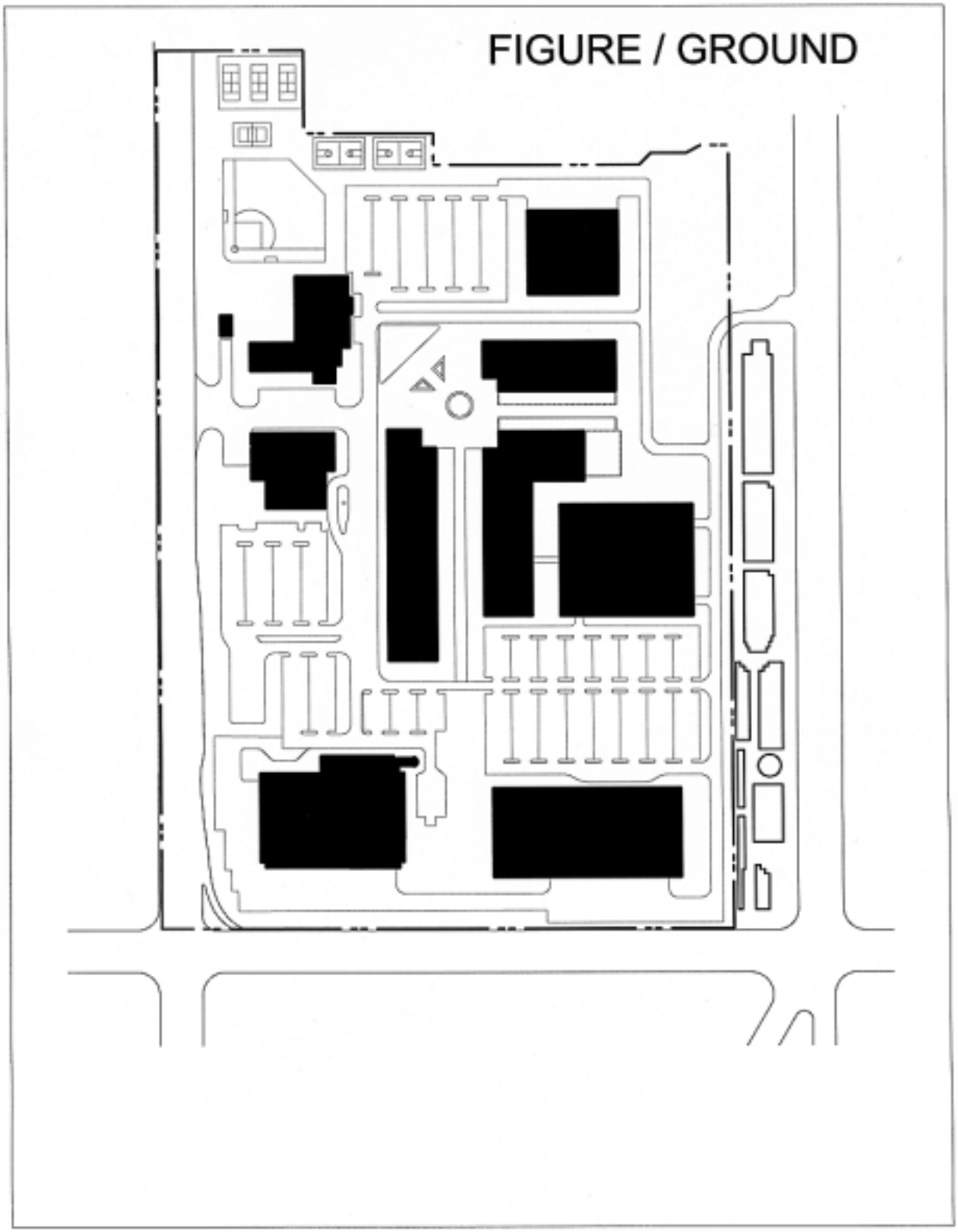


FIGURE / GROUND

4.5.13. SAMS Alternative Site Plan Layouts

The office buildings will primarily be four to five stories. Consideration shall be given to human scale and incorporation of massing setbacks, roof terraces, and stepped back façade treatments to add interest to the buildings. Vantage points from the surrounding community, as well as those on the Base and from the pedestrian spaces adjacent to the buildings should all be considered. Entrances and facades adjacent to pedestrian spaces should be especially proportioned and detailed to accommodate human scale. Provide shadow lines, detailed fenestration and façades and other architectural elements to accentuate proportion and approachability of the buildings where people will come in contact with the building exterior.

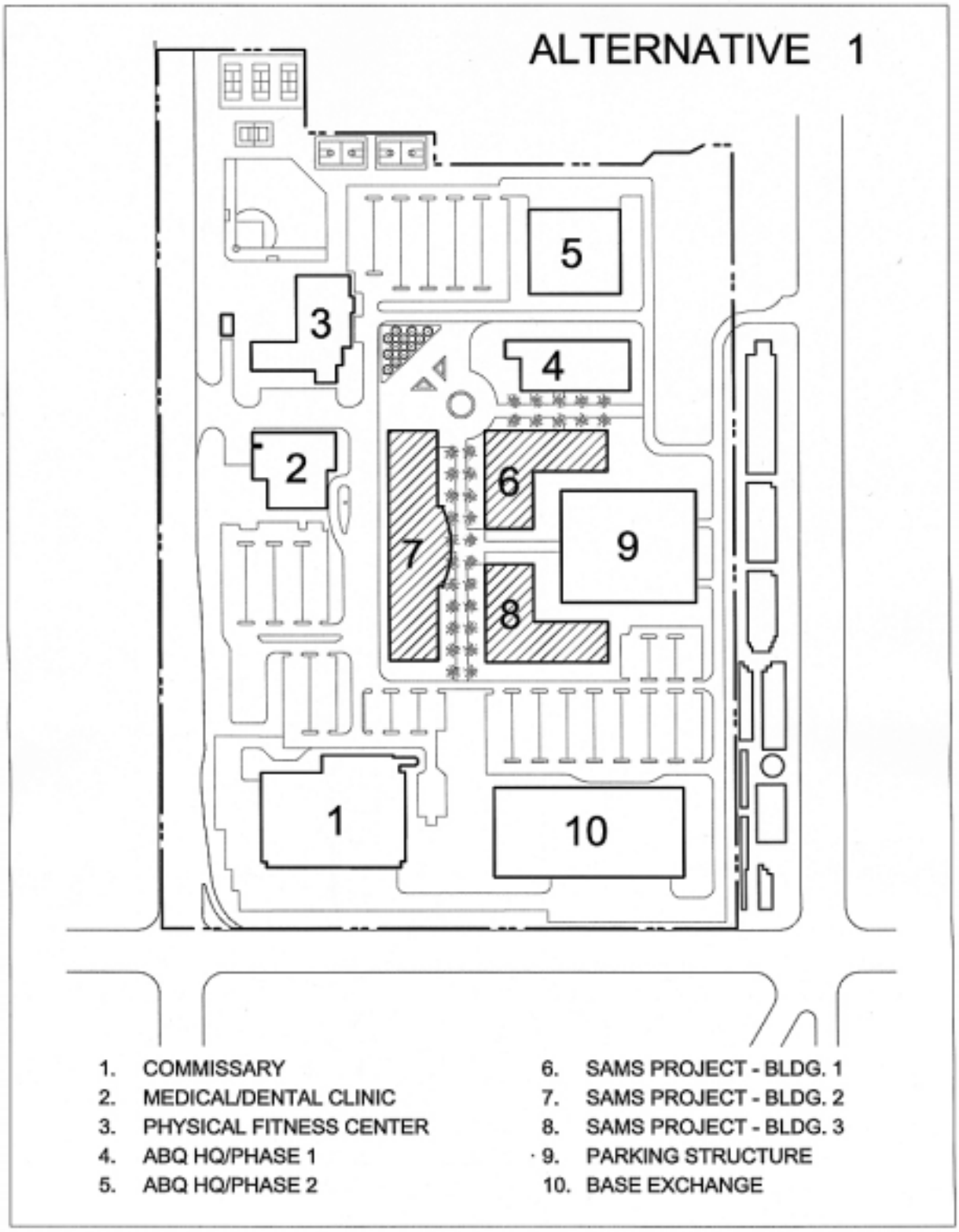
Alternative One
Alternative One uses the idea of "portals" as entry points. Two duplicated, reversed buildings as a portal entry into the central open space of the SAMS complex. The larger building to the west serves as a "focal point" from the parking areas to the central open space. The two "mirrored" buildings allow for a repetitive design/build package.

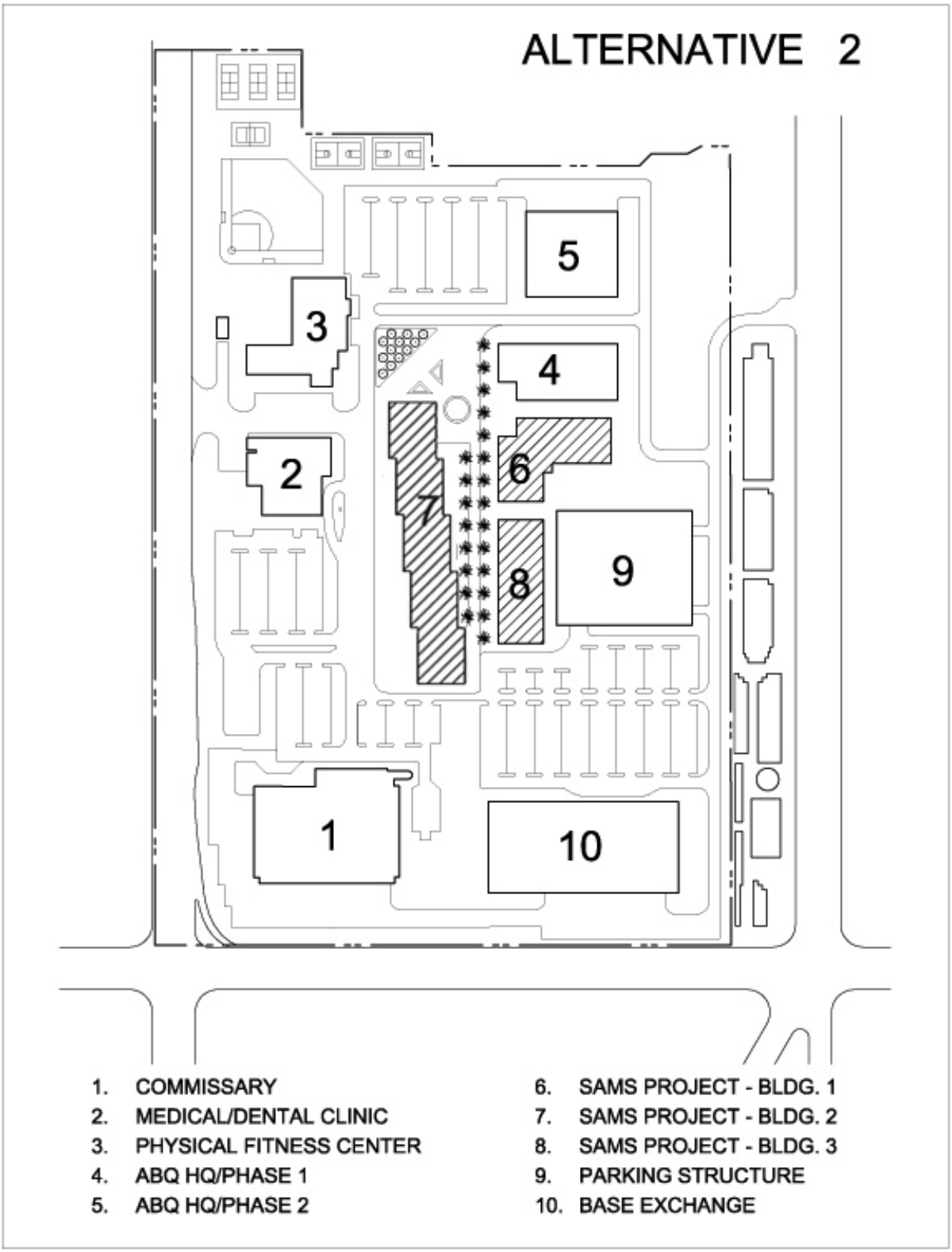
Alternative Two
Alternative Two also utilizes two duplicated, reversed buildings on the western side of the SAMS complex and an L-shape building on the eastern side. The northern most ends of the buildings open up to the defined "plaza" to the north.

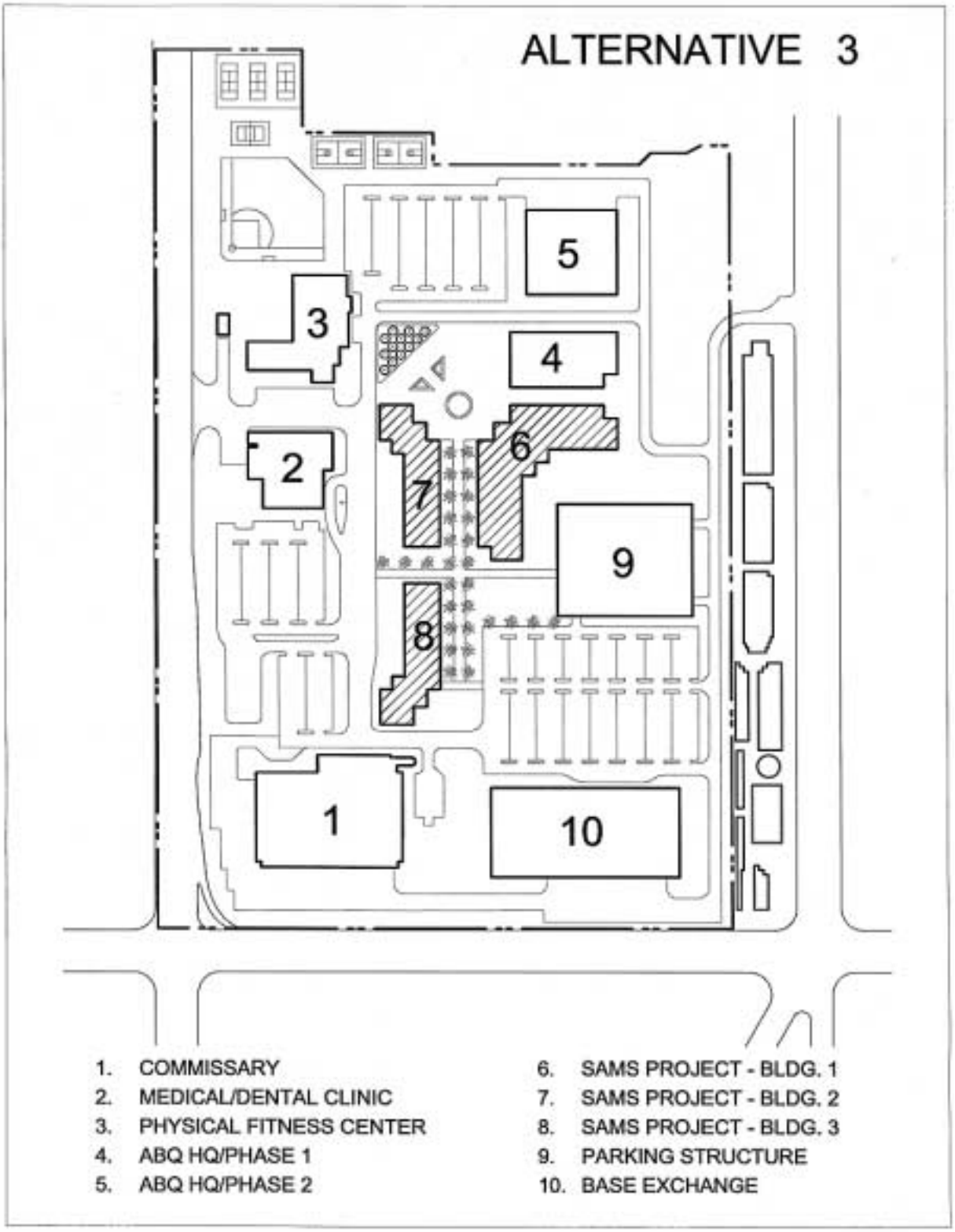
Alternative Three
Alternative Three has three distinct buildings. The western building is conceived as a "stepped" building in plan helping to break up its relative mass. The two eastern buildings have the potential of being connected by a "bridge" element.

The three master plan alternatives are shown for conceptual master planning purposes and programmed square footage reconciliation only. Offerors are encouraged to propose alternate solutions based on the above design criteria.

Design of any parking structure shall reflect and compliment the design of the office buildings. While serving a different function and having its own structural system, the exterior treatment of the two facilities should be unified, but not mimicking.


ALTERNATIVE 1
5
3
4
2
6
9
7
8
1
10
1. COMMISSARY
2. MEDICAL/DENTAL CLINIC
3. PHYSICAL FITNESS CENTER
4. ABQ HQ/PHASE 1
5. ABQ HQ/PHASE 2
6. SAMS PROJECT - BLDG. 1
7. SAMS PROJECT - BLDG. 2
8. SAMS PROJECT - BLDG. 3
9. PARKING STRUCTURE
10. BASE EXCHANGE

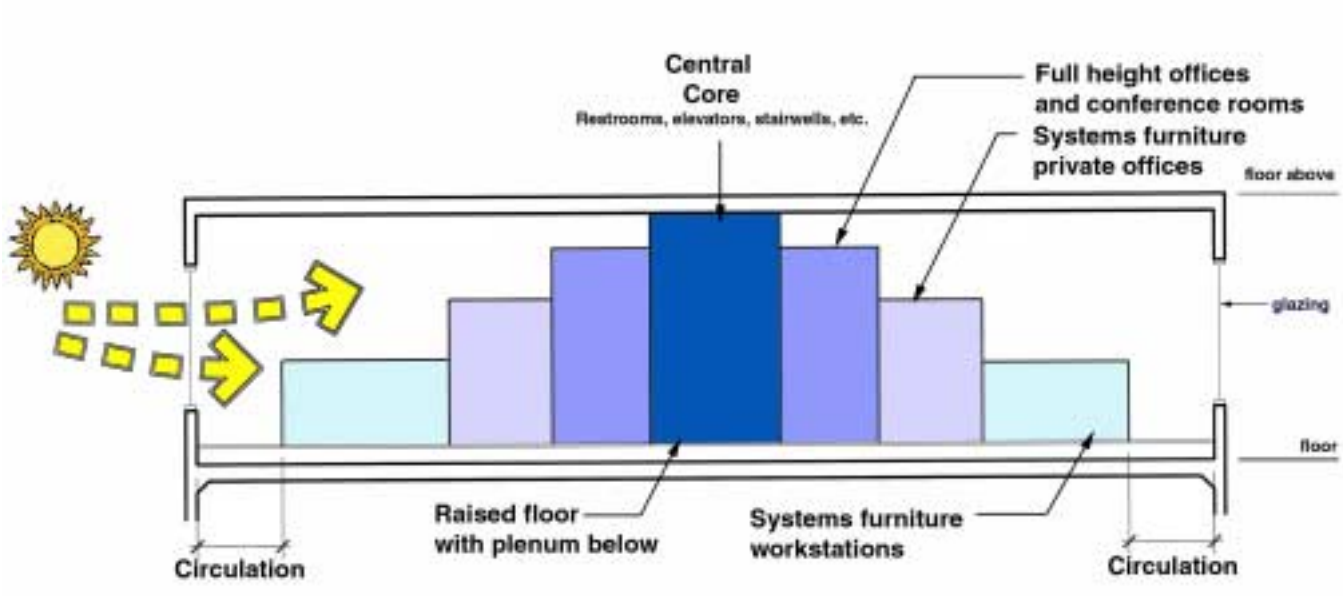

ALTERNATIVE 2
1
2
3
4
5
6
7
8
9
10
1. COMMISSARY
2. MEDICAL/DENTAL CLINIC
3. PHYSICAL FITNESS CENTER
4. ABQ HQ/PHASE 1
5. ABQ HQ/PHASE 2
6. SAMS PROJECT - BLDG. 1
7. SAMS PROJECT - BLDG. 2
8. SAMS PROJECT - BLDG. 3
9. PARKING STRUCTURE
10. BASE EXCHANGE


ALTERNATIVE 3
1
2
3
4
5
6
7
8
9
10
1. COMMISSARY
2. MEDICAL/DENTAL CLINIC
3. PHYSICAL FITNESS CENTER
4. ABQ HQ/PHASE 1
5. ABQ HQ/PHASE 2
6. SAMS PROJECT - BLDG. 1
7. SAMS PROJECT - BLDG. 2
8. SAMS PROJECT - BLDG. 3
9. PARKING STRUCTURE
10. BASE EXCHANGE

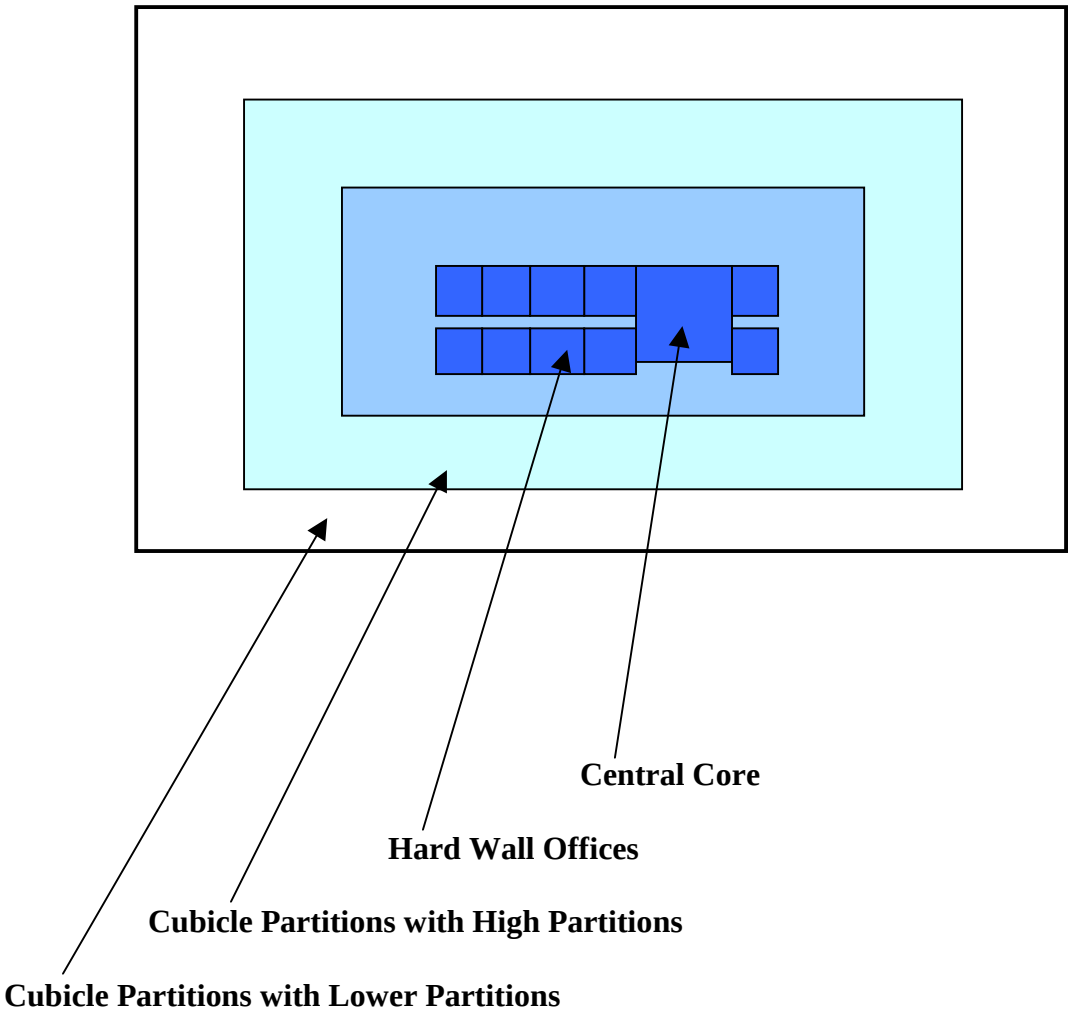
5. SAMS MASSING AND FACADE GUIDELINES

The massing and facade appearance of the SAMS complex, as it rises from the ground, is dependent on the building layouts, final footprints and how the buildings are vertically configured to accept daylighting. The following are guidelines for those developments.

Floor Plate and Typical Floor-Building Section Analysis



Preferred Typical Floor-Building Section to Maximize Natural Daylight Penetration into Work Areas

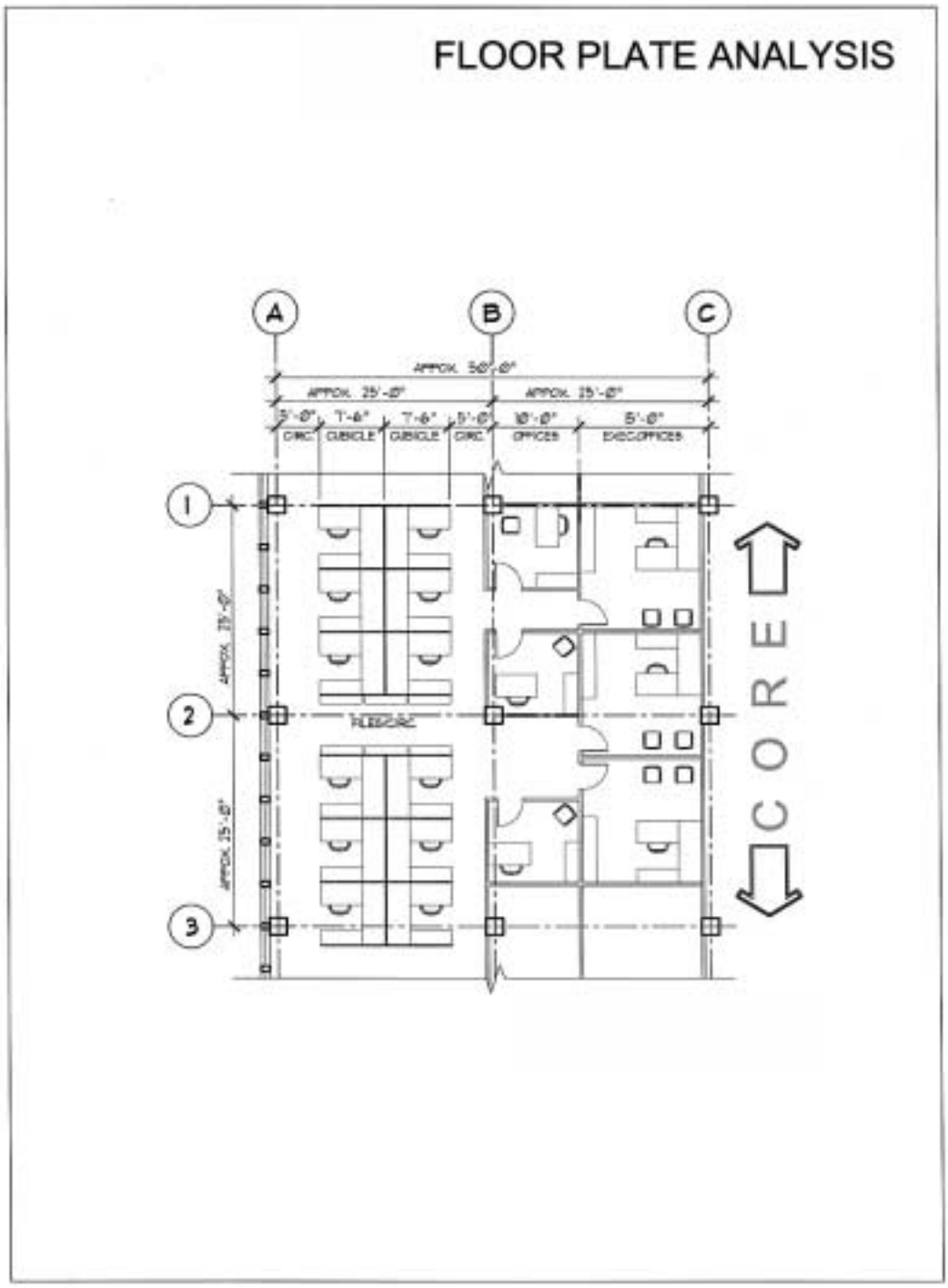


Typical floorplates and sections in SAMS office space will be organized as follows to maximize penetration of daylight into interior spaces:

- Hard wall offices will be located in the interior of the space, adjacent to the core.

- Cubicles with higher partition walls will be located adjacent to the hardwall offices and core, separated by a major corridor.

- Cubicles with lower partition walls will be located adjacent to the exterior of the building. Conference rooms and teaming areas will be located in this area as well.



The individual building diagrams are based on the floor plate analysis as derived from the preferred typical floor-building section. This floor plate analysis allows for an outer bay with perimeter circulation and two rows of systems furniture workstations. The internal bay allows for one row of systems furniture private offices and another row of full height offices. The bay at the central core contains restrooms, vertical circulation and ancillary support spaces.

5.1. BUILDING DIAGRAMS

The primary design guidelines for the individual floor plates are as follows:

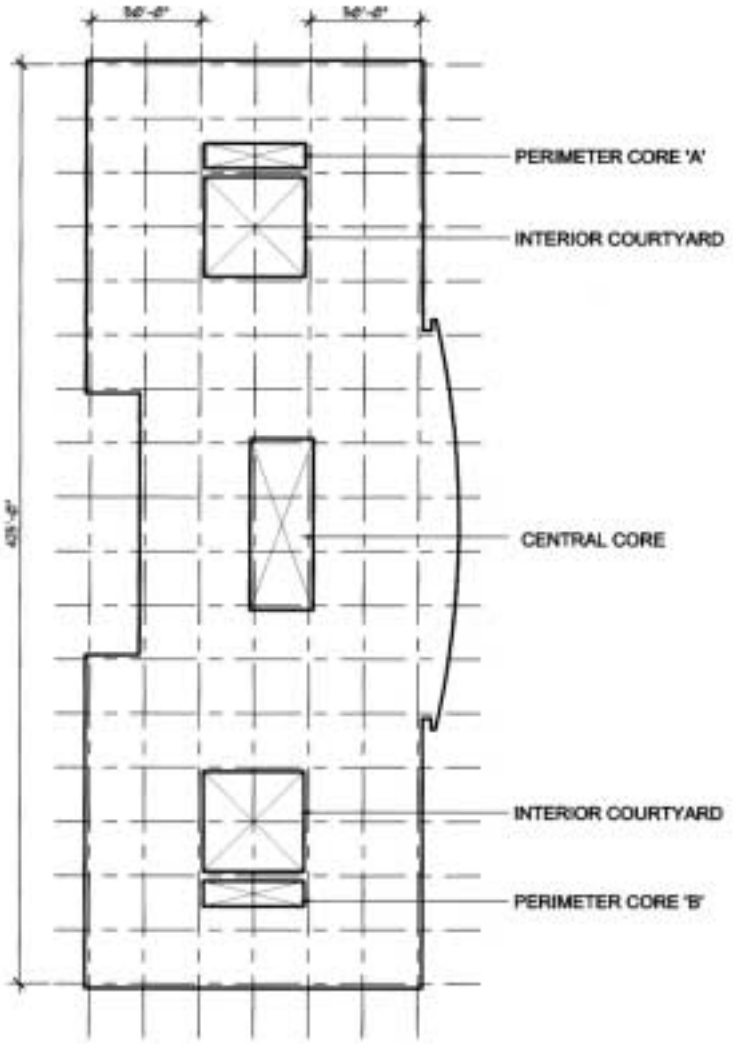
Two structural bay widths of approximate 25’-0” spacing are created around a central core space of approximately 25’-0”. The two structural bays wrap around the central core space in configurations based on the individual floor plate square footage requirements. These square footage requirements are taken from the three master plan schemes contained within the Design Guide.

Building masses are achieved through shifting the bays in order to articulate the individual façade. Additional articulation is achieved by creating recesses into the first structural bay or by pulling the façade away from the building and creating a curved façade in portions of the building’s exterior.

All building square footages are based on creating midrise buildings of the required square footages.

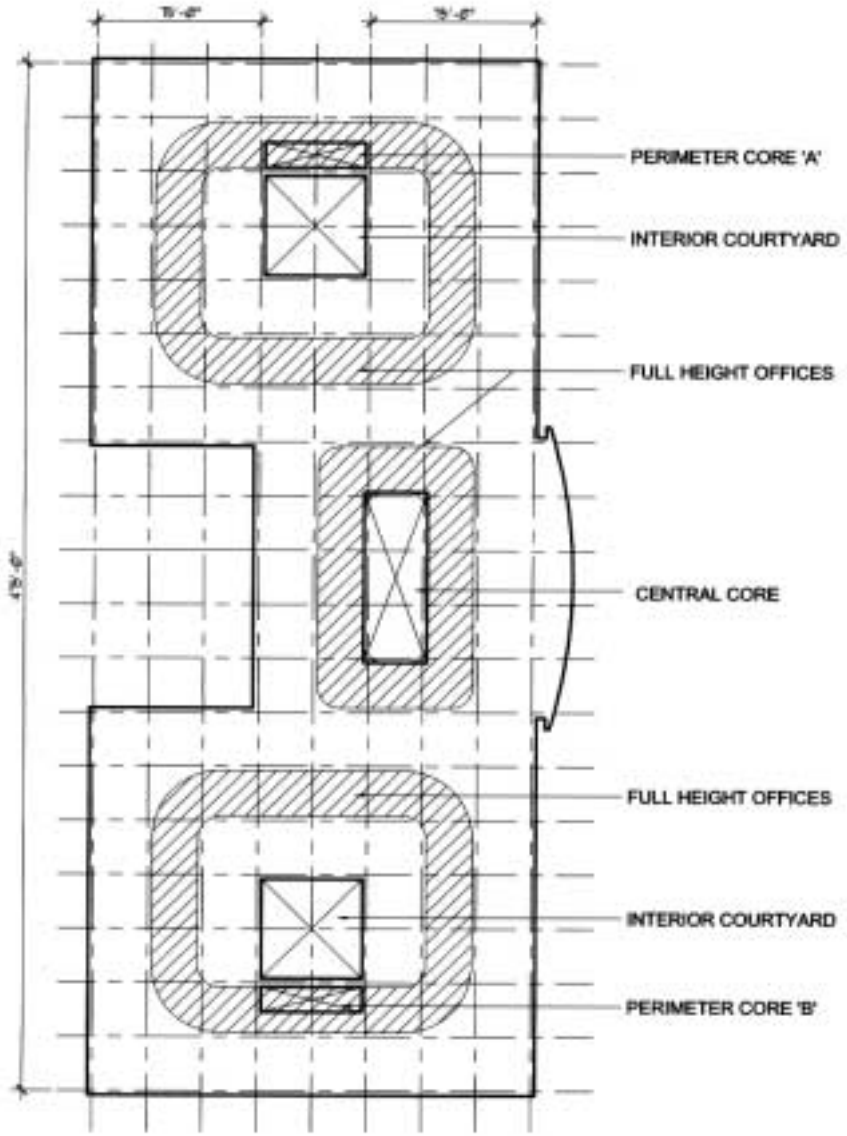
Following are example study floorplates. The Offeror is encouraged to develop their own floorplate designs and resolve the design issues in a creative manner. The dimensions indicated on the following drawings are intended to illustrate the design guidelines.

ALTERNATIVE 1
SAMS PROJECT-BLDG. 2A



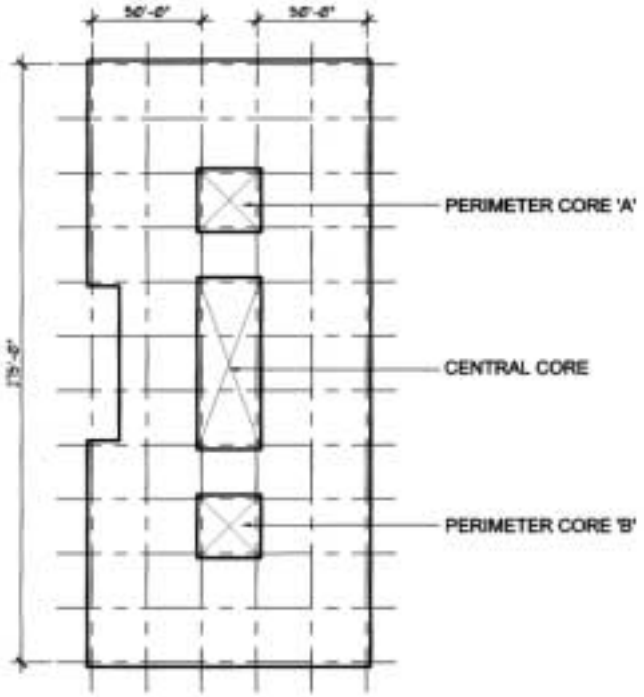
63,750 S.F. FLOOR
318,750 S.F. BUILDING

ALTERNATIVE 1
SAMS PROJECT-BLDG. 2E



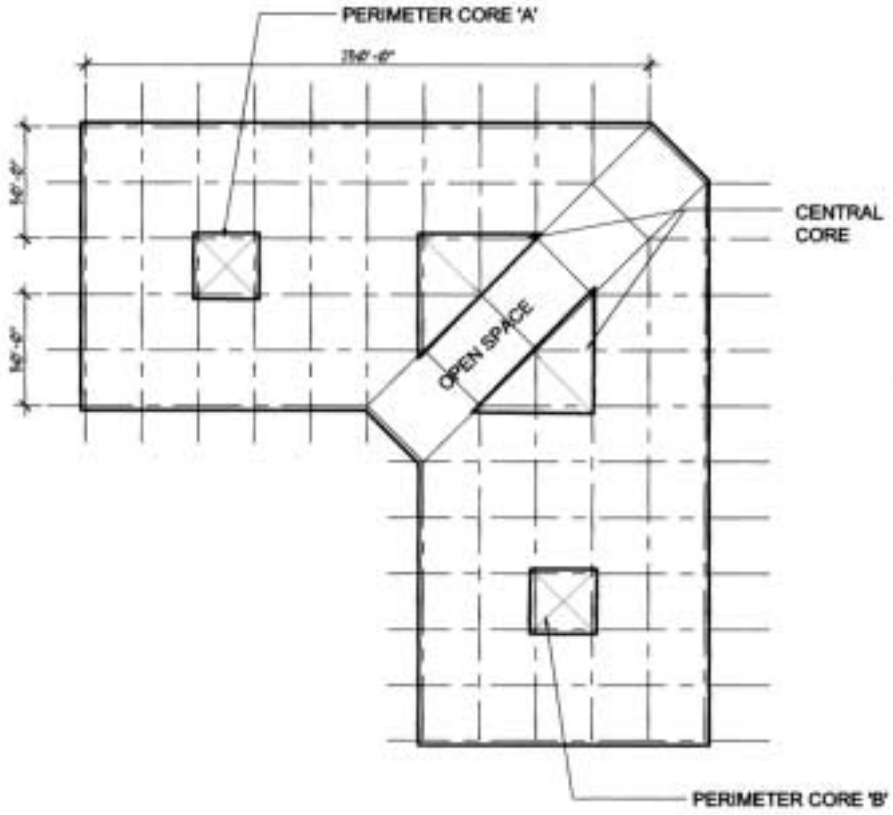
90,475 S.F. FLOOR
271,425 S.F. BUILDING
(3 STORIES)

ALTERNATIVE 2
SAMS PROJECT-BLDG. 3



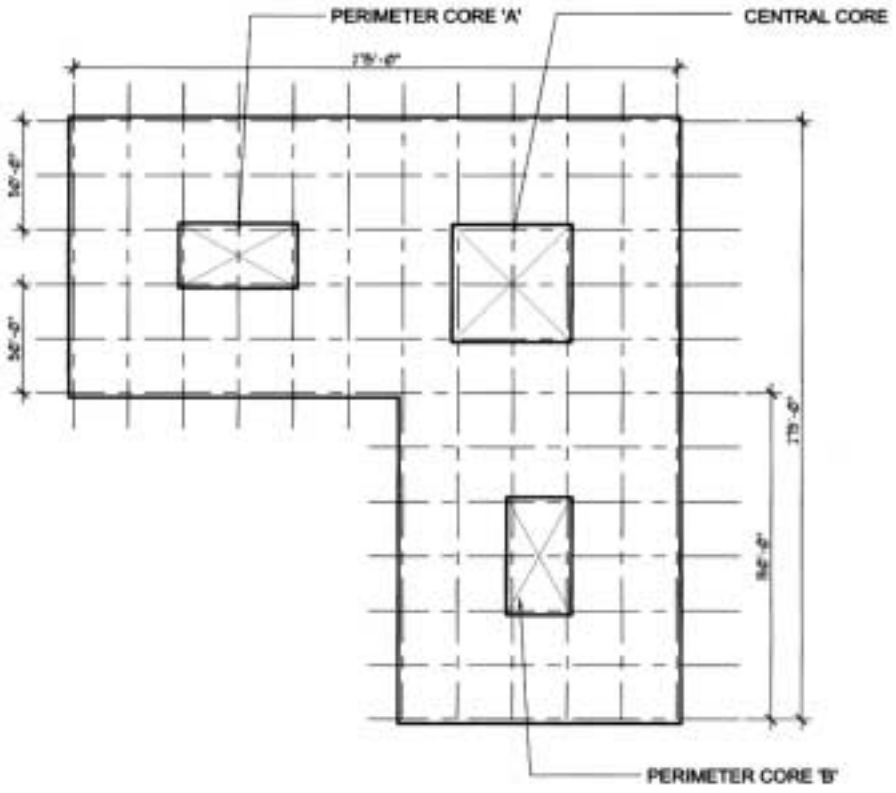
34,375 S.F. FLOOR
171,875 S.F. BUILDING

ALTERNATIVE 1 & 3
SAMS PROJECT-BLDG. 1 & 3

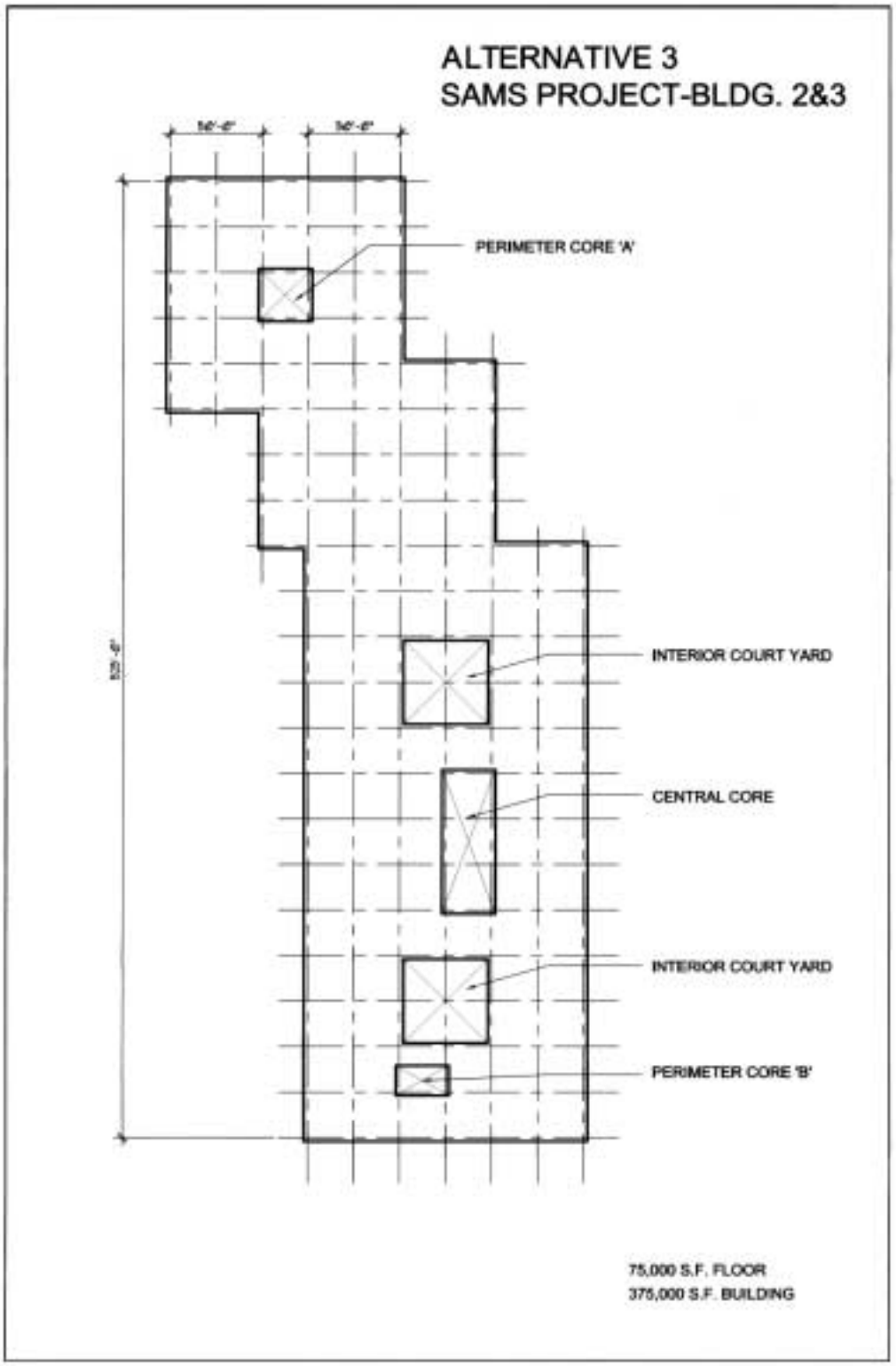


46,000 S.F. FLOOR
230,000 S.F. BUILDING

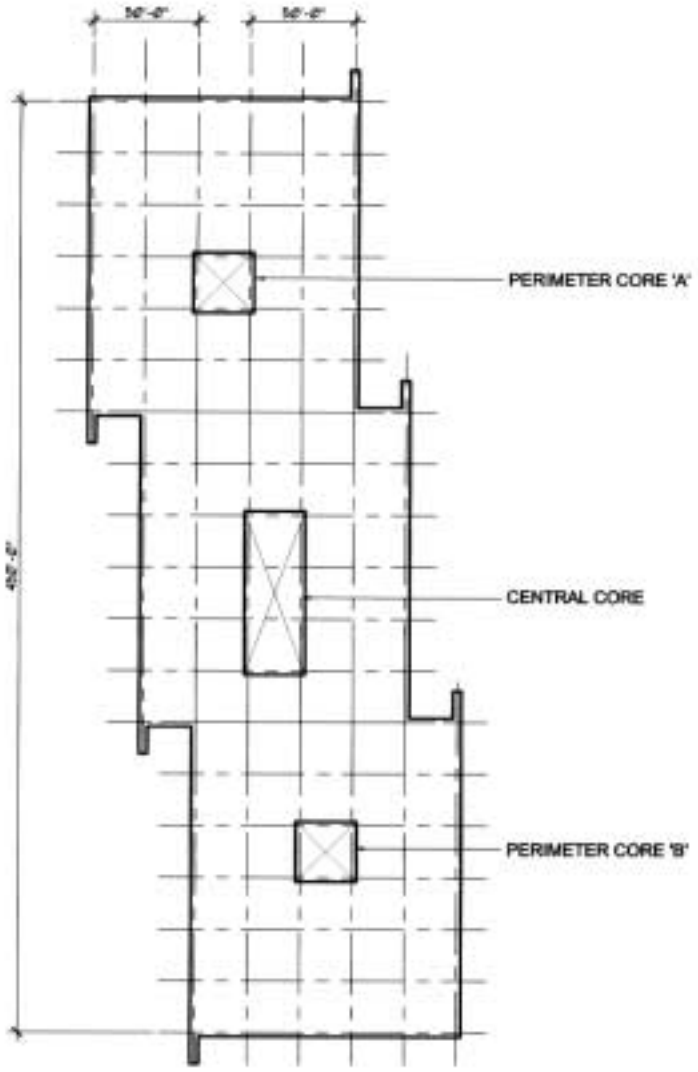
ALTERNATIVE 1 & 3
SAMS PROJECT-BLDG. 1 & 3



52,575 S.F. FLOOR
262,875 S.F. BUILDING


ALTERNATIVE 3
SAMS PROJECT-BLDG. 2&3
PERIMETER CORE 'A'
INTERIOR COURT YARD
CENTRAL CORE
INTERIOR COURT YARD
PERIMETER CORE 'B'
75,000 S.F. FLOOR
375,000 S.F. BUILDING

ALTERNATIVE 2
SAMS PROJECT-BLDG. 2



56,250 S.F. FLOOR
281,250 S.F. BUILDING

5.2. MASSING AND FACADE PHOTO GUIDELINES

Following are photographic examples of desired features of the SAMS complex.

BUILDING ENTRY GUIDELINES

- Entrance shall be clearly identifiable and designed to pedestrian scale while being in proportion to the building mass.
- Provide covering for inclement weather by incorporating either a building recess or a canopy integrally designed with the building.
- Consider curved roof elements as a contrast to grid-like nature of typical façade articulation and to provide continuity with other LAAFB facilities.
- Consider developing building entries as connecting elements between individual building masses.

BUILDING MASSING GUIDELINES

- Consider stepped facades to alleviate box-like masses.
- Provide clearly defined building entrances.
- Consider curved façade elements to complement existing LAAFB facilities.
- Consider curved roof elements at lower story to complement existing LAAFB facilities.

FACADE ARTICULATION GUIDELINES

- Express either a vertical or horizontal ribbon window scheme, punched or individual windows should be avoided.
- Provide for sufficient recess in window system in order to alleviate thin appearance of exterior building materials and to provide a shadow line.
- Consider expressing ground floors as a “base” to the overall building as a material or articulation change.
- Consider shading elements on appropriate exposures.
- Maximize natural light penetration into interior spaces.
- Façade articulation shall express the individual floor levels of the building

CAMPUS MASSING GUIDELINES

- Massing shall create courtyards and malls at a pedestrian scale.
- Building articulation and materials for office buildings, parking structure, and existing LAAFB facilities shall be complimentary.
- Massing shall accommodate varying individual building heights within square footage requirements.
- Consider non-parallel juxtapositions of individual buildings to provide for interesting courtyard and mall areas.

COURTYARD/MALL GUIDELINES

- Courtyards and malls shall be of a comfortable and welcoming pedestrian scale.
- Incorporate hardscape and landscape in an integral manner.
- One of the public gathering areas shall accommodate a large group.
- Provide smaller intimate places for conversation and breaks with seating areas that provide shade.
- Consider solar and wind orientation of outdoor areas.
- Consider water features.

PARKING GUIDELINES

If a parking structure is proposed, the following guidelines apply

- Complimentary to the adjacent office buildings in materials and articulation.
- Naturally ventilated.
- Vertical circulation components expressed as exterior elements.
- Relate pedestrian circulation to adjacent buildings.
- Open access (non-gated).

6.0 REQUIREMENTS

The requirements for SAMS are documented in the following sections that are divided by specialty or function. These divisions include requirements for General, Architectural, Mechanical, Electrical, Communications and other Special requirements. Each section provides the requirements in a narrative and tabular format. These requirement sections provide additional information and descriptions intended for use by the Offeror in finalizing the SAMS project design.

The Air Force envisions using a design build process for the SAMS Complex. It is intended that the Successful Offeror will use the information in this document to design and construct what is essentially a build-to-suit facility. Throughout the process the Successful Offeror will need to work closely with the Air Force since construction phasing is required in order to avoid disruption to ongoing Air Force missions.

After the project has been awarded to a single Offeror, the Air Force must be involved in the design of the facility including the finish levels, floor plan layout, communications, and color/material selections.

Once the project starts construction, the Offeror shall have a fulltime project manager and will maintain an on-site presence. The project manager will develop a quality assurance plan and make copies available to the Air Force management team.

6.1 GENERAL REQUIREMENTS

The General Requirements section provides detailed space and occupancy requirements for SAMS. This data supplements the overall SAMS project physical space requirements provided in Section 3, Project Description and Physical Requirements.

The physical space requirements for SAMS are divided into seven space types based upon similar power, communications or occupancy requirements. The basic space type divisions include: Office, Conference, Training, Specialty, Miscellaneous, Communications, and other Facility space requirements. This space type division carries through the remainder of the requirements sections for consistency.

6.2 PERFORMANCE

6.2.1 Basic Function:

- Provide built elements and site modifications as required to fulfill needs

described in the project program. Terms' offeror", design/builder", and "developer" will be considered equivalent and used interchangeably.

- The complete project comprises the following elements:
  - Substructure (A): Elements below grade and in contact with the ground.
  - Shell: The superstructure, exterior enclosure, and the roofing.
  - Interiors: Interior construction, stairs, finishes, and fixtures, except fixtures associated with services and specialized equipment.
  - Services: Mechanized, artificial, automatic, and unattended means of supply, distribution, transport, removal, disposal, protection, control, and communication.
  - Demolition: Removal of unneeded and undesirable existing elements.
  - Sitework: Modifications to the site, site improvements, and utilities.

6.2.2 Code:

Make all portions of the project comply with the code. The code referred to herein consists of all applicable local, State, and federal regulations, including those listed below (the role of the code official described in the document(s) will be performed by Air Force or by the Air Force's designee):

- Federal Regulatory Requirements:
- Federal Emergency Management Agency current publications including, but not limited to:
  - FEMA 302.
  - FEMA 350.
- Americans with Disabilities Act of 1990, as a public accommodation, as implemented in:
  - 28 CFR 36, Department of Justice regulations, including ADAAG.
  - 49 CFR 27, 37, and 38, Department of Transportation regulations, including ADAAG.
  - 29 CFR 1910, Occupational Safety and Health Standards, as a work place.

6.2.3 State of California regulatory requirements:

The current State of California Building code including all associated and/or referenced documents or codes as adopted and amended therein.

6.2.4 Non-Regulatory Criteria Documents:

In addition to specific regulatory requirements, the following documents are also incorporated into the definition of "the code" for the purposes of this project, except for administrative provisions contained therein; where referenced, the role of the code official described in the document will be performed by Air Force or the Air Force's designee.

- NFPA 70, National Electrical Code.
- NFPA 101, Safety to Life From Fire in Buildings and Structures.
- Los Angeles Air Force Base, SAMS Complex Facility Requirements and Design Guide, Appendix A.
- ICC International Plumbing Code.

6.2.5 Environmentally Responsible Design:

In addition to other requirements, provide design and construction that minimizes adverse effects on the exterior environment, enhances the quality of the indoor environment, and minimizes consumption of energy, water, construction materials, and other resources.

- Achieve at least a Certified rating in accordance with U.S. Green Buildings Council LEED Green Building Rating System, LEED reference Guide Version 2.0 and Environmentally Responsible Facilities Guide of the U.S. Air Force; selection of specific credits to achieve is the responsibility of Design-Builder unless otherwise indicated; comply with criteria specified in current LEED Rating System documentation as well as related criteria specified in other chapters.
- The goals listed below are some of those that are applicable to the project.
  - The goals indicated as "required" must be achieved.
  - The goals indicated as "desirable" will be given high priority in evaluating proposals.
  - The goals indicated "as specified" have different requirements specified in other chapters.
- Sitework:
  - Bicycle and cyclist facilities: Required. (Changing facilities will be made available in the new fitness Center separate from this project.)
  - Alternative-fuel refueling station(s): Desirable.
  - Preferred parking for car pools and van pool, with minimum parking capacity: Desirable.
  - Minimum surface disturbance: Desirable.
  - Sediment and erosion control: Required.
  - No net increase of storm water runoff: Desirable.
  - Reduction in runoff content of total suspended solids, phosphorus, and nitrogen: Desirable.
  - Capture of rain water for ground water recharge: Desirable.
  - Capture of rain water for landscape maintenance: Desirable.
  - Reduction of heat islands created by impervious paving and roofs: Desirable.
  - Light pollution reduction: Desirable.
- Water Conservation:
  - Landscaping requiring no potable water for maintenance: Desirable.
  - Reduction of potable water use for sewage conveyance: Desirable.

    - Inclusion of purple pipe to facilitate the use of reclaimed water (interior and exterior) required
- Energy Conservation:
    - Minimum energy efficiency: Complance with Title 24 is Required.
    - Energy efficiency exceeding minimum specified: Desirable.
    - Energy efficiency exceeding minimum by 40 percent: Desirable.
    - On-site renewable energy sources: Desirable.
    - On-site renewable energy sources supplying 5 percent of load: Desirable.
    - Improvement of efficiency through basic building commissioning: Required.
    - Improvement of efficiency through comprehensive building commissioning: Required.
    - Energy and water consumption measurement and verification systems: Desirable.
    - Purchase of power from renewable sources: Desirable.
    - No use of CFC-based refrigerants: Required.
    - No use of HCFC's or Halon: Desirable.
- Conservation of Materials and Resources:
    - Central location for collection and storage of recyclables: Required.
    - Recycling and/or salvaging of construction waste: Required.
    - Use of materials containing recycled content: Desirable.
    - Use of local/regional materials: Desirable.
    - Use of rapidly renewable materials: Desirable.
    - Use of certified wood: Desirable.
- Indoor Environmental Quality:
    - Smoking will be prohibited in the building.
    - Minimum ventilation performance: Required.
    - Carbon dioxide monitoring and control: Desirable.
    - Increased ventilation effectiveness: Desirable.
    - Construction procedures that reduce impact on interior air quality during and after construction: Required.
    - Use of materials that are low-emitting, non-toxic, and chemically inert: Required.
    - Control of sources of indoor pollutants: Required.
    - Individual occupant control of environmental systems: Desirable.
    - Individual occupant control of lighting systems: Desirable.
    - Thermal comfort conditions: As specified.
    - Provision of daylighting: Desirable. Comply with Appendix A and other systems criteria as defined herein.
    - Provision of views to outdoors: Desirable.
    - Humidity control and monitoring: Desirable.
- Substantiation:
    - Proposal Stage: LEED Checklist annotated to show specific credits to

be achieved with brief description of how they will be achieved.

- Preliminary Design Stage: LEED Checklist annotated (updated based on Air Force interaction/decisions to date) to show specific credits to be achieved with brief description of how they will be achieved.
- Design Development and Construction Documents Stages: LEED Checklist annotated to show status of design related to specific credits to be achieved and a comprehensive checklist of certification document specified in LEED Reference Guide annotated to show status of preparation of documentation.
- Construction Documents Stages:
  - LEED Checklist annotated to show specific credits status of design related to specific credits to be achieved.
  - Comprehensive checklist of certification documentation specified in LEED Reference Guide, annotated to show which forms of documentation have been submitted.
  - The documentation specified in LEED Reference Guide that is relevant to the degree of completion of the design; at subsequent design stages it will not be necessary to repeat submissions of the same documentation unless the design has changed.
- At Completion: LEED Certification, by U.S. Green Buildings Council.
  - Design-Builder shall provide all certification documentation and install certification plaque.
  - Design-Builder shall provide Air Force a complete duplicate of certification documentation.

- Athletic Spaces (SP7 Spaces): Provide softball field including turf and other surfaces in accordance with the Amateurs Softball Association.

6.2.6 Amenity and Comfort:

Thermal Performance: Design and construct to provide comfortable interior environment in accordance with the code and the following:

- Summer Interior Design Conditions: In lieu of specific criteria to the contrary the following conditions will prevail.
  - Daytime Setpoint: 72 deg F (22 deg C), plus or minus 2 deg F (1 deg C) except as specified in the project program.
- Winter Interior Design Conditions: In lieu of specific criteria to the contrary the following conditions will prevail.
  - Daytime Setpoint: 68 deg F (20 deg C), plus or minus 2 deg F (1 deg C) except as specified in the project program.
- Outside Air Design Conditions:
  - Summer Outside Air Design Temperature: 0.4 percent cooling design condition listed in the 1997 ASHRAE Fundamentals Handbook.
  - Winter Outside Air Design Temperature: 99.6 percent heating design

condition listed in the 1997 ASHRAE Fundamentals Handbook.

- Energy Design Wind Speed: Comply with ASHRAE and prevailing Meteorological Standards.

6.2.7 Health and Safety:

- Fire Resistance: Provide construction type in accordance with State of California building Code.
- Prevention of Accidental Injury: As required by code and as follows:
  - Safety Glazing: As defined by 16 CFR 1201; provide in locations required by code, glazed areas subject to human impact, glazed areas at grade, doors, and laminated glass.
  - Other requirements specified in other chapters.
  - Substantiation (Where compliance is duplicated by LEED conformance or by other requirements as defined herein only a single substantiation issuance or performance is required.):
    - Preliminary Design: Identification of building elements that require special accident prevention measures.
    - Design Development: Identification of safety measures taken, detailed description of design criteria, and structural analysis of load-resisting elements prepared by licensed structural engineer.
    - Construction Documents: For load-resisting elements, structural design calculations and drawings sealed by licensed structural engineer.
- Lightning Hazard: Design to prevent damage to occupants, structure, services, and contents due to lightning strikes.
  - Appendix A refers the developer to compliance with NFPA 780. Due to the minimal occurrence of lightning in the project area and because the standard design practice is to not recommend this expense for facilities in the project area, the developer should gain Air Force confirmation prior to inclusion of lightning protection in the project scope.
- Health Hazards:
  - Design to prevent growth of fungus, mold, and bacteria on surfaces and in concealed spaces.
  - Hazardous Construction Materials: Design and construct to comply with the requirements of the code.
  - Indoor Air Quality: Design and construct to comply with the code and the following:
    - Acceptable air quality as defined by ANSI/ASHRAE 62.
    - Substantiation (Where compliance is duplicated by LEED conformance or by other requirements as defined herein only a single substantiation issuance or performance is required.):
      - Design Development: Identification of methods to be used to

comply with requirements; ventilation design calculations. Identification of unusual indoor contaminants or sources and methods to mitigate their effects on occupants.
    - Construction Documents: Specifications showing that construction materials are not contaminant sources and do not adversely affect air quality.
    - Commissioning: Field measured outside and supply air quantities for each space and its associated air handler.
    - Occupancy: Field testing to show compliance, after full occupancy.
- Physical Security: In addition to any provisions that may be required by law or code, design and construct both exterior and interior spaces to incorporate accepted principles of crime prevention through environmental design (CPTED), using natural (as opposed to technological) methods of providing surveillance, access control, and territorial reinforcement wherever possible.
  - Definition of Elements at Ground Level: For purposes of physical security, any element within 20 feet (6 m) of the ground, grade, or adjacent paving.
  - Security Zones:
    - Public Access Zone: That area to which the public has free access, including entrance gate, unsecured parking at vehicle inspection area..
    - Reception Zone: The area to which the general public has access but beyond which access is restricted at all times.
    - Operations Zone: The area to which only employees and visitors escorted by staff having reason to be there have access.
    - Secure Zone: The area to which access is always controlled and which is monitored continuously.
    - High-Security Zone: Areas indicated in project program and areas named "vault", "secure file room", and "cash room".
    - High-security Zone: The areas as defined by the Los Angeles Air Force Base.
- Electrically-Operated Equipment and Appliances: UL listed for application or purpose to which they are put; suitable for wet locations listing for exterior use.
- The fire protection (sprinkler) zones, the fire alarm zones, the life safety zoning, the mechanical fire and fire and smoke damper locations, the architectural rated wall design, the smoke evacuation system, etc. will all coincide into a single set of compartmentalization for the entire project. All the systems will incorporate electronic detection (if they do not already) and interface with the Building Automation System. Specifically all points of the fire alarm system, all alarm points of the fire protection system, the status of the fire and fire and smoke dampers (ready or released), and all the points of the smoke evacuation system will become interfaced with the

BAS. The BAS will display this coincided zoning graphically and provide touch screen interactive capabilities for the users.

6.2.8 Structure:

- Earthquake Loads: Accommodate loads as prescribed by UBC 97 and the State of California Building Code..

- Substantiation:
  - Proposal: Identification of major structural materials and systems.
  - Preliminary Design: Detailed listing of design criteria and preliminary analysis, prepared by a licensed structural engineer.
  - Construction Documents: Detailed design analysis and Drawings by State of California licensed structural engineer.

6.2.9 Durability:

- Expected Service Life Span: Expected functional service life of the built portions of this project is 50 years.
  - Service life spans of individual elements that differ from the overall project life span are defined in other chapters.
  - Substantiation: Since actual service life cannot be proven, substantiation of actual service life is not required; however, the following are reasonable indicators of anticipatable service life:
    - Preliminary Design or Design Development: Service life expectancy analysis, for each element for which life span is specified; including:
      - Length of effective service life, and aesthetic service life if specified, with action required at end; e.g. complete replacement, partial replacement, or refurbishment.
      - Conditions under which estimate will be valid; e.g. expected uses, inspection frequency, maintenance frequency, etc.
  - Design Development: Life cycle cost of project, over the specified project service life, excluding operating staff costs; include costs of:
      - Replacement of each element not expected to last the life of the project; identify the frequency of replacement.
      - Deduct salvage value of replaced elements.
      - Calculate costs in today's dollars, disregarding the time value of money, inflation, taxes, and insurance.

- Flood Resistance: The project is located in a Special Flood Hazard Area (A Zone); design to minimize damage due to 1 percent annual chance flood.
  - Do not provide enclosed interior spaces below 1 percent annual chance flood level, except for Building Services (U1), Utility Equipment (U2),

and Automotive (V1) spaces.

- At interiors below 1 percent annual chance level provide interior construction and fixtures that are inherently water resistant.

6.2.10 Operation and Maintenance:

▪ Space Efficiency: Minimize floor area required while providing specified spaces and space relationships, plus circulation and services areas required for functions. For purposes of this project "Rentable" areas shall be considered as those areas which are not shell and core and do not contain toilet facilities, elevators, lobbies, atriums, courtyards, reception areas, means of egress, mechanical and electrical rooms, etc. “Usable” shall be defined as gross building square footage. These definitions should, however, be considered default directions for those portions of the project that are not specifically referenced by Appendix A.

- Rentable Area: R/U Ratio of 85 percent, minimum, for building as a whole, calculated as defined in ANSI/BOMA Z65.1.
- Substantiation: Areas and ratios measured and calculated in accordance with ANSI/BOMA Z65.1.
  - Proposal: Calculation of Gross Building Area, Building Common Area, Floor Common Areas, Floor Rentable Areas, and Building Rentable Area, R/U Ratio, and net area of each space.
  - Design Development: Calculation of Gross Building Area, Building Common Area, Floor Common Areas, Floor Rentable Areas, and Building Rentable Area, R/U Ratio, and net area of each space.

- Energy Efficiency: Minimize energy consumption while providing function, amenity, and comfort specified. Comply with ASRAE 90.1, Appendix A, LEED Reference Guide Version 2.0, and the Environmentally Responsible Facilities Guide of the U.S. Air Force. Compliance with ASHRAE 90.1 shall be deemed equivalent to compliance with California Title 24. (Documentation of said compliance with Title 24 (ASHRAE 90.1) as defined by LEED Reference Guide 2.0 shall be considered a requirement of the project.)
  - Provide energy efficient design using procedures and values specified in Title 24.
    - Provide at least 10 percent less energy consumption than that of an equivalent minimally-complying baseline building, demonstrated by comparing the actual Design Energy Cost to the Energy Cost Budget of a prototype building, both calculated in accordance with Title 24.
  - Provide energy efficient design using procedures and values specified in Title 24 (ASHRAE 90.1.
  - Substantiation (Where compliance is duplicated by LEED conformance or by other requirements as defined herein only a single substantiation issuance or performance is required.):

    - Proposal: Identification of method of calculation of energy efficiency to be employed.
    - Design Development: Detailed listing of design criteria and design analysis showing compliance, prepared by a licensed mechanical engineer.
    - Design Development: Energy cost of all energy-consuming equipment and systems over the first year of operation; include analysis of probable change in annual cost over time due to aging but disregarding inflation and rate changes.
    - Construction Documents: Detailed listing of design criteria and design analysis showing compliance, prepared by a licensed mechanical engineer. Provide updated and annotated changes, additions and deletions in relation to the previous design stage.
    - Construction Documents: Energy cost of all energy-consuming equipment and systems over the first year of operation; include analysis of probable change in annual cost over time due to aging but disregarding inflation and rate changes. Provide updated and annotated changes, additions and deletions in relation to the previous design stage.

- Water Consumption: Minimize water consumption. Comply with Appendix A, LEED Reference Guide Version 2.0, and environmentally Responsible Facilities Guide of the U.S. Air Force.
  - Substantiation (Where compliance is duplicated by LEED conformance or by other requirements as defined herein only a single substantiation issuance or performance is required.):
    - Proposal: Estimated quantity of water that will be used in the first year of operation, divided into domestic water, HVAC water, and other water categories, with quantity of water recycled, if any; include basis of estimates.
    - Design Development: Quantity of water that will be used in the first year of operation, divided into domestic water, HVAC water, and other water categories, with required storage capacity and quantity of water recycled, if any; include basis of calculations.
    - Construction Documents: Updated water consumption, based on actual equipment selections and sizes.

- Waste (Trash/Rubbish) Removal: As described in the project program.

- Ease of Operation: Provide facility, equipment, and systems that are easily operated by personnel with a reasonable level of training for similar activities.
  - Minimize the need for specialized training in operation of specific equipment or systems; identify all equipment and systems for which the manufacturer recommends or provides training programs.
  - Train Air Force's personnel in operation of equipment and systems.
  - Substantiation (Where compliance is duplicated by LEED confor-

mance or by other requirements as defined herein only a single substantiation issuance or performance is required.):

- Proposal: Type of operating personnel and amount of training required; identification of each equipment item or system for which more than one day of training is required; identify source of data.
- Design Development: Operating impact analysis, including identification of type and quantity of staff, tools, and supplies required; estimate of impact that aging materials will have on operating requirements; no cost calculations required; identify source of data.
- Construction Documents: Updated operating impact analysis, based on actual product selections.

- Ease of Maintenance: Minimize the amount of maintenance required.
  - Substantiation (Where compliance is duplicated by LEED conformance or by other requirements as defined herein only a single substantiation issuance or performance is required.):
    - Proposal: Estimated maintenance cost for first year of operation, based on use of outside maintenance contracts; estimate of the impact that aging materials will have on maintenance costs; description of maintenance activities included in estimated cost.
    - Design Development: Maintenance impact analysis, including identification of maintenance effort (type of staff, time required, and frequency), tools, and supplies required, over expected functional and aesthetic service life of project; including preventive maintenance, replacement of parts, and cleaning, but not energy for operation or replacement at end of service life; no cost calculations required; identify source of data.
    - Design Development: Maintenance cost for first year of operation, based on use of maintenance contracts; estimate of the impact that aging materials will have on maintenance costs; description of maintenance activities included in estimated cost.
    - Construction Documents: Updated maintenance impact analysis, based on final product selections.
    - Construction Documents: Updated maintenance cost for first year of operation, based on actual product selections.

- Ease of Repair: Elements that do not meet the specified requirements for ease of repair may be used, provided they meet the specified requirements for ease of replacement of elements not required to have service life span equal to that specified for the project as a whole; the service life expectancy analysis and life cycle cost substantiation specified for service life are provided; and Air Force's acceptance is granted.

- Allowance for Changes in Occupancy and Arrangement:
  - Office Spaces: Design for churn of at least 75 percent, requiring very frequent minor changes in location and workplace layout.
    - Size and Layout: So that relocation of individuals and small

groups can be accomplished overnight with no disruption of work and no disruption of work of neighbors and no degradation of functionality or amenity.
    - Air Force requires that operations staff be able to make such adjustments without technical help, with only a few days ordering/delivery time for new components.
    - Where fixed partitions are used to separate spaces, relocated partitions must be completely salvageable, where possible.
    - All spaces involved in changes described above include special air exhausts, special lighting, and special cooling which must be moved at the same time.
- Substantiation:
    - Preliminary Design: Method of accomplishing changes anticipated; degree of salvage anticipated.
    - Design Development: Incorporation of costs of anticipated changes into life cycle cost analysis.
- Ease of Replacement:
    - Elements Not Required to have the Expected Service Life Span Equal to that Specified for the Project as a Whole: Make provisions for replacement without undue disruption of building operation.

6.2.11 Elements and Products

- In addition to requirements specified in other chapters, provide products and elements that comply with the following.
- Elements Made Up of More Than One Product:
    - Where an element is specified by performance criteria, use construction either proven-in-use or proven-by-mock-up, unless otherwise indicated.
        - Proven-In-Use: Proven to comply by having actually been built to the same or very similar design with the same materials as proposed and functioning as specified.
        - Proven-by-Mock-Up: Compliance reasonably predictable by having been tested in full-scale mock-up using the same materials and design as proposed and functioning as specified. Testing need not have been accomplished specifically for this project; when published listings of independent agencies include details of testing and results, citation of test by listing number is sufficient (submittal of all test details is not required).
        - The Design-Builder may choose whether to use elements proven-in-use or proven-by-mock-up, unless either option is indicated as specifically required.

    - Where test methods accompany performance requirements, use those test methods to test the mock-up.

- Where a type of product is specified, without performance criteria specifically applicable to the element, use the type of product specified.
- Where more than one type of product is specified, without performance criteria specifically applicable to the element, use one of the types of products specified.
- Where a type of product is specified, with applicable performance criteria, use either the type of product specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.
- Where more than one type of product is specified, with applicable performance criteria, use either one of the types of products specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.
- Where neither types of products nor performance criteria are specified, use products that will perform well within the specified life span of the building.
- Products:
    - Where a product is specified only by a manufacturer name and model number/brand name, use only that model/brand product.
    - Where the properties of a product are specified by description and/or with performance criteria, use products that comply with the description and/or performance criteria.
    - Where manufacturers are listed for a particular product, use a product made by one of those manufacturers that also complies with other requirements.

6.2.12 Substantiation

- Definition: Substantiation is any form of evidence that is used to predict whether the design will comply with the requirements or to verify that the construction based on the design actually does comply. During Preliminary Design, Design Development, and Construction Documents, requirements to submit substantiation are primarily intended to forestall use of designs or constructions that will not comply. At any time before completion of construction, substantiation is presumed to be only a prediction and may subsequently be invalidated by actual results.
- Regardless of whether substantiation is specified or not, the actual construction must comply with the specified requirements and may, at Air

Force discretion, be examined, inspected, or tested to determine compliance.

- Substantiation submittals will not be approved or accepted, except to the extent that they are part of documents required to be approved or accepted in order to proceed to the next stage of design or construction. However, approval or acceptance of substantiation will not constitute approval or acceptance of deviations from the specified requirements unless those deviations are specifically identified as such on the submittal.
- The Air Force accepts the responsibility to review substantiation submittals in a timely manner and to respond if they are unacceptable.
- Where compliance with any substantiation requirement is duplicated by LEED conformance, the California Building Code, Appendix A. or by other requirements as defined herein only a single substantiation issuance or performance is required and desired. All resulting individual substantiation requirements shall be conformed with as defined and submitted collectively at a single time, whether it is for Preliminary Phase, Design Development Phase, Construction Document Phase, Construction Phase, Acceptance Phase, etc.

In addition to the requirements stated in other chapters, provide the following substantiation of compliance at each stage of the project:

- If a substantiation requirement is specified without an indication of when it is to be submitted, submit or execute it before the end of Construction Documents.
- As part of the project Quality Assurance program a Technical Review of the Design Documents will be conducted by the Air Force, (or his designee) at the Preliminary Design Phase (35% interim design package), at the Design Development Phase (65% design stage), and at the Construction Document Phase (95% design stage). Prior to proceeding with each subsequent design phase the individual review comments of the presently submitted stage will be addressed and responded to by the design team. In addition this review will comply with and satisfy the first two tasks of LEED Energy and Atmosphere credit 3.0.
- Design document submittal requirements shall comply with section 11.0 of Appendix A.

- Previous Construction: Where elements proven-in-use are used to comply with performance requirements:

  - In the Proposal, identify which elements will be accomplished using proven-in-use elements.
  - During Design Development, identify proven-in-use elements proposed for use, including building name, location, date of construction, Air Force contact, and description of design and materials in sufficient

detail to enable reproduction in this project.

- Mock-Up Testing: Where elements proven-by-mock-up are used to comply with performance requirements:
  - In the Proposal, identify which elements will be accomplished using proven-by-mock-up elements.
  - During Design Development, identify proven-by-mock-up elements proposed for use, with test report including date and location of test, name of testing agency, and description of test and mock-up.
  - Mock-up testing need not have been performed specifically for this project, provided the mock-up is substantially similar in design and construction to the element proposed.
- Design Analyses (including Engineering Calculations):
  - Where a design analysis or calculation is specified without identifying a particular method, perform analysis in accordance with accepted engineering or scientific principles to show compliance with specified requirements, and submit report that includes analysis methods used and the name and qualifications of the designer.
  - Where engineering design is allowed to be completed after commencement of construction, substantiation may be in the form of shop drawings or other data.
  - Submit design analyses at the end of Design Development unless otherwise indicated.
  - Where design analysis is specified to be performed by licensed design professional, use a design professional licensed in the State in which the Project is located.
- Products:
  - Where actual brand name products are not identified by either the Air Force or the Design-Builder, identify the products to be used.
  - In the Proposal:
    - Identify one or more product types for each system, assembly, or element.
    - For each product type, provide brief descriptive or performance specifications.
    - For major manufactured products that are commonly purchased by brand name, and any other products so indicated, identify at least one manufacturer that will be used.
- During Preliminary Design or Design Development:
  - Where more than one product type is identified for a particular system, assembly, or element, identify exactly which type will be used.

    - For each product type, provide descriptive or performance specifications; early submittals may be brief specifications, but complete specifications are required prior to completion of construction documents.
    - For each product type, identify at least one manufacturer that will be used.
    - For major manufactured products that are commonly purchased by brand name, and any other products so indicated, provide manufacturer's product literature on at least one actual brand name product that meets the specifications, including performance data and sample warranty.

- During Construction:
    - Identify actual brand name products used for every product, except commodity products specified by performance or description.
    - Where a product is specified by performance requirements with test methods, and if so specified, provide test reports showing compliance.
    - Provide manufacturer's product literature for each brand name product.
    - Provide the manufacturer's certification that the product used on the project complies with the contract documents.

- Before End of Closeout:
    - Provide copies of all manufacturer warranties that extend for more than one year after completion.

- Air Force Furnished Equipment:

    - The developer will familiarize himself with all the Air Force furnished equipment and provide a listing of said equipment to be accepted and incorporated into this project.

    - The developer will be responsible for acceptance from the Air Force of this equipment and its relocation to the project buildings.

    - Before acceptance the developer will test all equipment to verify its functional capabilities. Equipment that fails to function adequately for service in the project will be repaired or replaced.

    - As part of his proposal the developer will propose an allowance that should reasonably cover said repair work or replacement after his inspection of the equipment. Any costs to thoroughly and adequately repair and/or replace this equipment that must be incurred beyond the agreed upon allowance will be borne by the Air Force. Any allowance funds that, likewise, may remain after all said work to the equipment has been satisfactorily completed will be returned to the Air Force.

    - Equipment that fails testing will not be considered "accepted" until repaired or replaced. The developer will document the specific transactions in this regard as they occur.
        - Upon acceptance and installation into the project, the developer is

responsible for the complete operation of the facility and the building systems that the said equipment become part of. This will be the case just as if they were purchased as an original, new component of the building project.

- Replace in kind:
  - Comply in all respects with the specific requirements of Los Angeles Air Force Base SAMS Complex Facility Requirements and Design Guide, Appendix A. Where information appears to address only the partial requirements of a project space or area or where no information appears to be applicable, the developer will, at a minimum, use as a baseline the replacement in kind of the following project elements:
    - Officers Club / Consolidated Club.
    - Child Development Center.
    - Warehouse.
    - Conference Center.

6.3 SPACES

6.3.1 Interior Spaces:

The project includes spaces of the following types:

- "Customer" Contact (SP1 Spaces): Spaces where the occupants meet the public or their customers, including reception desks, display areas, and conferencing.
- Occupant Work (SP2 Spaces): Spaces intended primarily for one worker, including offices and open-office cubicles.
- Equipment Utilization (SP3 Spaces): Spaces where more than one person may use common equipment, including copier rooms, work rooms, computer rooms, mail rooms, and production kitchen.
- Audience (SP4 Spaces): Spaces with fixed seating and projection rooms.
- Assembly (SP5 Spaces): Spaces without fixed seating, including assembly halls, dining and drinking, library reading rooms, and multipurpose rooms.
- Meeting and Instruction (SP6 Spaces): Spaces for meeting rooms, conference rooms, and classrooms.
- Occupant Services (SR Spaces): Spaces for toilets, showers, changing and dressing, eating, and cooking.
- Storage (SS Spaces): Rooms devoted to storage, including closets, storage rooms, secure storage, and heavy-weight storage.
- Circulation (SC Spaces): Spaces functioning as corridors, lobbies, waiting

areas, vestibules, stairs, and ramps.

- Building Services (SU1 Spaces): Spaces for service sinks, maintenance equipment, trash collection, trash removal, trash incineration, maintenance shop, and central loading dock.
- Utility Equipment (SU2 Spaces): Spaces for mechanical equipment, heating equipment, electrical equipment, communications equipment, and elevator equipment.

6.3.2 Exterior Spaces:

The project includes spaces of the following types:

- Outdoor Athletic (SP7 Spaces): Spaces used primarily for athletic activities, including softball field.
- Outdoor Occupant Services (SR Spaces): Spaces for eating, sitting, and casual gathering.
- Outdoor Circulation (SC Spaces): Spaces functioning as corridors, lobbies, waiting areas, stairs, ramps, and pedestrian links to Areospace Cap and rest of Area B.
- Outdoor Utility Equipment (SU2 Spaces): Dedicated spaces for outdoor elements of water and drainage, heating and cooling, fire protection, electrical power, telecommunications, and screened from view services.
- Automotive (SV2 Spaces): Spaces for parking private vehicles, access roads, driveways, and passenger loading zone.

6.3.3 Existing Conditions

- The proposed project site is idenitifed generally as Area B. Design-Builder shall clearly outline the extent of site development.
- The project site is currently occupied by existing structures.
  - Existing structures are to be completely removed.
- Trees and Vegetation:
  - Air Force requests the preservation of trees to the greatest extent possible.
- Other site features that may affect the design or construction include new utility alignment.

6.3.4 Office Space Requirements

SAMS Office space generally falls into two categories, hard walled offices and systems furniture. Hard walled offices are identified as OL-1 through OL-5. Systems furniture offices are identified as SL-1 through SL-4. The distribution and allocation of office space is by rank and position and follows the Air Force guidelines. The following table summarizes each type of office space and tabulates the size, occupancy, and estimated quantity.

Table 6.1.1 Office Space Requirements

Office Space:	Size (Sq. FT.)	Occupant	Quantity	Plus or Minus	Notes:
OL-1	635	LT GEN	1		
OL-2	535	BRIG GEN/SES	12	2	
OL-3	320	2 LTR COL	13	2	
OL-4	240	3 LTR COL	65	10	
OL-5	120	LT COL/GS-14/CMSgt	451	68	
SL-1	100	MAJ/GS-13/SMSgt	291	44	
SL-2	80	CGO/CIV/CONTR/ENL	1152	173	
SL-3	64	ADMIN	272	40	

6.3.5 Conference Space Requirements

SAMS Conference space generally falls into two categories, hard walled and systems furniture. Hard walled conference rooms are identified as CL-1 through CL-5. Systems furniture teaming and meeting rooms are identified as SCL-6 and SCL-7. Additionally conference spaces include the Court Room, the Conference Center and the Presentation Room. To maximize the use of the Conference Center and the Consolidated Club the developer should locate the two spaces next to one another enhancing there functionally. The conferencing center shall accommodate catering services. The distribution and allocation of office space is by organization and follows the Air Force guidelines. The following table summarizes each type of conference space and tabulates the size, occupancy, and estimated quantity.

Table 6.1.2 Conference Space Requirements

Conference Spaces:	Size (Sq. FT.)	Total Occupancy	Quantity	Plus or Minus	Notes:
CL-1	1200	50-80	7	1	
CL-2	950	30-40	11	2	
CL-3	850	20-30	5	1	
CL-4	500	16-20	18	3	
CL-5	200	8-10	26	4	
SCL-6	150	4-6	86	13	
SCL-7	TBD				
Conference Center	18,000	>200	1	0	
Presentation Room	8,000	>200	1	0	
Court Room	3,200	100	1	0	1

Notes:
1. Build IAW AF design guide for Court Rooms.

6.3.6 Training Space Requirements

SAMS Training space is generally hard walled rooms. The larger rooms will have the capability of being partitioned into smaller workrooms. The distribution and allocation of training space is by organization and mission and follows the Air Force guidelines.

6.3.7 Specialty Space Requirements

SAMS Specialty space is generally hard walled rooms. Specialty space includes the common classified workrooms, Scientific Engineering Research Facility (SERF), the Command Post, The Base Communications Center (BNCC), the SCIF and other special purpose rooms. The distribution and allocation of specialty space is by organization and mission and follows the Air Force guidelines.

6.3.8 Miscellaneous Space Requirements

SAMS Miscellaneous spaces are generally consist of rooms that do not fall into any other category. Miscellaneous space includes the Photo Lab, Video Lab, Art Service Rooms, the Consolidated Club, the Child Development Center and other special purpose rooms. To maximize the use of the Consolidated Club and the Conference Center the two spaces should be located next to one another enhancing there functionally.

6.3.9 Communications Space Requirements

SAMS Communications spaces are generally hard walled rooms specifically designed and constructed to support communication equipment and distribution requirements. Communications space includes the Cable Vault or Entrance Facility (EF), Main Distribution Frame (MDF), Telecommunications Rooms (TR), Dial Central Office (DCO), Battery Room, Consolidated Network Control Center (CNCC), Test and Integration Facility (TIF), Equipment Rooms (ER) and Classified Equipment Rooms (CER), and other special purpose rooms. The distribution and allocation of communications space is by organization, mission, and physical building layout and follows the Air Force guidelines. The following table summarizes each type of communications space and tabulates their size and estimated quantity.

Table 6.1.3 Communications Space Requirements

Communications Space	Size (Sq. FT.) (Minimum)	Quantity	Notes:
Cable Vault (Entrance Facility)	Note 3	1 Per Campus	
Main Distribution Frame (MDF)	500	1 Per Campus	
Telecomm Room (TR)	150	1 Per 10,000 Usable Square Feet	4
Dial Central Office (DCO)	700	1 Per Campus	
DCO Battery Room	150	1 Per DCO	
Switchboard Operator Room	300	1 Per Campus	
Consolidated NCC (CNCC)	10,000	1 Per Campus	1
Main CLASSIFIED NCC (CER)	1500	1 Per Campus	
Satellite CLASSIFIED Equip. Rm. (CER)	150	1 Per Satellite Building	2

Notes:

1. Of this 10,000 S.F., 2,500 S.F. is for a server room2,500 S.F. is for network equipment, 1,500 2,500 S.F. is for an assembly area, and 1,000 S.F is for a tape library.
2. Any building not containing the Main Classified NCC.
3. Size of entrance facility is dependant on quantity of pairs entering the building.
4. Minimum of one TR per floor. TRs shall be verticaly aligned.

General:

1. Communications spaces shall meet the requiorements of TIA/EIA 569-A.

6.3.10 Facility Space Requirements

SAMS Facility spaces are generally hard walled rooms and areas required to support all building occupants. Facility space includes the hallways, rest rooms, storage rooms, electrical and mechanical support rooms and other special purpose rooms. The distribution and allocation of facility space is by occupancy and physical building layout and follows the Air Force guidelines. The following table summarizes each type of facility space and tabulates their size and estimated quantity.

Table 6.1.4 Facility Space Requirements

Facility Space	Size (Sq. FT.)	Quantity	Notes:
Computer Storage Room	400	1 Per Floor	
File Storage Room	400	1 Per Floor	
Janitor Closet	AR	1 Per Bathroom	1
Electrical Room	AR	1 Per TR	2
Mechanical Room	AR	AR	
Hallway	AR	AR	
Restroom	AR	AR	

Notes:
AR- As Required
1. Co-Locate with Bathrooms.
2. Provide 1 main Electrical Room / building and one satellite Electrical Room / TR Co-Locate with TRs.

7.0 Civil and Structural Requirements

7.1 SITEWORK

PERFORMANCE

7.1.1 Basic Function:

Provide all modifications to the site and site improvements and utilities required for proper functioning of the project and as indicated in the project program.

Sitework comprises the following elements:

- Site Preparation: All modifications to the site and grades required for construction of new work and for proper functioning of the project.
- Site Improvements: All elements required to provide finished and durable site surfaces, indoor plantings, and outdoor improvements described in the project program.
- Site Services: All outdoor and underground elements required to complete the design of services defined in 0.
- Other Site Construction: Miscellaneous site elements.

- Where site elements also must function as elements defined within another element group, meet the requirements of both element groups.
- Site paving materials at the entrances to the building shall be of a quality and design that emphasizes the transition from the exterior to the lobby.

7.1.2 Amenity and Comfort:

- Provide shelter from weather for:
  - Persons waiting for and getting out of automobiles at entrances.
  - Persons waiting at the bus stop.
  - Persons walking between units and common facilities.
  - Persons walking around the site, at not more than 50 ft (15 m) intervals.
  - Persons waiting for entrances to open, minimum of 100 people standing.
  - Sitting outdoors; minimum of 10 seating locations
- Heat/Cold: Design to minimize heat gain in summer and maximize heat gain in winter.
- Wind: Design to shield entrances from wind in all seasons.
- Privacy:
  Provide complete visual screens around the following, preventing visual

observation of occupants from other areas of the site:
  - Private outdoor sitting areas.
  - Equipment, trash and similar yard areas.

- Sound:
  Provide exterior activity spaces with ambient sound levels within the following Noise Criteria (NC) ranges, as defined in ASHRAE HVAC Applications Handbook, when adjacent spaces, both on and off the site, are being used normally:
  - Outdoor Dining Areas: NC 35-50.
  - Outdoor Sports and Recreation Areas: NC 45-55.

- Cleanliness: Provide above grade elements, fixtures, and equipment that:
  - Prevent attraction and adherence of dust and air-borne dirt and soot, and minimize appearance of settled dust and dirt.
  - Are washed reasonably clean by normal precipitation.

- Comfort:
  - Provide outdoor seating as described in the project program:

- Appearance:
  - Preserve:
    - Trees, shrubs, and other vegetation that need not be removed to accomplish the design.
    - Natural waterways.
    - Provide trees, shrubs, lawns, and other vegetation to create a lush landscape feel.
    - Finish site walls, equipment yard enclosures, trash enclosures, and similar utility structures to be compatible with the exterior finish of the building;
    - Where fencing is provided, match the iron fencing that is the LAAFB standard design or provide a comparable design;
    - Provide walls high enough to conceal all equipment from view at equipment, trash, and similar yard areas; and screen those utility areas that can be seen from upper floors with horizontal architectural grillwork or a similar screening device that is compatible with the design of the building.
  - Fit the new activities on site to the topography, soils, and existing vegetation as much as possible.
  - Finished Surfaces:
    - Make finished surfaces smooth and uniform in appearance, without depressions that collect water.
    - Do not leave soil surfaces exposed in finished work; minimize the amount of time soil surfaces are left exposed.
    - If, after consideration of other performance requirements, options remain as to methods of finishing soil surfaces, the Air Force prefers:
      - Landscaping, rather than paving.

        - Water-pervious paving, such as unit pavers on pervious bed, rather than monolithic pavement.
    - Conceal unsightly site elements from view from the pedestrian walkways.
    - Substantiation:
        - Design Development: Site plans showing methods of achieving appearance requirements; renderings or sketches showing principal views described in requirements.

7.1.3 Health and Safety:

Safety:

- Inhibit:
    - The intentional passage of people across controlled access highways, except at intended roadway crossings.
    - The intentional driving of vehicles from adjacent public rights-of-way onto the site, except at intended roadway accesses.
    - The intentional driving of vehicles from roadways and parking areas onto pedestrian walkways and planted areas.
- Prevent:
    - The passage of people and dogs from the site onto the public right-of-way.
    - Access by unauthorized persons to outdoor areas containing electrical equipment that has exposed powered components.
    - Access to swimming pools and other water features as required by code.
- Substantiation:
    - Construction Documents: Identification of barrier location and type.
- Maximum Slopes:
    - Slopes with Smooth Pavement: 1:20, unless restricted to vehicular use.
    - Slopes Covered with Grass: 1:5, unless less than 3 feet (1 m) in height.
    - Slopes with Pedestrian-Inhibiting Vegetation: 1:2, unless less than 5 feet (1.5 m) in height.
    - Slopes With No Access From Top: Limited only by structural stability and resistance to erosion.
- Fire Sources: Design to minimize the danger of wildfires spreading to the site, by complying with NFPA 299.
- Substantiation:
    - Design Development: Identification of measures taken; review by authorities having jurisdiction.
- Vermin/Animal Control:

    - Prevent and eliminate standing water that could become stagnant.

- Physical Security:
    - Prevent passage of people and dogs between:
        - The site and adjacent properties.
        - The site and adjacent public rights-of-way.
        - SAMS Complex and remainder of site.
- Provide fixed mountings for securing of bicycles against theft.
    - Bicycle owner to provide lock and chain.
    - Allow for securing of 20 bicycles at each entrance.
- Substantiation:
    - Construction Documents: Identification of physical security measures and locations.

- Vehicular Safety: Comply with the code.
    - Provide visual barriers at extreme changes in elevation near roadways.
    - Provide tactile and visual warnings where pedestrian walkways cross or run adjacent to roadways.

7.1.4 Structure:

- Earthwork: Provide structural design in accordance with ANSI/ASCE 7 if not otherwise required by code.
    - Bearing Capacity: Under substructure, paving, and site structural elements, maintain natural bearing capacity or achieve or correct compaction as required to prevent uncontrolled subsidence or other movement.
- Substantiation:
    - Design Development: Engineering design of any structural fills required.

- Site Fixtures, Equipment, and Services:
    - Provide foundations or other mountings as required to support the completed and operational element permanently and safely and without uncontrolled subsidence or other movement.
    - Design structural elements in accordance with code.
    - Miscellaneous Site Structures with Floors or Roofs: Designed to comply with same requirements as building superstructure.
    - Substantiation: Same as required for superstructure.

7.1.5 Durability:

- Weather Resistance of Plants and Turf: Use plants that will withstand extremes of weather likely to occur in any 5 years without supplementary irrigation and without seasonal protection other than mulch.
    - Air Force agrees that maintenance to the level specified by the Design-

Builder will be necessary to assure survival of the plants.

- Exception: Supplementary irrigation is expected during new plant establishment period.
- Exception: Turf is required for lawns; supplementary irrigation as necessary to maintain health, growth, and appearance is required.
- Exception: Indoor plantings; recirculated water is required.
- Substantiation:
  - Design Development: Documentation of the historical extremes and duration of extremes in temperature, rainfall, and drought periods; proven-in-use documentation on major plant groups to be used, under similar site conditions in the same climatic region; length of time required for full establishment.
  - Construction Documents: Proven-in-use documentation of all plants used; proven-in-use data may be from actual nearby growing locations or from non-local nursery supplier having plants grown under same climatic conditions.
  - Closeout: Maintenance requirements of all plants used, for new plant establishment period and subsequent maintenance; length of establishment period for each type of plant.
  - Occupancy: Report of inspection of plants at end of spring, summer, fall, and winter, beginning with season immediately following planting.

- Soil Erosion Resistance: Comply with the code and the following:
- Maintain the existing site features that contribute to erosion resistance to the greatest extent possible.
  - Design to minimize soil erosion.
  - If erosion occurs during construction and within one year after completion, relocation or replacement of eroded soil and repair of eroded areas shall be performed by the Design-Builder at no cost to the Air Force.
  - If erosion occurs within one year after completion, provide improved erosion control measures within one week after notification by Air Force.

- Traffic Resistance: Provide finished site surfaces that are permanently resistant to the type of traffic to be expected, under all weather conditions.
  - Where vegetated surfaces will not withstand the anticipated traffic, provide pavement or other surfacing.
  - If vegetated surfaces are damaged due to traffic within one year after completion, replacement of vegetation with more durable materials shall be performed by the Design-Builder at no cost to the Air Force.
  - Vegetation and fencing may be used to discourage pedestrian traffic, if other functional requirements can be met.
  - Substantiation, Paving and Hard Surfacing:
    - Preliminary Design: Identification of types and thickness of pav-

ing and surfacing for various functions.
    - Design Development: Proven-in-use documentation of paving and surfacing consistent with types of traffic anticipated; manufacturer's data may be submitted for modular paving units.
    - Construction Documents: Engineering calculations, based on anticipated weights and intensity of traffic.

- Flooding:
  - Control storm water runoff as required to prevent damage to project elements, including vegetation, and to prevent damage to neighboring sites, including vegetation.
  - Prevent storm water runoff into public utilities in excess of actual capacity or amount allowed by public agencies, whichever is less, under conditions of the most extreme rainfall that might occur in 50 years.
  - Minimize increase in storm water runoff into rivers, streams, lakes, and other waterways and drainageways as required by authorities having jurisdiction.
  - Substantiation:
    - Design Development: Engineering design of site drainage, including drainage volume calculations.

- Vehicular Collision: Design to minimize the probability of vehicular impact on site fixtures and accidental driving on lawns and landscaped areas.

7.1.6 Operation and Maintenance:

- Water Conservation: Minimize water use.
  - Substantiation:
    - Design Development: Irrigation system design for required plant materials; estimated water use, by season and by year; explanation of conservation measures.
    - Construction Documents: Calculated water use based on final design and irrigation schedule.
    - Commissioning: Field verification.

7.2 <u>SUBSTRUCTURE</u>

7.2.1 PERFORMANCE

- Basic Function:
  - Provide substructure as required to support the completed and occupied building safely and without uncontrolled subsidence or other movement.
  - Substructure comprises the following elements:
    - Foundations: Structures responsible for transferring dead loads,

live loads, and environmental loads of completed building to the earth in such a way that the building is supported evenly and without movement.
    - Basements: Space-enclosing elements below grade, including necessary excavation, structural walls and floor, and other elements of enclosure such as waterproofing and thermal insulation.
    - Other Substructure Elements.

- Where substructure is integral with elements defined within another element group, meet requirements of both element groups.

7.2.2 Amenity and Comfort:

▪ Thermal Performance: Provide thermal resistance as necessary to maintain interior comfort levels specified and in accordance with code and the following:

- Average Thermal Transmittance: U-value of 0.15 IP (0.85 SI), maximum, for portions of substructure in contact with earth and enclosing conditioned space.
- Condensation: None on interior surfaces under normal interior temperature and relative humidity conditions, during 97-1/2 percent of the days in the coldest 3 months of the year.
- Minimum thermal performance values for individual substructure elements are also specified in other chapters.
- Substantiation:
    - Preliminary Design: Identification of major thermal resistant materials and systems.
    - Design Development: Detailed listing of design criteria and design analysis, prepared by licensed mechanical engineer.
    - Construction Documents: Product data on thermal materials and details of continuous thermal barrier.

- Water Penetration: Prevent ground water penetration into the interior of the building, under any circumstances.
    - Substantiation:
        - Preliminary Design: Identification of major water resistant assemblies and drainage features.
        - Construction Documents: Details of proven-in-use or proven-by-mock-up design.

- Water Accumulation: Prevent accumulation of water in crawl spaces or open areas adjacent to substructure.
    - Substantiation:
        - Preliminary Design: Identification of dewatering methods to be used.
        - Construction Documents: Details of proven-in-use or proven-by-mock-up design.

- Acoustical Performance: Limit sound transmission through substructure as follows:
  - Ambient Sound Level: Maintain ambient sound levels in enclosed, occupied substructure spaces within noise criteria (NC) ranges specified in 0 - Interiors during normal hours of occupancy.
  - Vibration Control: Use substructure elements that will not resonate at frequencies that are characteristic of ambient underground sound and vibration sources at the project site.
  - Minimum performance values for individual substructure elements are also specified in other chapters.

7.2.3 Health and Safety:

- Fire Resistance: Design and select materials to provide fire resistance in accordance with code.
  - For all elements required to have a fire resistive rating and which are not made of materials and systems specified as acceptable by the code, use proven-by-mock-up construction.
  - For proven-by-mock-up construction, acceptable testing agencies are Underwriters Laboratories Inc..
  - Minimum performance values for individual substructure elements are also specified in other chapters.
  - Substantiation:
    - Design Development: Identification of assemblies required to have fire resistance rating and method to be used to achieve rating.
    - Construction Documents: Identifying numbers on the construction drawings.
- Substance Exclusion: Prevent accumulation of harmful chemicals and gases such as radon and methane in spaces below substructure and subsequent penetration into occupied spaces.
- Vermin Protection: Provide permanent protection against infestation of construction by ground dwelling termites and other vermin.
- Flood Protection:
    - Areas Prone to Flooding and High Velocity Wave Action: Provide substructure supporting lowest habitable floor comprising columns or piers.
    - Substructure Enclosing Walls Below Flood Level: Breakaway type, designed to avoid damage to loadbearing elements of substructure.

7.2.4 Structure:

- Capacity: Provide loadbearing substructure members as required by code and designed to distribute dead loads, live loads, and environmental loads so that bearing capacity of soil is not exceeded.

- Extend bearing portions of substructure; not less than 4 ft (1.2 m) below grade.

▪ Dead Loads: Accommodate loads from weights of building materials, construction itself, and all fixed service equipment.

▪ Live Loads: Accommodate loads from use and occupancy of the building, either uniformly distributed loads as prescribed by code or concentrated loads, whichever are more demanding structurally.

- Uniformly Distributed Loads: 80 psf (3.96 kN/sq m).
- Uniformly Distributed Loads: As required by code for building occupancy.
- Concentrated Loads: As required by project program and building design, minimum 3000 lbs.

▪ Environmental Loads: Accommodate loads from all environmental forces in accordance with code and the following:

- Lateral Soil Loads: Lateral pressure of soil adjacent to vertical substructure elements, including potential surcharge from fixed or moving loads and potential hydrostatic pressure.
  - Increase lateral pressure assumptions if expansive soils have been identified by a geotechnical investigation, unless expansive soils are excluded from backfill.
- Earthquake: In accordance with requirements.
- Wind: Overturning forces attributable to design wind speed at project location applied to full building height.

▪ Substantiation:

- Proposal: Identification of major structural materials and systems.
- Preliminary Design: Soil investigation report, detailed listing of design criteria, and preliminary analysis, prepared by a licensed structural engineer.
- Construction Documents: Detailed design analysis by a State of California licensed structural engineer.

7.2.5 Durability:

- Corrosion Prevention: Provide supplementary protection for underground metal elements, sufficient to prevent corrosion completely for the service life of the element without maintenance.
  - 3 inches (150 mm) of concrete cover is considered to be permanent protection.
  - Provide cathodic protection if any of the following is true; coatings or wrappings will not be considered sufficient protection for elements falling under these criteria:
    - Metal elements are buried in a soil environment known to cause corrosion on similar nearby structures.

- Metal elements are buried in a soil environment in which stray DC electrical currents are present.

7.3 SHELL

7.3.1 PERFORMANCE

Basic Function:

- Provide permanently enclosed spaces for all functional areas shown in the project program, unless otherwise indicated. Provide a physical enclosure that keeps out weather, unwelcome people, animals, and insects without requiring specific action by occupants, while providing convenient movement of occupants between inside and outside, desirable natural light, and views from inside to outside. Provide level floor areas, comfortable ceiling heights, and essentially vertical walls.

- The elements forming usable enclosed space and separating that space from the external environment comprise the shell and consist of:
  - Superstructure: All elements forming floors and roofs above grade and within basements, and the elements required for their support, insulation, fireproofing, and firestopping.
  - Exterior Enclosure: All essentially vertical elements forming the separation between exterior and interior conditioned space, including exterior skin, components supporting weather barriers, and jointing and interfacing components; not including the interior skin unless an integral part of the enclosure.
  - Roofing: All elements forming weather and thermal barriers at horizontal and sloped roofs and decks, and roof fixtures.
  - Other Shell Elements.

- Exterior Surfaces Exposed to View: Surfaces visible from street or ground level, plus surfaces visible from windows of same building and adjacent existing buildings.

- Where shell elements also function as elements defined within another element group, meet requirements of both groups.

7.3.2 Amenity and Comfort:

- Thermal Performance: Provide construction that will have thermal resistance as necessary to maintain interior comfort levels specified and in accordance with code and the following:
  - Energy Efficiency
  - Condensation: None on interior surfaces under normal interior temperature and relative humidity conditions, during 98 percent of the days in the coldest 3 months of the year.
  - Components That Have Surfaces Facing Both Interior and Exterior

Environment: Condensation Resistance Factor (CRF) as required to meet requirement above, when tested in accordance with AAMA 1503.1.

- Minimum thermal performance values for individual shell elements are also specified in other chapters.
- Substantiation:
  - Preliminary Design: Identification of major thermal resistant materials and systems.

- Design Development: Detailed listing of design criteria and design analysis, prepared by licensed mechanical engineer.
- Construction Documents: Product data on thermal materials and details of continuous thermal barrier.

- Water Penetration: Design and select materials to prevent water penetration into the interior of the building, under conditions of rain driven by 50 mph (80 km/h) wind.

- Natural Ventilation: Design and construct shell to provide natural ventilation in accordance with code and the following:
  - Minimum Ventilation Opening Area: 8 percent of total floor area for each habitable room; not required for bathrooms, toilet compartments, closets, halls, or storage and utility spaces.
  - Ventilation Area: Minimum 10 percent of wall area for each floor equally distributed on two elevations.
  - Design ventilation to provide cross ventilation where possible.
  - Substantiation:
    - Proposal: Identification of spaces relying on natural ventilation with description of ventilation concept and required building elements.
    - Design Development: Drawings showing natural ventilation location, ventilation opening areas, and floor areas being served.
    - Construction Documents: Engineering design calculations and drawings prepared by licensed engineer.

- Acoustical Performance: Design and construct the shell to limit sound transmission as follows:
  - Ambient Sound Level: Maintain ambient sound levels in perimeter spaces within Noise Criteria (NC) ranges. Interiors during normal hours of occupancy.
  - Vibration Control: Use shell elements that will not resonate at frequencies that are characteristic of ambient exterior sound sources at the project site.
  - Minimum performance values for individual shell elements are also specified in other chapters.
  - Substantiation:
    - Proposal: Identification of exterior enclosure elements required as sound barriers and proposed methods of meeting requirements.

- Cleanliness of Exterior Surfaces: Design and select materials to:
  - Prevent attraction and adherence of dust and air-borne dirt and soot, and minimize appearance of settled dust and dirt.
  - Be washed reasonably clean by normal precipitation.
  - Prevent precipitation from washing settled dust and dirt over surfaces exposed to view.

- Appearance: Design and select materials to provide exterior appearance with characteristics as follows:
  - Compatible with adjacent buildings on same campus.
  - Matching the materials on the existing building or the Air Force's descriptions of the appropriate materials in Appendix A.
  - Providing a contemporary architectural style as described in Appendix A.
  - Concealing mechanical equipment, plumbing equipment, electrical equipment, and piping, conduit, and ducts from view from the street.
  - Substantiation:
    - Proposal: Concept drawings of proposed solution indicating overall building configuration, massing, scale, including sight line study from adjacent buildings and street, and relationship to surrounding buildings.
    - Preliminary Design: Drawings showing facade treatment for principal elevations identifying visible materials.
    - Design Development: Drawings and artist's rendering showing all building elements that are part of the shell with sizes and locations to scale.
    - Construction Documents: Details of building shell, annotated to show compliance with performance requirements.

- Ventilation of Special Spaces: Design and construct shell to provide outside air movement through enclosed shell volumes (such as SCIF spaces) in accordance with code.
  - Substantiation:
    - Proposal: Identification of volumes relying on natural ventilation with description of ventilation concept and required building elements.
    - Design Development: Drawings showing natural ventilation location, ventilation opening areas, and volumes being served.
- Explosion: Design and construct shell in mail delivery area(s) to provide relief from explosion hazards so as to minimize the effect on occupants and structural members per Air Force standards.

7.3.3 Structure:

- Structural Performance: Design and select materials to support all loads without damage due to loads, in accordance with code.

    - Special Loads: In addition to loads defined by code, design for loads from moving machinery, elevators, cranes, vehicles, and project Force Protection criteria.
    - Special Components: If design method is not specifically prescribed by code, design in accordance with ASCE 7.
    - Design and provide shell elements to resist loosening or detachment in winds equivalent to the code design wind speed.
    - Shell elements engineered by their manufacturer or fabricator, rather than by the engineer-of-record, shall comply with the following additional requirements:
        - Manufacturer/fabricator employs licensed structural engineer to accomplish design of structural elements.
- Substantiation:
    - Proposal: Identification of major structural materials and systems.
    - Preliminary Design: Detailed listing of design criteria and preliminary analysis, prepared by a licensed structural engineer.
    - Construction Documents: Detailed design analysis by a State of California licensed structural engineer.
    - Construction Documents: Detailed design analysis by a State of Californa licensed structural engineer (for structures engineered by their manufacturer or fabricator, engineer-of-record may provide detailed design criteria, with design analysis postponed until construction stage).
    - Construction: For structures engineered by their manufacturer or fabricator, detailed design analysis prepared by and shop drawings stamped by a licensed structural engineer, with approval of engineer-of-record recorded.

- Construction Loads and Erection Stresses: Accommodate temporary construction loads and erection stresses during construction.

7.3.4 Durability:

- Service Life Span: Same as building service life, except as follows:
    - Load-Bearing Structural Members: Minimum of 100 years.
        - No anticipated deterioration when protected as specified.
        - Protective Elements: Minimum 25 years.
    - Wall Primary Weather-Barrier Elements: Minimum 50 years functional and aesthetic service life, excluding joint sealers.
    - Joint Sealers: Minimum 20 years before replacement.
    - Surfaces Exposed to View: Minimum 20 years aesthetic service life; in addition, deterioration includes color fading, crazing, and delamination of applied coatings.
    - Roof Covering Weather-Barriers: Minimum 20 years, fully functional.

- Water Penetration: Design and select materials to prevent water penetra-

tion into the interior of shell assemblies as described by code.

- Weather Resistance: Design and select materials to minimize deterioration due to precipitation, sunlight, ozone, normal temperature changes, salt air, and atmospheric pollutants.
  - Deterioration includes corrosion, shrinking, cracking, spalling, delamination, abnormal oxidation, decay and rot.
  - Surfaces Exposed to View: Deterioration adversely affecting aesthetic life span includes color fading, crazing, and delamination of applied coatings.
  - Joint Components and Penetration Seals: Capable of resisting expected thermal expansion and contraction; use overlapping joints that shed water wherever possible.
  - Transparent Elements (Glazing): No haze, loss of light transmission, or color change, during entire expected service life.
    - Test Criteria: Less than 1 percent change in haze, transmission, and color over 2 years exposure, when tested after natural exposure conditions or accelerated light and water conditions simulating natural exposure at project, in accordance with ASTM D 1003; accelerated exposure documented with comparison to natural conditions.
  - Service Temperature: Low temperature equal to historically-recorded low; high temperature equal to that expected due to any combination of air temperature and heat gain from solar and other sources.
  - Freeze-Thaw Resistance: Adequate for climate of project.
  - Corrosion Resistance: In locations exposed to the outdoor air or in potential contact with moisture inside shell assemblies, use only corrosion-resistant metals as defined in this chapter.
  - Ozone Resistance: Do not use materials that are adversely affected by ozone.
  - Substantiation:
    - Proposal: Identification of weather-exposed elements and proposed materials.
    - Design Development: Details of proven-in-use materials and test reports.

- Impact Resistance: Design and select materials to resist damage due to impact in accordance with code.

- Moisture Vapor Transmission: Design to prevent deterioration of materials due to condensation of moisture vapor inside assemblies.

7.4 SERVICES

7.4.1 PERFORMANCE

Basic Function:

- Provide the following services:
  - Water and Drainage: Means of delivery of water to points of utilization; automatic heating and conditioning of domestic water; and unattended removal of water, rainwater, and liquid waste.
  - HVAC: Artificial means of maintaining interior space comfort and air quality, including heating, cooling, ventilation, and energy supply.
  - Electrical Power: Energy to operate all electrically-operated devices, including those included under other services and those provided separately by the Air Force.
  - Artificial Lighting: Means of illuminating spaces and tasks, both interior and exterior, independent of reliance on natural light.
  - develop shall recommend appropriate methane gas containment, collection, or mitigation as they determine is required by site conditions.

- Utility Sources and Outlets:
  - Water Source: Existing public utility. Work with the LA Air Force Base and the City of El Secundo as necessary to coordinate required service for this project.
  - Sewage Disposal: Connect building sewer to the existing public sewage system. Work with the LA Air Force Base and the City of El Secundo as necessary to coordinate required service for this project.
  - Rain Water Drainage Outlet: Existing site storm drainage system independent of sanitary sewer..
  - Electrical Power Source: Existing site utility.
  - All utilities shall be connected to on-site mains. If developer determines that additional capacity is required, be responsible for capacity, costs for providing additional capacity, including utility permits and connection fees.

  - Equipment That is Not Part of Services Systems: Specified in the project program.

- Where services elements must also function as elements defined within another element group, meet the requirements of both element groups.
  - Where services elements are located outside the building in the site area, meet applicable requirements.
    - The terms 'offeror", "design/builder", and "developer" will be considered equivalent and used interchangeably.

7.4.2 Amenity and Comfort:

- Artificial Illumination: Provide illumination for all interior spaces that is adequate in level and quality for comfortable performance of tasks typical for each space, regardless of the availability of natural light.
  - Light Levels: Provide maintained ambient illuminance values for various activities that are within the ranges specified in the IESNA Lighting Handbook. In addition comply with Title 24.

- Accent Lighting: In addition to general and task illumination, provide lighting on architectural features, displays, and artwork in focal areas to produce luminances that are within the range of 5:1 with respect to ambient background.
- Substantiation:
  - Design Development: Overall lighting scheme, including types of luminaires and lamps for primary spaces.
  - Construction Documents: Calculations of illuminance levels for representative spaces, prepared by a registered electrical engineer.
  - Construction: Measurements of luminance and illuminance levels for representative spaces throughout the project, with a report setting forth results after correcting for maintenance factors keyed to luminaire design and lamp types.

- Equipment Producing By-Product Heat: Ventilate housings and cabinets as required by equipment manufacturer and rooms and spaces as required to maintain specified environmental conditions.

- Moisture: Prevent condensation from forming on service elements.

- Airborne Sound:
  - Maintain the sound transmission characteristics of assemblies through which services must pass; comply with requirements of chapter where penetrated assembly is specified.
  - Prohibited Plumbing Noises: All sounds of flushing and of liquid running through pipes ("bathroom sounds") are prohibited outside of the rooms housing toilets, bathtubs, and showers, with the exception of when doors to those rooms are open.
  - Equipment Noises: Noise level below that which will be objectionable, based on occupancy of spaces.
  - When services are located within assemblies that perform sound isolation functions, consider the noise produced by the service itself as one of the external sound sources.

- Structure-Borne Sound and Vibration: Prevent transmission of perceptible sound and vibration from services equipment that rotates, vibrates, or generates sound, by isolating such equipment from superstructure or by isolating equipment support foundations from building foundations.
  - Substantiation:
    - Preliminary Design: Identification of sound- and vibration-generating equipment and method of isolation.
    - Construction Documents: Details of isolation methods.
    - Closeout: Measurement of sound transmitted through structure during functional performance testing and during full operation of all systems.

- Cleanliness: Prevent accumulation of debris and dirt at floor mounted equipment, such as air handlers, chillers, pumps, switchgear, and panel-

boards by one or more of the following methods.
  - Provide 4 inch (100 mm) thick, concrete housekeeping pads.
  - Provide corrosion-resistant equipment stands.

- Odors: Eliminate, isolate, or exhaust odors produced by occupant functions and building services.

- Appearance:
  - Conceal services elements from view to greatest extent possible, with exposed portions of simple, neutral design and color.
    - Exception: Standard designs of manufacturers, without consideration for appearance, may be used for fire suppression sprinkler heads.
    - Exception: Exposed portions are acceptable in SU1, SU2, SV1, and SV3 areas.
    - Where exposed portions are acceptable, do not obstruct or diminish clear dimensions of doorways, windows, other operable openings, access panels and cabinet doors, or passageways, stairs, and other exitways.
    - Where exposed piping is acceptable, install it close to walls and overhead structure, parallel and square to finished construction, plumb and nominally horizontal (except where required to slope for drainage).
- Cover annular spaces around pipes, ducts, and conduits, where they pass through walls, ceilings, and floors with escutcheons or cover plates.
  - Exception: Escutcheons not required in SU1, SU2, and SV1 areas, provided annular spaces are filled completely.
- Mountings: On finished surfaces, use concealed attachments with cover plates, frames, or trim overlapping finishes.

7.4.3 Health and Safety:

- Fire Safety:
  - Maintain fire resistance of walls, floors, ceilings, and other fire-rated assemblies that services must pass through, in accordance with requirements of the chapter in which the fire-rated assembly is specified.
  - Provide fire-rated separations between equipment rooms and other spaces where required, and as specified by, the code.
  - Combustible pipes may be used only where buried if outside building.
  - Substantiation for Combustible Materials, Where Allowed: UL listed or labeled, with flame spread and smoke developed ratings printed on product.
  - Provide products which are fire rated for the specific locations where they are installed.
  - The fire protection (sprinkler) zones, the fire alarm zones, the life safety zoning, the mechanical fire and fire and smoke damper loca-

tions, the architectural rated wall design, the smoke evacuation system, etc. will all coincide into a single set of compartmentalization for the entire project. All the systems will incorporate electronic detection (if they do not already) and interface with the Building Automation System. Specifically all points of the fire alarm system, all alarm points of the fire protection system, the status of the fire and fire and smoke dampers (ready or released), and all the points of the smoke evacuation system will become interfaced with the BAS.

- Safety Hazards: Avoid safety hazards wherever possible; where services must involve flammable materials or hazardous operations, comply with code.
- Excess Pressure: Design pressurized components to withstand operational pressures without failure and to relieve or reduce excessive pressure to prevent failure.
- Misuse: Minimize misuse that could result in damage to property, injury, or loss of life.
- Electric Shock: Provide equipment which protects personnel from electrical shock.
- Toxic Materials:
  - Lead: Do not use lead or lead-containing materials in potable water systems.
  - Lead: In solid materials (including pipe), maximum lead content of 8 percent; in solders and flux, maximum lead content of 0.2 percent.
- Vermin Resistance: Use components that are resistant to the entry of rodents and insects.
- Flooding: Flood zone applicability.

7.4.4 Structure:

- Supports for Piping, Conduit, Ducts, and Components: Attached to, and supported by, the superstructure, not to or by non-structural construction or sheet metal elements, so that they do not move or sag, using the following:
  - Supports that allow movement of the rigid linear elements (pipe, etc.) without undue stress on the piping, tubes, fittings, components, or the superstructure.
  - Intermediate supports mounted between structural members to limit distance between supports.
  - Supports capable of handling seismic forces in accordance with the code.
  - Mounting frames, bases, or pads, designed for ease of anchorage or mounting.

- Rigid sway bracing at changes in direction of more than one-half of a right-angle, for all pipes.
- Substantiation:
- Design Development: Details of supports, including engineering analysis.

- Structural Design of Components and Their Supports: In accordance with code.
  - Safety Factor for Component Structural Elements: Two; based on weight (mass) of component.
  - Anchors: Securely and positively attach all services components to superstructure.

- Concealed or Buried Components: Design cover or concealment so that components are not subjected to damaging stresses due to applied loads.

7.4.5 Durability:

- Expected Service Life Span: Same as the service life of the building, except as follows:
  - Ducts, Piping, and Wiring in All Services: Same as the service life of the building.
  - All Components Permanently Installed Underground or Encased in Concrete: Same as service life of building.
  - Conveying Systems: Minimum 20 years.
  - Plumbing:
    - Shut-Off Valves and Similar Components: Same as service life of building.
    - Electrically- and Fuel-Operated Equipment: Minimum 20 years.
    - Other Moving Components: Minimum 20 years.
    - Plumbing Fixtures: Same as building service life.
    - Sink Faucets, But Not Other Fittings: Minimum 10 years.
  - HVAC:
    - Shut-Off Valves: Minimum 10 years.
    - Dampers, Louvers, Registers, Grilles: Same as service life of building.
    - Main Heat Generation and Cooling Equipment: Minimum 20 years.
    - Secondary Equipment: Minimum 10 years.
    - Control Components, Except Wiring: Minimum 10 years.
  - Fire Protection:
    - Sprinkler Heads, Valves, and Other Inlet and Outlet Components: Same as building service life.
    - Pumps and Other Operating Components: Minimum 20 years.
    - Fire Hoses: Minimum 20 years.
  - Electrical:

        - Power Distribution Equipment: Same as building service life.
        - Power Generation Equipment: Minimum 20 years.
        - All Components of Life Safety-Related Systems: Minimum 20 years.
        - Control Components, Except Wiring: Minimum 10 years.
    - Lighting Fixtures: Minimum 15 years.
    - Telecommunications Systems: Minimum 10 years.
    - Integrated Facility Controls: Minimum 15 years.
    - Security and Surveillance Controls: Minimum 15 years.
    - Lightning Protection and Special Grounding Systems: Same as building service life.
    - Software and Firmware Integral to Operation of Services Equipment: Minimum 20 years functional life without reprogramming required, and specifically, unaffected by millennium date changes.

- Weather Resistance:
    - All components exposed to outdoor environment must comply with applicable codes; equipment enclosures are considered the equivalent of the exterior enclosure.
    - Liquid Storage and Distribution Components: Prevent freezing during longest duration of low temperature anticipated, based on historical weather data; if necessary, provide automatically controlled supplemental heating.
    - Services Passing From Inside to Outside: Openings through shell sealed as required to meet performance specified.

- Condensation: Provide insulated drain pans and piping to remove condensation from cooling coils.

- Moisture Resistance: Where components are mounted to surfaces that are required to be moisture-resistant, seal mounting surface of components to finish surface so that moisture cannot penetrate under or behind component, using material that is not affected by presence of water, that is mildew-growth resistant, and that has a minimum service life of 10 years.

- Temperature and Humidity Endurance: Design equipment to endure temperature and humidity that will be encountered and to resist damage due to thermal expansion and contraction.

- Corrosion Resistance: Prevent corrosion by using corrosion-resistant materials, by preventing galvanic action, by preventing contact between metals and concrete and masonry, and by preventing condensation on metals.
    - Metals Considered Corrosion-Resistant: Aluminum, stainless steel, brass, bronze, cast iron, ductile iron, malleable iron, hot-dipped galvanized steel, chrome-plated steel, cadmium-plated steel, and steel coated with high-build epoxy or coal tar-based paint.
    - Piping Connections for Piping of Dissimilar Metals: Dielectric adapters.

- Underground Elements: Provide supplementary protection for underground metal pipes, ducts, conduits, and tanks, sufficient to prevent corrosion completely, for the service life of the element without maintenance.
    - 3 inches (150 mm) of concrete cover is considered to be permanent protection.
    - Bituminous or other waterproof coating or wrapping is considered permanent protection unless cathodic protection is required and unless underground element is subject to movement due to structural loads or thermal expansion or contraction.
    - Provide cathodic protection if any of the following is true; coatings or wrappings will not be considered sufficient protection for elements falling under these criteria:
        - Metal elements are submerged or buried in a soil environment known to cause corrosion on similar nearby structures.
        - Metal elements are submerged and buried in a soil environment in which stray DC electrical currents are present.
        - Metal piping carrying petroleum products or other hazardous or toxic materials is buried or otherwise installed without means of visual observation of entire exterior surface of piping.
        - Metal tank holding petroleum products or other hazardous or toxic materials is buried or otherwise installed without means of visual observation of entire exterior surface of tank.

- Accidental Water Leakage: Locate components that would be damaged by water leakage from pipes or through foundations or roof out of likely paths of water and at least 4 inches (100 mm) above floor level.

- Abuse Resistance:
    - Buried Components: Minimum of 12 inches (300 mm) below surface of ground.
    - Underground Piping and Conduit: Watertight and rootproof.
    - Finishes on Exposed Components Subject to Touching by Occupants: Durable enough to withstand regular scrubbing using ordinary methods.
    - Provide equipment which has been designed to prevent tampering.

- Accidental Damage: Protect equipment and piping from accidental damage.

- Underground Piping Accidental Damage: Protect heating piping and chilled water piping from accidental damage with a warning tape buried 12 inches (300 mm) above the pipe.

7.4.6 Operation and Maintenance:

- Capacities defined as follows:
    - Conveying Systems: As specified in the project program.

- Water and Drainage: As required by code.
- Heating, Cooling, and Ventilating: Maintain interior environment within ranges specified.
    - Design HVAC to provide partially redundant systems with sufficient extra capacity to carry the entire load during maintenance and failures. Specific equipment sizing as defined.

- Fire Suppression: As required by code.
- Electrical: As required by code.
    - Power: Non-interruptible power supply.
- Substantiation:
    - Proposal: Description of systems required, sources, input-side capacities, and means of distribution.
    - Design Development: Engineering calculations showing input- and output-side capacities and loads and sizes of distribution elements.
    - Construction Documents: Complete system details.
    - Construction and Closeout: Functional performance testing.

- Ease of Use:
    - Access: All mechanical and electrical equipment located to allow easy access. Provide access doors for equipment accessed through walls, partitions, or fixed ceilings. Mechanical rooms should be placed on the ground floor level.
    - Valves and Other Control Devices: Accessible handles, switches, control buttons; valve handles on top/upper side; chain or other remote operators where located out of normal reach above floor level in SU1 and SU2 spaces.
    - Space Around Components: Working clearances and access routes as required by code and as recommended by component manufacturer.
    - Testing: After completion of installation, prepare services for starting-up by testing appropriately for proper operation.
    - Commissioning: As part of the Project Quality Assurance program, commissioning will represent the establishment and implementation of QA procedures across all phases of the Project. The commissioning authority will be the Air Force or his designee and will plan, coordinate, witness, and approve the QA process throughout the Project. The Developer is responsible for the design and construction, installation completion, and system troubleshooting of all building systems. In addition the Developer shall demonstrate all building systems verifying their performance and their collective interaction. Specifically during the construction and acceptance phases. The Developer shall prepare building for Air Force use by eliminating operational anomalies, adjusting control systems for optimum operation, and demonstrating proper equipment and system performance. The GSA/DOE Commissioning Guide defines the commissioning process and the functional performance verifications (demonstrations). The Developer, therefore,

shall consider the Guide an adopted criterion for this Project.

- Substantiation:
  - Proposal: General outline of commissioning procedures and responsibilities of the parties.
  - Design Development: Identification of systems and equipment to be tested and method of test.
  - Construction Documents: Complete the performance verification test demonstration and training portions of the commissioning plan.
  - Construction Phase: Provide draft copies of O & M manuals within 180 days of construction commencement. The developer, the design team, and the commissioning authority will then review and return these with comments and edits. No later than 180 days prior to substantial completion, the final submission of the O & M's will be due. Submit O & M's both as an electronic copy and in hard copy. Complie electronic copy entirely in Abode Acrobat complete with a Table of Contents. Submit electronic copy on a CD (or CD's).
  - Acceptance and Closeout: Complete all performance verification demonstrations and submit reports to the commissioning authority. Invite the Air Force operating staff to participate, at their discretion, during the verification demonstrations as an initial introduction to their formal training of the equipment and systems.
  - Post-occupancy: Perform all seasonal verification demonstrations that could not be conducted during the time of project completion and occupancy.
- Preparation for Operation: Provide assistance for the Air Force 's preparations for operation, as follows.
  - Demonstration of all services to Air Force personnel is required for verification of the intended performance of the associated equipment and systems. Retesting and subsequent demonstrations, in the event performance does not meet intent, will be necessary until developer can successfully demonstrate compliance with Project intent.
  - Training Air Force personnel in the operation of all service systems.
    - Coordinate with Air Force staff in order to provide training as necessary in order to include personnel that work on second and third shifts.
    - Provide the Air Force with videotape records of the training sessions in order to that the Air Force may train future staff that become employed or site located following the physical completion of the Project.
- Substantiation:
  - Construction Documents: Schedule of demonstrations.
  - Construction Documents: Training plan and schedule.

        - Acceptance and Closeout: Documentation of training conducted.

- Ease of Cleaning: Where not otherwise specified, design equipment mountings to allow easy cleaning around, and under, equipment, if applicable, without crevices, cracks, and concealed spaces where dirt and grease can accumulate and with raised, closed bases for equipment mounted on the floor.
    - Provide equipment with removable access panels to allow cleaning.

- Ease of Maintenance and Repair:
    - Piping Other Than Gravity Drains: Provide means of isolating convenient portions of piping system, so that small portions may be shut down leaving the remainder in operation and so that drainage of the entire system is not required to enable repair of a portion of it.
    - Piping: Entire systems drainable without disassembly of piping.
    - Above Ground Piping: Labeled to identify contents and direction of flow, each shut-off valve, each piece of equipment, each branch take off, and at 20 ft (6 m) maximum spacing on exposed straight pipe runs.
    - Equipment in Piping Systems: Each unit provided with a union or flanged connector at each pipe connection to allow easy removal.

- Ease of Equipment Service:
    - Lighting: Adequate for locating and operating equipment; emergency lighting for critical components.
    - Do not locate any equipment requiring maintenance on the roof, in attics, in crawl spaces, where access must be through attics or crawl spaces, or where access is not possible using removable panels or doors.
    - Rooftop Equipment: Of type that is serviceable by relatively quick replacement of parts, minimizing time required on roof, and eliminating need to perform repair work in the weather.
    - Parts Having Service Life Less Than That Specified for Element: Easily replaceable, without de-installation or de-mounting of the entire element, component, or equipment item.
    - Valves: Easily replaceable internal parts, eliminating necessity of removal of entire valve for repair.
    - Parts: Readily available from stocking distributors within 50 miles (80 km) of project location.
    - Substantiation:
        - Construction Documents: Identification of parts normally replaced during routine maintenance and parts replaced only when damaged or unexpectedly worn out; location of stocking distributors.

- Ease of Equipment Removal: Provide doors and corridors large enough for removal of major pieces of equipment, such as, chillers, and boilers.
- Substantiation:
    - Preliminary Design: Identify locations of major pieces of equipment.

- Design: Submit the measurements of the major pieces of equipment and the path for removal from the building. Verify doors and corridors provide adequate clearance for removal of equipment.
- Construction Documents: Indicate sizes of doors and corridors used for removal of equipment. Indicate equipment sizes.

7.5 WATER AND DRAINAGE

7.5.1 PERFORMANCE

Basic Function:

- Provide delivery of hot and cold domestic water to points of utilization and the removal of water, rainwater, and liquid waste. Where any conflict or ambiguity seems apparent between the directions and/or definitions as described herein and Appendix A view the directions and/or definitions of Appendix A as having precedence. Furthermore, for issues described as having to be "Considered" in one document and "Required" in another, the term "Required" shall have precedence.
  - The terms 'offeror", "design/builder", and "developer" will be considered equivalent and used interchangeably.
- Water and drainage elements comprise the following:
  - Water Supply: Water sources and storage.
  - Plumbing Fixtures: All fixtures necessary for sanitation, occupancy, and use, that are connected to water supply or drainage; not including water heating or conditioning equipment or kitchen appliances.
  - Domestic Water: All elements required to distribute water to fixtures, including piping and equipment for water cooling, heating and storage.
  - Sanitary Waste: All elements required for removal of sanitary waste, including piping, venting, discharge and disposal, and equipment.
  - Rain Water Drainage: All elements required for drainage of rain water from building areas in which it may accumulate and drainage of clear wastes from building services; not including gutters and downspouts or subdrainage (A).
  - Other Water and Drainage: Services elements required for swimming pool water supply, treatment, and drainage, fountains water supply, drainage, and decorative water effects, and supplementary drinking water
- Where plumbing elements also must function as elements defined within another element group, meet the requirements of both element groups.

7.5.2 Amenity and Comfort:

- Hot Water Supply:
  - Provide pressure balanced shower valves which limit the water tem-

perature to 120 deg F 49 deg C).
    - Provide a master thermostatic mixing valve which limits the hot water supply temperature to 120 deg F 49 deg C).

- Noise:
    - Design to prevent noise due to air trapped in piping systems.
    - Locate risers in dedicated and sound attenuated chases.
    - Minimize noise produced by fixtures.

- Convenience:
    - Fixture Heights: As specified in code.
    - Fixture Configurations: As specified in code.
    - Water Connections: Hot water on the left side of fixtures and cold water on the right side of fixtures.

- Odors:
    - Locate odor producing elements in areas separate from human occupancy in dedicated equipment rooms.
    - Do not locate sanitary waste vent openings where odors are noticeable by occupants or by occupants of adjacent properties or where odor-bearing air may enter building spaces.
    - Connect fixtures to prevent entry of sewer gases into occupied spaces.

- Appearance:
    - Vents: Conceal vents from view.

7.5.3 Health and Safety:

- Health: Provide potable water.
    - Public utility water can be considered to be potable.

- Waste Disposal: Connect each fixture to sanitary drainage system for proper disposal of waste and harmful materials.

- Pressure Control: Control pressures to protect the building, fixtures, equipment, and occupants from harm.
    - Maximum Water Distribution Working Pressure: 80 psi (550 kPa).
    - Pressure Reduction: Use pressure reducing valves or regulators.
    - Air Removal: Remove air trapped in water distribution system.

- Prevention of Sewer Gas Leaks:
    - Provide waste system vents as required by code to avoid trap siphonage or compression.
    - Prevent entry of sewer gases from the sanitary sewer into building's sewer system.

- Protection of Potable Water Supply: As required by code.

- Waste Drainage: Provide food handling equipment, food storage equip-

ment, commercial dishwashing, drinking fountains, and water coolers with indirect waste pipe for drainage.

- Burn Hazards:
  - Maximum Fixture Discharge Temperature: 120 degrees F (49 degrees C).
  - Maximum Exposed Surface Temperature: 105 deg F (40 deg C).
- Fire Hazards:
  - Do not use combustible piping materials inside the building.
    - Terminate combustible piping entering the building within 5 feet (1.5 m) of penetration.
- Hazard Labeling: Clearly label domestic hot water, domestic cold water, rain water drainage, and sanitary waste and vent systems indicating the nature of contents and direction of flow.
  - Conform to requirements of ANSI/ASME 13.1.
- Hazardous Material Drainage: Prevent damage to public utility drainage systems by removing or neutralizing hazardous materials before discharging.

7.5.4 Structure:

- Insulated Pipes: Prevent compression of insulation by using pipe shields or saddles or dense insulation inserts.

7.5.5 Durability:

- Joint Durability: Provide watertight joints.
- Electrical Component Protection:
  - Do not route piping through electrical rooms, switchgear rooms, transformer vaults, and elevator equipment rooms unless it is absolutely necessary.
    - Where piping must be routed near electrical equipment, shield the electrical equipment with drip pans which drain to the nearest floor drain.
  - Substantiation: See tests specified under Operation and Maintenance.
- Equipment Protection:
  - Domestic Water Distribution System: Provide a filtration device upstream of equipment which may be damaged by debris in the distribution system.
- Maximum Discharge Temperature into Sewer: 120 degrees F (49 degrees C).

7.5.6 Operation and Maintenance:

- Capacity of Water Service: Provide adequate water flow and pressure to supply peak demand requirements. Comply with requirements specified in the code.
    - Water Delivery: If the water source has insufficient flow or pressure, provide means of increasing to required level.
    - Use booster pumps or elevated storage tanks.
    - Provide hot water return loops with return pumps at a minimum of 2 per floor for continuous hot water delivery and ease of operation and maintenance. Propose the most effective and economic sizing, location, and quantities as deemed necessary for the specific requirements of each area served.
    - Substantiation:
        - Design Development: Identification of pressure and flow requirements (design conditions) for the building; verification of source availability at design conditions.
        - Construction Documents: Equipment to be used to deliver water at design conditions; submit pump curves.
        - Construction: Test of system flow and pressure; submit report verifying performance.
    - Water Flow:
        - Maximum Velocity: 8 fps (2.4 m/s) at the design flow rate.
        - Provide shock absorber devices, not air cushions, at each fixture group line up, both flush valve fixtures and lavatories.
    - Water Supply Pressures:
        - Service Main Working Pressure: 100 psi (690 kPa) at 75 deg F (24 deg C). Verify capabilities of existing site utility loop.
        - Water Distribution Working Pressure: 80 psi (550 kPa) at 75 deg F (24 deg C).
    - Substantiation:
        - Preliminary Design: Analysis and documentation of water supply source and flow conditions.
        - Design Development: Piping design calculations and entrance locations.
        - Construction: Prior to installation of plumbing fixtures and prior to concealment of piping, air and water tests of piping systems at 110 percent of operating pressure, maintaining pressure for 2 hours to demonstrate system is watertight.
        - Construction: Functional tests of fixtures and equipment.
        - Occupancy: Observation of function during full occupancy simulating extreme conditions.

- Waste Pipe Sizing:
    - Size piping as required by code.
    - Building Drain: 4 inches (100 mm) diameter, minimum.
    - Buried Piping Below Slabs: 3 inches (75 mm) diameter, minimum.

- Pipes 3 inches (75 mm) in Diameter and Smaller: Sloped at 1/4 inch per foot (1:50), minimum, downward in the direction of flow.
- Pipes 4 inches (100 mm) in Diameter and Larger: Sloped at 1/4 inch per foot (1:50), minimum, downward in the direction of flow.
- Substantiation:
  - Preliminary Design: Analysis and documentation of sewer discharge method and locations.
  - Design Development: Drainage design calculations and documentation of piping outlets.
  - Construction: Air and water pressure tests of piping systems; functional tests of drains and equipment under simulated full occupancy loads.
  - Occupancy: Observation of function during full occupancy simulating extreme conditions.

- Rain Water Drainage Capacity: As specified in the code and as follows:
  - Design Rainfall Rate: Short storm intensity of 1 inch (25 mm) in any 5 minute period. Verify standard design conditions for region.
  - Secondary Drainage: Required for roofs and exterior structural decks that do not drain naturally. Provide secondary roof drains connected to a secondary drainage system.
  - Substantiation:
    - Preliminary Design: Analysis and documentation of rain water discharge methods and locations.
    - Design Development: Drainage design calculations and documentation of piping outlets.
    - Construction: Air pressure test to verify continuity of piping; functional tests of each drain.
    - Occupancy: Field observation of performance during at least two storms.

- Ease of Maintenance and Repair:
  - Provide devices at each branch take-off which allow insertion of measurement devices to monitor flow and pressure levels in the water distribution system.
  - Isolation of Piping Segments and Equipment: Provide a means of isolating the following:
    - Each building from main water service. Provide a shut-off valve located inside a valve box whose removable access cover is at grade level.
    - Water meter from building piping.
    - Each tenant space from building service, excluding locations where there is only one fixture with its own isolation valves.
    - Each water branch from main service.
    - Each vertical riser from piping below.
    - Each water branch to fixtures or equipment from main vertical

riser.
    - Piping lower than the supply, to prevent unnecessary draining in the case of disconnection.
    - Each plumbing fixture, storage tank, and item of equipment, so that removal of one will not necessitate shutdown of others.
    - Individual fixtures and equipment. Provide an isolation device within 3 feet (900 mm) of pipe connection to item.
- Provision for Drainage of Water Distribution Piping:
    - Slope Piping Toward Drain: 1/4 inch per 10 feet (1:500).
    - Provide a system drain at the lowest point in the system.
    - Provide an adequately sized drain for the volume of water inside the distribution system.
    - Drain valve (or fixture shut-off valve) located at each low point.
- Provision for Cleaning of Drainage Piping: Provide a cleanout as required by code and as follows:
    - At the upstream end of each horizontal sanitary drainage pipe, for cleaning in direction of flow.
    - At the dead end of each dead-end pipe.
    - Pipe 3 inches (75 mm) and Smaller: At intervals of 50 foot (15 m), maximum.
    - Pipe 4 inches (100 mm) to 6 inches (150 mm): At intervals of 80 foot (24 m), maximum.
    - Pipe 8 inches (200 mm) and Larger: At intervals of 100 foot (30 m), maximum.

7.6 Architectural and Engineering Requirements

7.6.1 INTERIORS

PERFORMANCE

- Basic Function:
    - Provide appropriately finished interiors for all spaces indicated in the program, equipped with interior fixtures as required to function properly for specific occupancies.
    - Interiors comprise the following assemblies:
        - Interior Construction: All elements necessary to subdivide and finish space enclosed within the shell, including applied interior surfaces of the exterior enclosure.
        - Interior Fixtures: All elements attached to interior construction that add functionality to enclosed spaces, except for elements classified as equipment or services fixtures.
    - Provide physical separation between spaces, constructed to achieve

fire ratings required by code, appropriate security between adjacent spaces, and visual, acoustical, olfactory, and atmospheric isolation as necessary to maintain desirable conditions in each space.

- Provide finishes for interior surfaces that are appropriate for the functions of each space.
- Provide interior fixtures that are necessary for the proper functioning of each space.
- Where interior elements also must function as elements defined within another element group, meet requirements of both element groups.
- Reference Documentation: In addition to the requirements of this chapter, comply with all applicable requirements.
  - Where any conflict or ambiguity seems apparent between the directions and/or definitions as described herein and Appendix A, view the directions and/or definitions of Appendix A as having precedence. Furthermore, for issues described as having to be "Considered" in one document and "Required" in another, the term "Required" shall have precedence.

7.6.2 Amenity and Comfort:

- Natural Ventilation: Design and construct interiors to permit air movement between exterior openings positioned to enhance warm weather thermal comfort of occupants in all major spaces.
  - SR1 (Sanitary Facilities), SS (Storage), SV (Vehicular), SC (Circulation), and SU (Utility, Building Services) spaces are exempt from natural ventilation requirements.
  - Substantiation:
    - Proposal: Information on overall building configuration that will permit natural ventilation of all major spaces.
    - Design Development: Engineering calculations for representative spaces, predicting anticipated air movement under weather conditions typical for project site.
    - Construction: Field test of natural air movement, verifying compliance with predicted design performance.
  - View: Provide views to the building exterior or interior atria from most locations within primary interior spaces, especially the customer contact and occupant work areas.

  - Acoustical Performance:
    - Background Noise: Provide interiors that maintain ambient sound levels in primary spaces within the following Noise Criteria (NC) ranges, as defined in ASHRAE HVAC Applications Handbook, when adjacent spaces are occupied and are being used normally:

- Odor Control: Prevent unpleasant, dangerous, or noxious odors generated within a space from affecting occupants of adjacent spaces, by providing physical isolation of the spaces, separate ventilation, or a combination of isolation and ventilation.
- Appearance: Provide interiors that are pleasing in appearance and do not detract from the primary functions performed in each space.
    - Provide proposed interior finishes (selections, manufacturers, palette, materials, durability, special requirements, etc.) with interim design submittals for Air Force review and approval prior to incorporation into the final design.
        - Texture: Provide interior elements and surfaces that are textured appropriately for primary functions to be accommodated within each space.

7.6.3 Health and Safety:

- Egress: Provide egress from all interior spaces in accordance with code.
- Fire Resistance: Design and select materials to provide fire resistance in accordance with code.

7.6.4 Structure:

- Structural Performance: Provide interior construction and fixtures to support without damage all loads required by code.

7.6.5 Operation and Maintenance:

- Cleaning: Provide interior construction and fixtures that will not be damaged by ordinary cleaning and maintenance operations.

7.6.6 Facility Finish Levels

- The finish levels within the SAMS Complex will vary depending on the use and function of the workspace. The following table depicts the minimum trim components associated with each finish level.

Table 6.2.1-1 Finish Level Trim Components

Finish Level	Fabric Wall Covering	Painted Gypsum Board	Vinyl Wall Covering	Ceramic Tile Walls	Vinyl Baseboards	Wood Baseboards	Ceramic Tile Base	Carpet	Vinyl Tile Floor	Ceramic Tile Floor	Acoustic Ceiling Tile	Painted Ceiling	Wood Chair Rail	Sealed Concrete Floor	Panel Wall System	Notes:
E/E+	+					+		+			+		+			
O+		+			+			+			+		+			
O		+			+			+			+					
W															+	
S		+			+				+		+					
R				+			+			+		+				
H			+			+		+			+		+			
C		+			+				+			+				
M		+			+							+		+		

- The following finish level tables are provided as a guide for each type of space. In addition to assigning trim level by space, the following tables indicate which spaces require private bathrooms and increased sound privacy provided with soundproofing.

Table 6.2.1-2 Office Space Finish Level

Office Space:	**Finish Level**	**Sound proof-ing**	**Bath-room**	**Notes:**
OL-1	E+	Yes	Yes	
OL-2	E	Yes	Yes	1
OL-3	E	Yes	Yes	2
OL-4	O+		Yes	2
OL-5	O			
SL-1	W			
SL-2	W			
SL-3	W			

Notes:
1. Generals and SESs, if in the Command Section, have private Bathroom.
2. SESs in the command Section, have private Bathroom.

Table 6.2.1-3 Conference Space Finish Level

Conference Spaces:	Finish Level	Soundproofing	Notes:
CL-1	E	Yes	
CL-2	E	Yes	
CL-3	E	Yes	
CL-4	O+	Yes	
CL-5	O+	Yes	
SCL-6	W	Yes	
SCL-7	W	Yes	
Conference Center	O	Yes	
Presentation Room	O+	Yes	
Court Room	E	Yes	1

NOTES:
1. Build IAW AF design guide for Court Rooms

Table 6.2.1-4 Training Space Finish Level

Training Space:	Finish Level	Soundproofing	Notes:
CZ Training Room	O	Yes	
CL Training Room	O	Yes	
AX Training Room	O	Yes	
DSMA Training Room	O	Yes	
FM Training Room	O	Yes	
MT Training Room	O	Yes	
PK Training Room	O	Yes	
XPM Training Room	O	Yes	
61 CS Training Room	O	Yes	
61 CS Training Room	O	Yes	

Table 6.2.1-5 Specialty Space Finish Level

Specialty Space:	Finish Level	Soundproofing	Notes:
Classified Work Area	O	Yes	
MT SERF	O	Yes	
Command Post	O		
BNCC	C		
SCIF	O	Yes	
SCIF Equipment Room	C		
IN		Yes	
Reservist Lab	O		
Research Center	O		
Computer Lab	O		
IN/PWW Equipment Room	C		
Library (1 Large Room)	O		
PWW Server Room	C		
IN Server Room	C		
XR		Yes	
Equipment Room	C		
TS Computer Room	C		
Secret Computer Room	C		
Blue Room	O	Yes	
	C		
Notes:			

Table 6.2.1-6 Miscellaneous Space Finish Level

61 CS/SCSV			
Photo Lab			
Development Room	O		1
Studio	O		
Digital Development	O		
Office	O		
Storage	O		
Video Lab			
Editing Suite	O	Yes	
Tape Library	O		
Dubbing Room	O	Yes	
Viewing Room	O	Yes	
Office Area	O		
Art Services			
Work Room	O		
Office/Work Area	O		
Processing Room	O		
Storage	O		
Presentations			
VTC	O	Yes	
Board Room	E	Yes	
Office Area	O		
Storage	O		
Conference Room	O	Yes	
Business Center	O		
Consolidated Club	AR		
Child Development Center	AR		

Notes:
1. Provide eyewash facility.
AR - As Required

Table 6.2.1-7 Communications Space Finish Level

Communications Space	Finish Level	Soundproofing	Notes:
Cable Vault (Entrance Facility)	C		
Main Distribution Frame (MDF)	C		
Telecomm Room (TR)	C		
Dial Central Office (DCO)	C		
DCO Battery Room	C		
Switchboard Operator Room	O	Yes	
Consolidated NCC (CNCC)	C		
Main CLASSIFIED NCC (CER)	C		
Satellite CLASSIFIED Eqpt Rm (CER)	C		
Notes:			

Table 6.2.1-8 Facility Space Finish Level

Facility Space	Finish Level	Notes:
Computer Storage Room	S	
File Storage Room	S	
Janitor Closet	R	
Electrical Room	M	
Mechanical Room	M	
Hallway	H	
Restroom	R	
Lobby		1

Notes:
1. Finish consistent with Class A office building.

7.6.7 Interior Materials and Finishes Submittals and Requirements

- **Walls**
  - All interior walls shall:
    - Be constructed to the underside of the structure above; and
    - Be steel-frame (wood framing is prohibited).
    - Have washable paint, Type II vinyl wall covering or UBC 8.2 rated fabric wall covering.

- Toilet areas, lavatory areas, and showers shall have full-height ceramic tile wall finish adjacent to sinks and toilet areas; other areas have a GWB finish. Acoustical insulation shall be provided at demising walls and walls requiring an STC assembly.

- Lobbies shall have natural stone, WIC Premium book-matched paneling, or similar material treatment as appropriate for a Class A office building. Offerors are encouraged to provide alternate, more cost-effective materials and finishes in lobbies, while still suitable for Class 'A' use. Walls at corridors, conference rooms, closed offices, restrooms, and similar adjacencies shall have STC 45 minimum. Care shall be taken that ceiling-to-wall, wall-to-door, and similar interfaces maintain the minimum STC. The Air Force may designate specific rooms that require a higher STC rating because of their function.

  - During the design/build phase the Offeror shall submit:
    - Product data and shop drawings of framing components for different wall finish materials;
    - 2’ x 2’ minimum mock-ups showing all ceramic walls, stone, wood paneling and similar materials; and
    - Samples of all transition pieces and special elements

- **Demountable Partitions**

  - Demountable partition systems shall:
    - Be of a vertical delineation revealing design between panels;
    - Have a floor-to-ceiling height ranging from 84” to 120”;
    - Permit extension in 2-, 3-, or 4-way plan conditions at any location without removal of existing panels or floor track; and
    - Provide a 3” vertical adjustment in overall height to accommodate floor irregularities, and +/- ½” at ceiling track.
  - Each panel unit shall:

    - Be constructed in such a manner as to contain provisions for mounting work surfaces and storage components on either side of the partitions including side-by-side mounting;
    - Have the ability to be installed on top of finished flooring, raised flooring, or carpeted flooring (the system can be installed to the underside of suspended grid ceilings without the use of destructive fasteners); and
    - Provide for complete integration of conventional and modular power systems.
- Frames may be either of the following: 2" standard frames, 4" non-stacking frames, or 4" stacking frames.
- The system shall:
    - Accommodate marker board and tackable acoustic fabric skins;
    - Have an integral leveling system with adjustment points at both the ceiling and floor intersections;
    - Have the ability to accommodate glass frames consistent with the modules of the frame system (all glass frames shall be of tempered glass);
    - Have trim consisting of base trims, top caps and edge trims, and any other elements required for a complete closure of the system;
    - Have the ability to interface with a post-and-beam system that can utilize electrical data along with modular marker board components (the post-and-beam system shall interface with the horizontal top raceway system at a height of 72"); and
    - Have a minimum STC 45 rating at all offices and conference rooms.

- All connection systems shall have the ability to accommodate in-line connections, off-module connections, and standard junctions. Moveable furniture components shall have the ability to work with all de-mountable and office partitions.

- Wiring and cabling shall utilize power distribution kits with standard receptacles and adapters. The de-mountable partition system and the office partition system (see below) shall be from the same manufacturer.

- During the design/build phase the Offeror shall submit:
    - Manufacturer's catalog data indicating thickness of material, fastenings, proposed method of anchoring, hardware, fittings, mountings, doors, frames, lights, and other related items;
    - Samples of material, finish, and color; and
    - Constructed mock-up of one fully enclosed room on-site. Mock-up may be incorporated into the project if accepted.

- **Office Partition Systems**

- Modular furniture systems shall be provided for all office and conference areas designated as "SL". These systems shall generally consist of a powered "spine" wall with non-powered side panels, cantilevered work surfaces, flipper cabinets, pedestal drawers, chairs, and various accessories.

- All systems and components shall conform to ANSI/BIFMA standards for structural integrity & mechanical strength, shall be free of rough or sharp edges, shall be UL Listed, and shall meet NFPS 101 requirements for fire retardance. The Modular furniture systems shall be compatible and interface with the Demountable partition systems.

- All components, including the panel system, must be easily disassembled and reinstalled without requiring special tools or factory-certified installers. Accessories and task lighting shall be supplied by the same vendor as the panel system, or be designed to integrate specifically with the proposed panel system

- The furniture vendor shall supply the following guarantees:
  - A 10-year warranty on all systems and components (with the exception of task lighting, electronic ballast, and tools)
  - A written commitment to non-obsolescence of the product

- Alternate designs to those specified in this document are permissible if they meet or exceed the specifications contained herein. The Government maintains the right to re-design or reconfigure the proposed furniture system (eg: number and location of flipper cabinets, lateral files, etc.) without contract modification prior to order. Additional costs will be based on the pricing schedule used in the original bid.

- All panels must be capable of supporting cantilevered work surfaces, shelves, flipper cabinets, etc., while accommodating height adjustments of these devices in 1" increments. Each section shall have leveling guides & will be installed plumb.

- Spine walls and side panels will be available in "step-down" walls of varying vertical heights from 30" to 72" and will interface with an 18" access floor system or cellular floor systems on 24" or 60cm centers, solid floors, GWB walls and power poles. The following pictures illustrate typical configurations with varying panel heights.

- The government will select the panel colors and finishes. Fabric used on systems furniture panels and chairs shall be a minimum of grade 30 and be in the cost range of $23.00 per square yard. The acoustical rating of panel structures must be a minimum NRC of .80 and STC rating of 24.

  All modular panels will be stackable, interchangeable and be available with the following surfaces:
  - Glazed
  - Tackable (not to be used as acoustical panels) (minimum of one per work area)
  - Non-tackable
  - White Board, integrated or surface-mounted (minimum of one per work area)
  - Tool Rail (minimum of one 16" high rail panel per work area)
  - Aluminum slat-wall skin panels
  - Other panel system requirement include:
    - Top of panels adjacent to windows must be at or below sash height
    - The system design must take into account panel creep and leave room for additional items in the work space, such as printers and safes

- The Spine Wall shall be a freestanding panel system with a minimum thickness of 3". The panels must be able to connect in straight line, right angle or "T" configurations, and must be able to provide horizontal and vertical management for power and telecommunications cables.

- Side panels shall have a nominal thickness of 2" and shall attach perpendicularly to the spine wall at modular intervals. Side panels shall be light

enough to be moved by one person during minor reconfigurations. All side panels shall extend beyond the width of the work-surfaces.

- Work-surfaces shall be cantilever type, with cable management raceways between the work-surface and furniture panels, and a cabling grommet in corner areas. The Work-surface material shall be a high-pressure laminate, a minimum of 1.25" thick. Work-surfaces shall be height-adjustable for user preference and to meet ADA requirements.

- The following accessories shall be included in each work area:

  Work-surface accessories:
  - Under-surface, hinged, adjustable keyboard tray with mouse pad extension
  - Under-surface pencil drawer

  Flipper Cabinets
  - Provide two flipper cabinets per work-station for work areas with panel heights of 60" or greater
  - Maximum load for door unit or shelf shall be 150 lbs
  - Cabinets shall be equipped with over-the-top doors with fabric or veneer covers (non-writeable surface)

  Task Lighting
  - Provide under flipper cabinets, minimum of one per four-foot furniture panel
  - Optional task lighting at top of panels
  - Lights must have electronic (rapid start) ballast
  - Furniture panels must have clips or other method of hiding task light power cord

  Pedestal Drawers
  - Provide a minimum of one freestanding pedestal drawer system per work area
  - A stackable drawer system is preferable, with drawers able to open out in either direction
  - Include a top drawer office supply organizer

  Tool Rail Tools
  - Shelves
  - Horizontal paper trays
  - Diagonal paper/magazine trays
  - Vertical paper/magazine trays
  - Pencil/white board material holders

Chairs

- Office chairs with castors
- Fabric to coordinate with panel fabric and of same quality as panel system

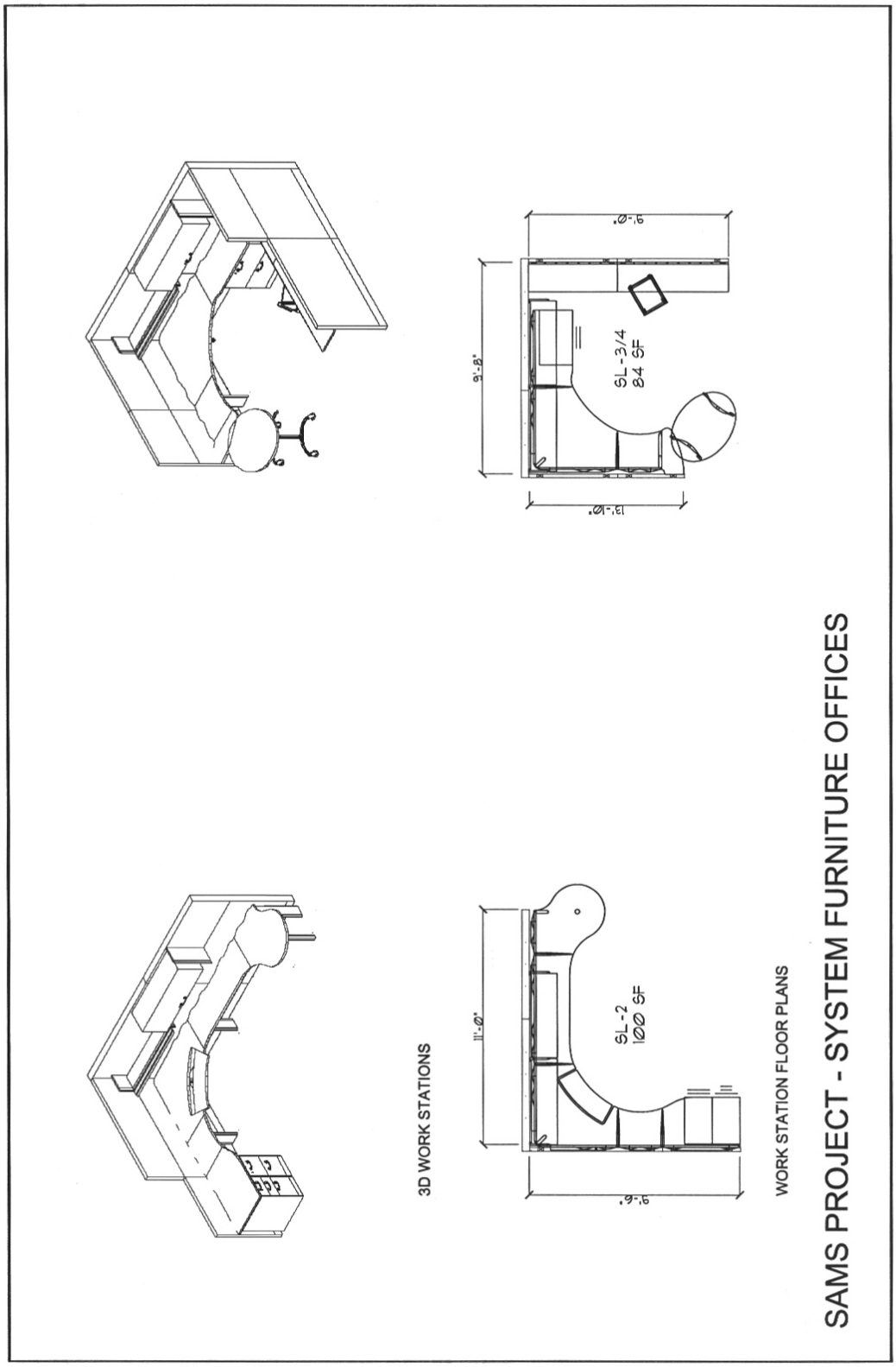
Cable Management Capabilities

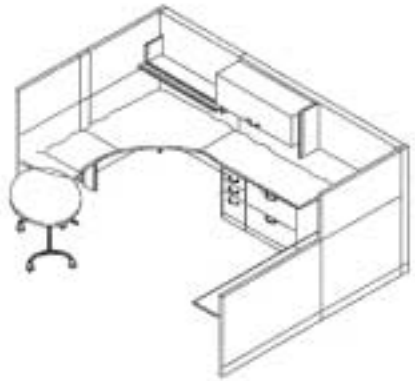
- Cable management shall be Lay-in type, not pull-through
- Management system shall accommodate a minimum of four BLACK security level telecom cables (CAT 5e or fiber) per workstation
- At least two panels per work area shall include knockouts with snap-in telecommunication faceplates under the work-surface, accommodating a minimum of two connections per faceplate
- Telecommunications cabling must be separated from power cabling inside panels by a minimum of 6”
- Panel system must be capable of accommodating an additional set of RED cabling and faceplates, separated by a minimum of 6” from BLACK telecom cabling and power.
- The cable management system must be able to integrate with Telecom/Power ceiling columns at any point along the spine wall
- The cable management system must be able to integrate with under-floor or hard-wall power and telecom cabling at any point along the spine wall
- The cable management system must allow easy access to cabling without dismantling work-surfaces or other major components
- The cable management system must be certified for CAT 5e cabling and able to accommodate the minimum bend radius of fiber optic and CAT 5e cable

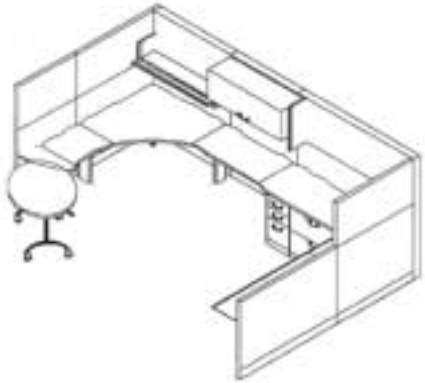
During the design/build phase the Offeror shall submit:

- Manufacturer’s catalog data indicating thickness of material, fastenings, proposed method of anchoring, hardware, fittings, mountings, indirect lighting, and other related items;
- Samples of material, finish, and color; and
- Samples of cable management hardware, telecommunications and electrical receptacles, ceiling column cross-section; and
- Constructed mock-up of one workstation on-site. Mock-up may be incorporated into the project if accepted.

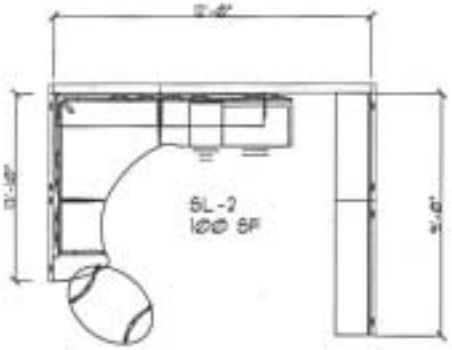
Typical SAMS Systems Furniture Layouts

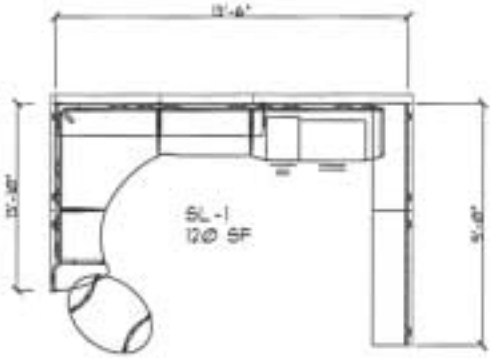






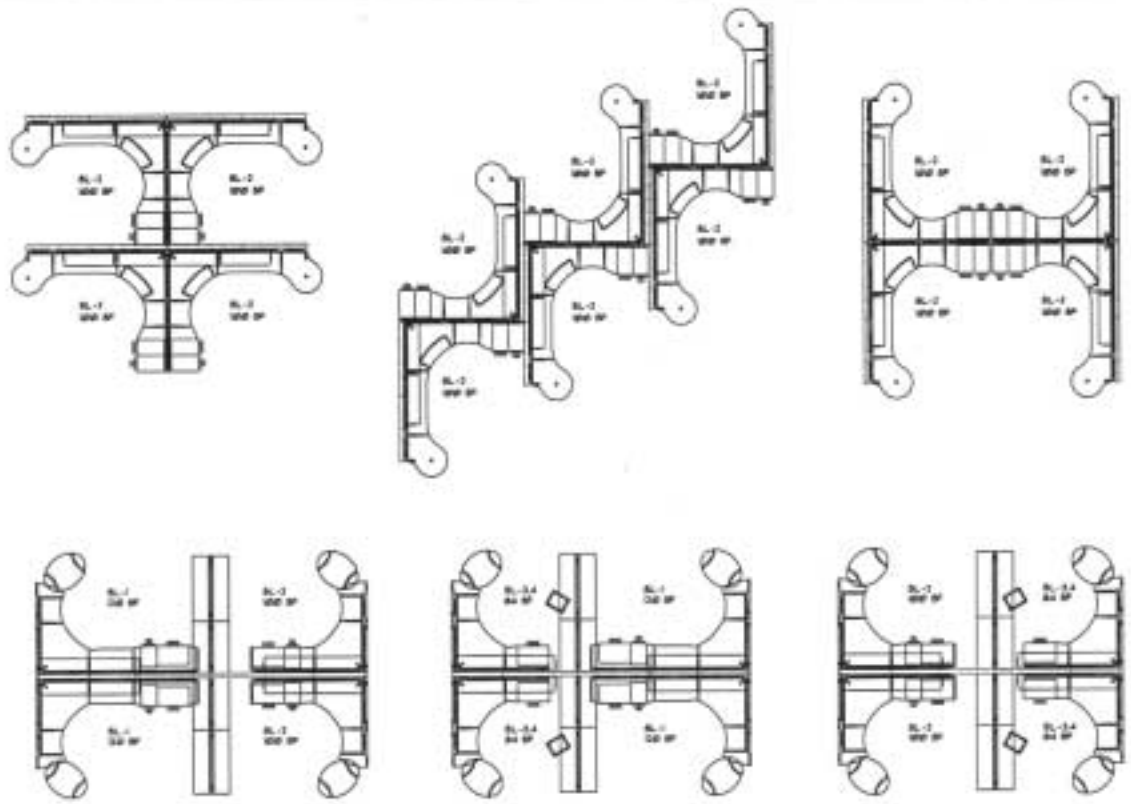
3D WORK STATIONS





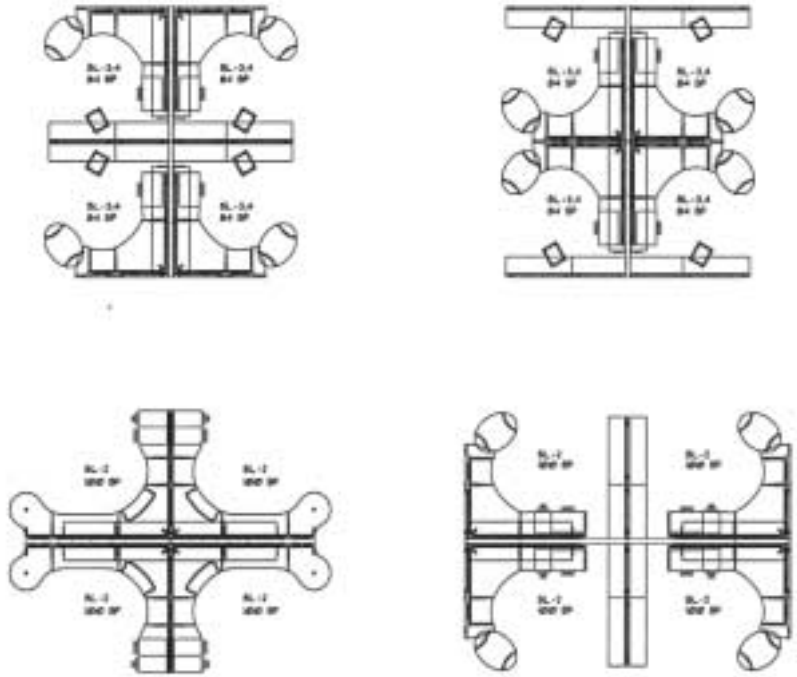
WORK STATION FLOOR PLANS

SAMS PROJECT - SYSTEM FURNITURE OFFICES



CLUSTER PLAN OPTIONS

SAMS PROJECT - SYSTEM FURNITURE OFFICES



CLUSTER PLAN OPTIONS

SAMS PROJECT - SYSTEM FURNITURE OFFICES

- **Interior Doors**

- Entrance doors to suites and departments (except to utility areas, see below) may be aluminum glass storefront system to match the exterior aluminum storefront system. Doors to suites and departments may be solid-core wood, oversized, with selected face veneers, five-ply minimum, and in conformance with WIC Premium grade standards. Doors within suites and departments shall be solid core wood with selected face veneers, five-ply minimum, and in conformance with WIC Custom grade standards. Wood doors shall be shop finished, stained, of solid-core construction, and shall have staved lumber, mineral, or particleboard cores (formaldehyde free). Doors shall have frames of comparable quality and design. Steel frames shall be fully welded. Entrance doors and/or doorframes shall be capable of accepting Government Furnished and Government Installed (GFGI) security and access control devices such as electric latches and Balance Magnetic Switches (BMS). All emergency exit doors and exterior doors leading into mechanical or electrical rooms require BMS capability.

- Interior doors in utility areas shall be hollow metal with fully welded steel frames. Finishes shall be paint with shop-primed rust inhibiting primer. Doors shall be heavy duty, 45 mm thick, Grade II, Model 2, core construction Type B, minimum. Interior doors and/or doorframes into classified and controlled areas shall be capable of accepting GFGI security and access control devices such as electric latches and BMS. The personnel entry doors for the SCIFs, CNCC, SERF, DCO, Classified Equipment Rooms, BNCC, and Command Post require both electric latches and BMS. The Command Post requires a mantrap area with both doors equipped as stated. The equipment entry doors for the SCIFs, CNCC, SERF, DCO, Classified Equipment Rooms, BNCC, and Command Post require BMS only.

- Interior doors to all OL-1, OL-2, OL-3, Telecommunications Rooms, Entrance Facility, Cable Vault, electrical and mechanical rooms shall be capable of accepting BMS devices. Additionally, interior doors for the Telecommunications Rooms, Entrance Facility and Cable Vault shall be equipped with the latest Unicam type programmable 5 digit (minimum) locking system. Telecommunications Rooms, Entrance Facility, Cable Vault, CNCC, SCIF entrance and equipment rooms, computer and equipment rooms without double doors shall have a minimum of one 48” wide door.

  During the design/build phase the Offeror shall submit:
  - WIC-Certified Compliance Certificates prior to installation;
  - Product and installation data for all products and shop drawings for millwork;

- 1’ x1’ cross section and finish sample of each door type; and
- UL-rated assemblies certification for openings in rated partitions.

- **Door Hardware**

All doors shall have heavy-duty, institutional-grade hardware. Mechanical and electronic hardware shall conform to force protection standards.

During the design/build phase the Offeror shall submit:

- Complete door hardware schedule describing products, product data, wiring diagrams for power, signal and control systems; and
- Samples for initial selection.

- **Interior Lights**

Interior lights shall be aluminum or steel frame with clear or diffused glazing as appropriate for the function of the space. Where wire glass is required by code, it shall be square grid wire pattern. Interior glazing larger than a single light module shall be aluminum storefront system to match the exterior storefront system.

During the design/build phase the Offeror shall submit:

- WIC-Certified Compliance Certificates prior to installation;
- Product and installation data for all products and shop drawings for millwork;
- 1’ x1’ cross section and finish sample of each window type; and
- UL-rated assemblies certification for openings in rated partitions.

Use Engineering Technical Letter (ETL) 00-6: Air Force Carpet Standards for performance requirements for carpeting within the facility.

- **Offices**

Departmental offices, open office areas, departmental conference rooms, and rooms of similar uses (except those with raised flooring, see below) shall have commercial-grade 28-ounce minimum carpet. Areas within suites shall have 36-ounce minimum carpet over a pad. Office areas with raised floors shall have non-adhesive type 32-ounce minimum carpet tiles with corner positioning buttons. Field and accent carpet must be by the same manufacturer; and have a 10-year wear guarantee.

- **Restrooms**

Restrooms shall have full-set ceramic mosaic tile flooring, unglazed porcelain. Base tile and trim tile that matches floors shall be provided. Base

shall be flush. Provide marble thresholds as a transition between ceramic tile and carpet.

- **Other Spaces**

Lobby floors shall be natural stone, terrazzo, or other comparable materials appropriate for a Class A office building. The design and layout of the lobby shall include consideration for floor-mounted power receptacles to support metal detectors and scanners.

Utility, electrical, mechanical, janitorial, and similar rooms shall have a sealed concrete floor. Dedicated computer rooms and operational centers with raised floors shall have a hard surface floor as recommended by the raised floor manufacturer. Break-rooms, coffee bars, kitchens, and similar areas shall have at minimum, commercial-grade vinyl tile.

During the design/build phase the Offeror shall submit:

- manufacturers catalog data;
- 1' x1' minimum samples of each floor material, color, and pattern.
- seaming diagrams for carpeted areas other than at raised floors;
- 2' x 2' mock-ups showing all ceramic floor tile colors and patterns;
- samples of all transition pieces and special shapes; and
- a minimum of 10 percent extra stock of each color and pattern of each floor material installed in the facility.

- **Raised Floor System**

A raised floor system designed as an air-plenum for HVAC should be considered the standard for all areas in the facility design. As a minimum, a raised floor is required in equipment rooms to include the CNCC, main Classified equipment room, and DCO.

The raised floor system height shall be sufficient to support the installation and maintenance of cable conveyance systems, power distribution, water pipes and other components generally associated with installations of this type. If an overhead HVAC distribution system is utilized, the raised floor height may be reduced as appropriate.

The raised floor in the office area shall be a minimum of 8". The floor height may be adjusted depending on the area serviced by the plenum and the quantity and volume of other under floor utilities and services. The raised floor system shall be compatible with the office flooring requirements referenced above.

The raised floor in equipment areas shall be a minimum of 12”. The floor height may be adjusted depending on the area serviced by the plenum and the quantity and volume of other under floor utilities and services. The raised floor system shall be compatible with the flooring requirements referenced for other spaces above.

The raised floor system shall:

- be rated for class "A" flame spread and smoke development ratings;
- be bolted stringer or corner-lock system;
- be compatible with both 24” sq. and 60 cm sq. applications;
- accommodate both steel and aluminum panel systems;
- allow for a minimum of 50 p.s.f. uniformed load in office areas;
- allow for a minimum of 100 p.s.f. uniformed load in equipment areas;
- allow for a minimum of 3000 p.s.f. concentrated load and 3000 p.s.f. rolling loads;
- accommodate solid, grate, and perforated panels;
- have solid panels injected with acoustic fill material;
- accommodate under-floor HVAC plenum system with both manual floor diffusers and electronic VAV terminals for individual comfort control at each workstation; and
- accommodate primary and secondary distribution boxes as well as under-floor P.V.D. (phone, voice and data) service centers; and power distribution centers

- stringerless floor systems are acceptable for raised floors less than 12”

- **Ceilings**

<u>General</u>

- All ceilings shall be a minimum of 9’ clear height. Lobbies and rooms accommodating 30 people or more shall have a minimum of 10’ clear ceiling height. Vaulted ceilings in lobby areas are highly desirable and will be considered a facility enhancement. Main entry lobbies should have a minimum of 12' clear ceiling height.

<u>Offices</u>

- Offices, open office areas, departmental conference rooms, and similar use rooms shall have at minimum a 2’ x 2’ suspended, lay-in ceiling system with acoustical panels. Edges shall be square cut regular lay-in or regular. Light reflectance shall have a minimum LR of .075.

- The ceiling grid system material shall be double-web Electro-galvanized steel with a baked polyester paint finish; duty classification Intermediate.
- In areas where an under floor plenum is utilized, systems other than suspended ceiling shall be proposed for review and approval.

- **Other Spaces**

Restrooms, utility rooms, corridors, kitchens, and similar areas shall have gypsum board or plaster ceilings. Rooms accommodating 30 people or more shall have gypsum board or full height systems panels. Showers shall have water resistant gypsum board or fiberboard or equal. The Air Force may designate additional spaces that require gypsum board because of their function. Lobbies shall have above standard ceiling design features. Lighting shall be integrally designed to enhance the lobby and ceiling design. Conference rooms and other special use spaces shall have lighting designed for maximum control and flexibility. Audio-visual systems shall be integrally accommodated within the design of the room.

For other spaces such as Restrooms, utility rooms, corridors, kitchens, and similar areas: During the design/build phase the Offeror shall submit:

- manufacturer's catalog data and 1'x 1' minimum samples of ceiling tile, ceiling suspension system, and other ceiling materials;
- provide 10% extra stock of each type and color supplied; and provide a 10-year warranty.

- **Miscellaneous Systems Components and Equipment**

- **Elevators**

- Elevator systems shall:
  - be at least comparable to Class "A" type office building standards for wait time, interior finishes, and door finish;
  - have a minimum rating of 2,500 pounds;
  - accommodate up to 15 passengers at a rate of 450 – 500 ft. per minute minimum;
  - have stops adequate to serve all floors of the buildings with an additional stop to the roof of the structure; and

- have the ability to accommodate a remote elevator monitoring system.

One elevator shall be designed as a service elevator with increased cab size and load rating.

It is preferred not to have an elevator in a parking structure and instead have a walkway that enters one of the SAMS Facilities at mid level. However, if the Offeror believes an elevator is more cost effective from a lifecycle standpoint, the parking structure elevator system shall be hydraulic with above standard security enhancing features.

- **Identification Devices**

Identification devices for exterior and interior installations shall comply with ADAAG requirements. Exterior signage shall identify the facility at the main entrance and at all ancillary entrances. Individual die-cut letters shall match exterior graphics of other LAAFB buildings. Ground-level monument signs shall be provided to adequately identify the facility.

During the design/build phase, the Offeror shall submit:

- Schedules of all identification devices which indicate type, material and location; and
- Samples of each type.

- **Millwork**

Casework shall meet WIC Custom Grade standards and shall have the WIC stamp, except for those locations indicated that conform to WIC Premium Grade. Countertops shall be solid polymer material. Casework and countertops in restrooms shall be solid polymer material with integral sinks. Casework in suites, the lobby reception area, and other specific areas as designated by the Air Force shall meet WIC Premium Grade standards, and shall have the WIC stamp. Casework shall be manufactured of selected matching hardwood veneer. Casework and paneling shall be bookmatched. Countertops shall be granite or solid polymer material selected from the manufacturer's designer series.

During the design/build phase the Offeror shall submit:

- Shop drawings complying with WIC criteria and with a WIC certified compliance label;
- Samples, 1'x1' minimum, of each type, material, and finish; and
- Manufacturers data.

- **Operable partitions**

Operable partitions (such as those used to divide meeting spaces) shall provide acoustical standards of 45 STC minimum and shall have recessed floor and ceiling tracks, lock downs, and recessed storage.

- **Toilet partitions**

Toilet partitions shall be ceiling hung. Laminated plastic or metal type partitions are prohibited. Hardware and fittings shall be institutional duty. Toilet accessories shall include recessed toilet tissue dispensers, semi-recessed paper towel dispensers and disposal, recessed seat cover dispensers, recessed sanitary napkin dispensers, counter-top-mounted soap dispensers, handicap grab bars, and mirrors. All shall be of stainless steel construction.

- **Window Treatment**

Exterior and interior windows shall have horizontal or vertical blinds. Materials shall be non-yellowing and able to operate manually.

During the design/build phase the Offeror shall submit:

- Manufacturer's catalog data indicating thickness of material, fastenings, proposed method of anchoring, hardware, fittings, mountings, and other related items; and
- Samples of material, finish, and color.

- **White Boards and Tackable surfaces**

All conference rooms and break-out areas shall have integrally designed white boards and tackable surfaces to pin-up work products.

During the design/build phase the Offeror shall submit:

- Manufacturer's catalog data indicating thickness of material, fastenings, proposed method of anchoring, hardware, fittings, mountings, and other related items; and
- Samples of material, finish, and color.

- **Food Service Equipment**

Existing food service equipment shall be relocated from the existing Consolidated Club to a new kitchen within the building.

- **Exterior Materials and Finishes Submittals and Requirements**

During the formal design process, the Offeror shall submit samples of the materials to the Air Force for approval. Samples will be of sufficient size to determine the appearance of the wall and in accordance with generally accepted industry practices for office projects.

During the design/build phase the Offeror shall submit:

- Manufacturer's catalog data of windows, finish, hardware, and window operators; and
- Samples of material, finish, and color.

The Offeror is required to:

- Use a manufacturer having not less than five years experience in the manufacturing of the exterior building systems
- Use installers who are factory (manufacturer) trained with a minimum of five years of experience;
- Warrant windows and doors (including window operators) for a minimum of 25 years; and
- Construct 6' x 8' minimum mock-up panels on-site of each major exterior building system.

- **Roofing**

  - <u>Standing seam metal:</u>
    - Have factory applied finish;
    - Be warranted for 20-years;
    - Be colored as indicated elsewhere in this solicitation document; and
    - Have the underside and sides of the metal roof system concealed.

  - <u>Bituminous roofing:</u>
    - Concealed roof drains and overflow drains;
    - Warranted for 20 years;
    - Be low emissivity; and
    - Single-ply membrane or foam type systems are prohibited.

Drainage and overflow systems shall not be allowed to stain the exterior of the building envelope and shall be routed to an underground drainage system. Any roof mounted equipment that is visible from the building or neighboring structures shall be screened with materials compatible with the building.

During the design/build phase the Offeror shall submit:

- Manufacturer's catalog data indicating; material, fastenings, proposed method of flashing, anchoring, and other related items; and
- Testing requirements for all items of the proposed work.

- **Flagpoles**

Three ground set tapered stainless steel seamless 40' high flagpoles, with a tensile strength of 30,000 psi minimum required.

- **Pre-Engineered Building System**

A Pre-Engineered metal building shall be provided for use as a warehouse. Clear spans shall be maximized to provide interior flexibility. Colors shall coordinate with the office buildings. Natural light shall be introduced. Floors shall be sealed concrete.

The Offeror shall submit:

- manufacturer's catalog data indicating thickness of material, fastenings, hardware, doors, frames, windows and other related items;
- 2' x2' minimum samples of material, finish, and color.

- **Parking Structure**

If constructing a parking structure, it shall be designed for maximum entrance and egress at peak hours. Exterior materials and colors shall be similar to coordinate with the office buildings.

The parking structure design shall be carefully developed so as to be an integral part of the base and the SAMS complex. Materials, scale, colors and proportioning shall all coordinate closely with the SAMS office buildings.

The parking structure design shall facilitate passive security through casual visual monitoring. Provisions for active security control and monitoring shall be provided. The parking structure shall have connectivity to the base duct bank and cable plant to support future GFGI CCTV cameras, emergency telephones, and access control.

The Offeror shall submit:

- samples of material, finish, and color for structure and related components; and
- construct 6' x 8' minimum mock-up of exterior.

- **Landscaping**

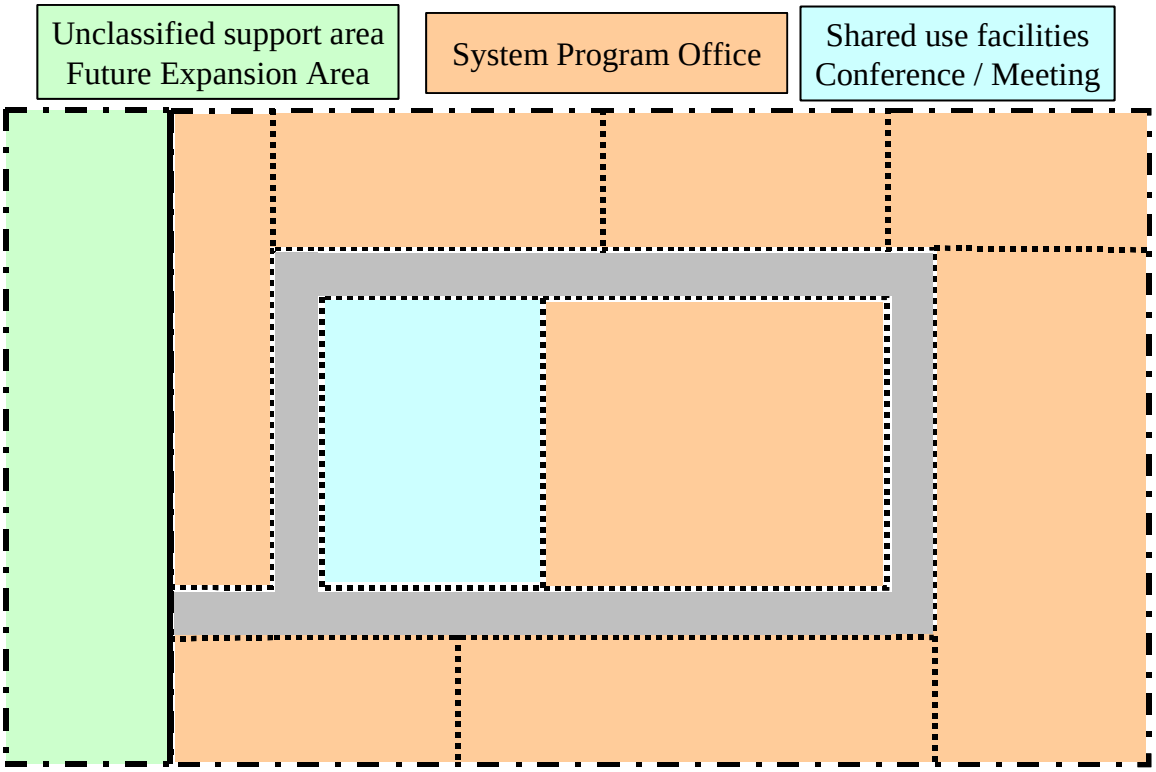
Refer to the LAAFB General plan and the AFCEE Design Guide Landscape Design for landscaping requirements.
(http://www.afcee.brooks.af.mil/dc/products/dcproducts.asp#dcd)

- **Seismic Requirements:**

Replacement facilities must comply with the seismic and safety design standards for Los Angeles County, California, in effect at the time the Air Force takes possession of the facility. In addition to Los Angeles County requirements, facilities must also comply with requirements contained in Air Force Engineering Technical Letter 00-5, Seismic Design for Buildings and Other Structures. ETL-5 may be found at the following Internet address: http://www.afcesa.af.mil/Publications/ETLs/ETL00-5Final.pdf

- **Sensitive Compartmented Information Facility Requirements**

There is a requirement for the Offeror to provide a SCIF. The design concept is to locate the SCIF in the basement of a facility. The area shall have one entry point, connected by a short corridor to an interior circulation loop. Located on the exterior of the loop are several System Program Offices (SPOs). Each SPO area is to be constructed as a SCIF within a SCIF. Located on the interior of the loop are additional SPOs unique areas and a Shared Use Facilities Conference/Meeting area. Each Shared Use Facilities Conference/Meeting area shall also be constructed as a SCIF within a SCIF. The interior and exterior walls shall meet DCID 1/21 construction requirements. Each SPO area will be made up of a number of office areas, conference rooms, specialty rooms and equipment rooms. These areas have been tentatively identified and are included in the General Requirements, Section 6.1. The exact number of rooms within the SCIF and their configuration to include the quantity of walls to be constructed to SCIF standards will be defined during Phase III of the RFP.



- **Scientific Engineering Research Facility**

There is a requirement for the Offeror to provide a Scientific Engineering Research Facility (SERF). The design concept is to collocate the SERF with the SPOs office area. The area shall have one entry point and is to be constructed SCIF-like following the construction guidelines in DCID 1/21. The SERF has been tentatively identified and is included in the General Requirements, Section 6.1.

- **Classified Work Rooms**

There is a requirement for the Offeror to provide common convenient Classified Work Rooms within the SAMS facilities. The design concept is to collocate a shared Classified Work Room within each SPO office area and a minimum of one work area per facility. The Classified Work Rooms shall have one entry point and are to be constructed SCIF-like following the construction guidelines in DCID 1/21. The Classified Work Rooms have been tentatively identified and are included in the General Requirements, Section 6.1.

8.0 Mechanical Requirements

8.1 FIRE PROTECTION PERFORMANCE

8.1.1 Basic Function:

- Provide services systems to protect life and property.
- Fire protection comprises the following elements:
  - Fire Sprinkler and Extinguishing Systems: Elements which automatically extinguish fires.
  - Standpipe and Hose Systems: Elements that deliver adequate supplies of water to locations in the building for manual fire-fighting.
  - Fire Detection and Alarm: Elements required to detect fires and communicate fire location to building occupants, building management, and public fire fighting agencies.
  - Smoke Control Systems: Elements required to control smoke in the event of a fire and to remove smoke after the fire is extinguished.
  - Fire Protection Specialties: Elements required for manual fire-fighting by occupants.
  - Other Fire Protection Elements: Elements that are not covered in other fire protection chapters.
- Provide automatic fire suppression for the entire building.
- Water Use (Comply in all respects with NFPA 14 and the California Building Code):
  - Provide a permanent water supply for standpipes as required by code.
  - Provide a water supply to sprinkler systems that is sufficient to extinguish fires inside the structure.
- Where fire protection elements also must function as elements defined within another element group, meet the requirements of both element groups.

8.1.2 Amenity and Comfort:

- Leakage: Provide systems that are leak-free.
- Accessibility: Provide clearances around system components for service and use.
- Sound: Provide audible alarm system to signal building occupants of fire hazard.
- Convenience: Provide an automatic system to signal building occupants of fire.
- Hazards: Provide systems which minimize risk of injury and damage to

property.

- Substantiation:
  - Preliminary Design: Fire protection areas identified.
  - Design Development: Fire protection zones indicated on the drawings with riser locations identified.
  - Construction: Functional performance testing in accordance with code.

8.1.3 Health and Safety:

- Path of Egress: Provide systems which safeguard path of egress.
- Fire Source: Provide system materials which do not contribute to the spread of the fire.
- Fire Spread: Provide systems to limit spread of fire from storage area to office area.
- Smoke Control: Provide a system to evacuate smoke after fire has been extinguished.
- Chemical Exposure or Use: Provide systems which limit exposure of occupants to extinguishing agents.
- The fire protection (sprinkler) zones, the fire alarm zones, the life safety zoning, the mechanical fire and fire and smoke damper locations, the architectural rated wall design, the smoke evacuation system, etc. will all coincide into a single set of compartmentalization for the entire project. All the systems will incorporate electronic detection (if they do not already) and interface with the Building Automation System. Specifically all points of the fire alarm system, all alarm points of the fire protection system, the status of the fire and fire and smoke dampers (ready or released), and all the points of the smoke evacuation system will become interfaced with the BAS. The BAS will display this coincided zoning graphically and provide touch screen interactive capabilities for the users.

8.1.4 Structural:

- Seismic Design: Provide support systems which sustain static (dead) loads twice the wet weight of the system.

8.1.5 Durability:

- Corrosion Resistance: Use corrosion resistant materials; ferrous metal is not considered corrosion resistant unless it is hot dipped galvanized, chrome plated, or coated with rust inhibitive paint.
- Vandalism: Provide systems which are tamper-resistant.

8.1.6 Operation and Maintenance:

- Ease of Use: Provide easy access to and working clearances around system components.
- Unauthorized Use: Provide systems which minimize activation and use by unauthorized persons.
- Substantiation:
  - Preliminary Design: System layout indicating operator interface locations.
  - Design Development: System equipment locations indicated on the drawings and manufacturer's product data indicating products to be used.

8.2 HVAC - HEATING, VENTILATING, AND AIR CONDITIONING PERFORMANCE

8.2.1 Basic Function:

- Provide artificial means of controlling temperature, relative humidity, velocity, and direction of air motion in the interior spaces enclosed by the shell, and reduction of airborne odors, particulates, and contaminant gases

- The SAMS mechanical requirements for the heating ventilating and air conditioning (HVAC) systems shall be designed to meet a variety of occupancy and equipment needs. The system equipment selection, quantity and operations will be required to service both 8 X 5 general purpose office areas and 24 X 7 equipment and operational areas. Additionally, the HVAC systems shall be capable of supporting general office environments for temperature and humidity as well as tightly controlled environments for computer and telecommunications equipment.
- The HVAC system consists of the following elements:
  - Energy Supply: Elements which provide energy used to maintain building comfort.
  - Heat Generation: Elements required to heat building to maintain space comfort.
  - Refrigeration: Elements necessary to generate the cooling required to maintain building comfort.
  - Air Distribution: Elements required to distribute air to maintain building comfort.
  - Hydronic and Steam Distribution: Elements required to distribute chilled water and steam to maintain building comfort.
  - HVAC Controls: Elements required to control equipment which maintains building comfort.

    - Other HVAC Elements: Other elements required to maintain building comfort.

- Special-Purpose Exhaust
- Where HVAC elements also must function as elements defined within another element group, meet the requirements of both element groups.

8.2.2 Amenity and Comfort

- Space Temperature Set point:
    - Thermal Performance: Design and construct to provide comfortable interior environment in accordance with the code and the following:
        - Summer Interior Design Conditions:
            - Daytime Setpoint: 72 deg F (22 deg C), plus or minus 2 deg F (1 deg C) except as specified in the project program.
        - Winter Interior Design Conditions
            - Daytime Setpoint: 68 deg F (20 deg C), plus or minus 2 deg F (1 deg C) except as specified in the project program.
        - Outside Air Design Conditions:
            - Summer Outside Air Design Temperature: 0.4 percent cooling design condition listed in the 1997 ASHRAE Fundamentals Handbook.
            - Winter Outside Air Design Temperature: 99.6 percent heating design condition listed in the 1997 ASHRAE Fundamentals Handbook.
    - Energy Design Wind Speed: Comply with ASHRAE and prevailing Meteorological Standards.

8.2.3 Substantiation:

- Closeout: Measurement of temperature and humidity in spaces with unacceptable temperature fluctuations. One measurement in the summer (outdoor air temperature at ASHRAE parameter conditions) and one measurement in the winter(outdoor air temperature at ASHRAE parameter conditions), within first year of occupancy.

- Office areas have less stringent HVAC requirements but special consideration is required for temperature control and noise abatement in larger conference rooms and presentation center. Noise induced from airflow in ducting, actuation of air mixture valves or variable airflow controllers is not acceptable within these centers.

8.2.4 Health and Safety:

- Emergency Power: Provide emergency power in accordance with code plus the following equipment:
  - Air handler(s) serving the Computer Room, All SCIF areas, all Classified Work Areas, Command Post, Command Center, Secret Computer, DCO Room, Telecomm Room, All CERs, CNCC, DCO and BNCC
  - Smoke control system fans.
  - Chillers.
  - Boilers.
  - Cooling towers.
  - Pumps serving above referenced equipment.
  - DDC control system.

- Electrical Shock Prevention: Provide a means of disconnecting power at each piece of equipment.

- Smoke Control: Coordinate control of ventilation fans, supply fans, return fans, exhaust fans, and dampers with smoke control system.

- Refrigerants: If a refrigerant based cooling system is utilized, it should comply with the Federal guidelines for ozone protection standards. Ceiling return plenums should not be used as they waste energy and pick up particulates. Depending on the seating arrangements and floor plan configuration, thought should be given to individual climate control, or at least to a high level of zone control.
  - Comply with the requirements of ASHRAE 15,and LEED Reference Guide Version 2.0.
  - Prevent release of refrigerant to atmosphere.
  - Prevent exposure of occupants to hazardous refrigerants.
    - Substantiation:
      - Construction: Measurement of refrigerant concentration in mechanical equipment rooms where refrigerants are located.

- Indoor Air Quality: Provide sufficient ventilation to obtain acceptable indoor quality, determined using the Ventilation Rate Procedure of ANSI/ASHRAE 62 . Outside air requirements should meet the criteria in ASHRAE Standard 62, Ventilation for Acceptable Indoor Air Quality.
  - Substantiation:
  - Design Development: Engineering analysis.
  - Occupancy: Field testing and survey of occupants.

8.2.5 Operation and Maintenance:

- Systems: Design the system for efficiency, reliability, redundancy and ease of maintenance. As a minimum, all operational and equipment areas shall be serviced with a fully redundant HVAC system to minimize impacts from system failures and scheduled maintenance. A fail over system shall be incorporated to enable continued service without human interven-

tion in the event of a failure.

- The building HVAC system will consist of a central chilled water plant, variable air volume (VAV) air handling units, heating water plant, air distribution system with terminal reheat VAV boxes, and a DDC control system. The central plant major components (chillers, pumps, boilers, and cooling towers) will have at least 50% redundancy.
- The chillers and associated pumps, piping, controls, etc. will be located in a single central plant location on grade for the entire SAMS Complex. Cooling Towers will either be located on a single rooftop with screening and in the same building housing the central plant or in a single location on grade in proximity to the central plant.
- The electrical service for the SAMS Complex will be located on grade in the same building as the HVAC plant and adjacent to it.
- The air handlers will be localized to the building they serve and located as high as possible in that building. While direct expansion roof top units are not to be considered, penthouses with air handling equipment should be considered as a viable option.
- Due to the very low requirement for heating on this project, the mechanical design engineer should propose alternative central heating design solutions, if in his opinion a more economical, maintainable, accessible, and energy efficient design approach is available than the central plant approach. The need for either central or local redundancy, however, can not be compromised.
- The design calculations shall be submitted to the Air Force or his designee and LEED Reference Guide 2.0. This work can be performed on Carrier's E2011, Trane's Trace 700, or DOE's 2.0 software. The HVAC design calculations shall be performed using software capable of performing transfer functions based on hourly heating and cooling analyses. The software shall utilize local meteorological weather and solar radiation data. Utilize the latest version of one of the following programs:

    - Carrier’s HAP (Hourly Analysis Program);
    - Trane’s Trace 6000; or
    - DOE 2.0 based software.

- In accordance with Executive Orders #12873 and #12902, with the Air Force Environmentally Responsible Facilities Guide, and LEED Reference Guide 2.0 a facility energy model and life cycle analysis will be prepared and presented. Compliance with the procedures for a minimum LEED Certification is a project requirement and a single substantiation of those requirements will be deemed to have satisfied all other published directions in this regard. The building envelope, mechanical, and electrical systems shall be designed cooperatively in an attempt to meet energy budget guidelines as defined in the Federal military “A/E Guide” s. Similarly, the design shall follow the requirements of Federal energy code ASHRAE Standard 90.1-1999, Energy Standard for Buildings Except

Low-Rise Residential Buildings. An attempt to outperform the energy standards as listed below should be discussed and agreed upon in the preliminary stages of the project. Taking from the LEED program, a goal of 20, 30, and up to 60 percent reduction in building energy usage may be achievable and should be discussed prior to any load calculations.

- The Building Automation System will be a Direct Digital Controls system utilizing pneumatic actuation for valve operation. The controls air compressor will be located in the same penthouse or mechanical room as the air handler units. The BAS will conform to the following requirements:
  - Central and single control to and from all the buildings in the SAMS Complex. The control center will be located on grade level adjacent to the chiller plant. Each separate building in turn will have a separate control station to monitor and control equipment and systems in its specific building, but it will be slaved back to the central control station for the complex.
  - The BAS will interface with the fire alarm, the fire protection (sprinkler) system, the power distribution gear (inclusive of the switchboards and motor control centers), the elevators, the generators, and have the capability of interface with the security systems. Security interface will be at the Air Force discretion.
  - The BAS will be supplied with interactive graphics utilizing detailed information regarding locations of equipment and systems served through architectural quality representations of the complex, its individual buildings, individual floors of each building, and individual areas served. The users should be able to touch the screen to select options including selection of specific equipment or specific areas for data.
- Open protocol and interoperability will be the definitive standards of application. The building, at a minimum, should meet all applicable Federal, State and Local codes and standards. Additional standards include: ASHRAE, SMACNA, and AMCA. In this regard the following standards, guidelines and protocols will be instituted:
  - ASHRAE BACnet Standard
  - ASHRAE DDC Guidelines
  - Lonmark Standard Guidelines
  - ANSI Control Network Protocol

- The submittals for the control system will be due 60 and 90 days following award of the contract for construction. Copy commissioning authority on the submittals.
  - The 60 day submittal will contain cut sheets of all equipment to be supplied on the project, a complete input/output matrix, and sequences of operation of all equipment and systems served.
  - The 90 day submittal will contain a one line graph of the entire system architecture, an electronic copy of the BAS code, and the system graphics that will be displayed.

- In all cases the location of all mechanical equipment will be determined by the provision that full accessibility can be afforded to the Air Force's staff completely around 100% of all mechanical equipment for purposes of operation and maintenance. The chiller tube pull spaces can be accommodated by proximity location of the chillers to exterior doors easily operable during times of maintenance. Mechanical rooms will be located on the ground floor level to facilitate access by maintenance personnel. Size mechanical rooms so equipment can be maintained, repaired, or replaced without having to remove walls, doors, or other equipment.

- The developer and the mechanical design team will take economic advantage of all available rebates for energy efficient equipment and systems. They will also cooperate with similar rebate applications undertaken by the Air Force.
- The distribution of hydronic systems to the areas served will be by reverse return piping loops. Provide at a minimum 2 per floor. The mechanical designer will propose the most effective and economic sizing, location, and quantities as deemed necessary for the specific requirements of each area served.
- Zoning of the project will follow the specific departmental criteria defined by the Program. Where areas do not appear to be specifically addressed or appear to be only partially addressed, the area zoning will conform to the following criteria:
    - Divisions and separations across every floor will accommodate SAMS Massing and Façade Guidelines adhering to the "Floor Plate and Typical Floor-Building Section Analysis" diagram in particular. (ie. Open office landscape, closed office areas, etc.)
    - All perimeter building areas will at a minimum be separated and zoned by exposure. Resulting corner areas will operate independently from either of the adjoining exposures and be accorded their own zones.
    - Zones in no case will encompass more than 2,500 square feet of building net floor area.

- Design Criteria: In all cases the design shall comply with the latest edition of Title 24. (Propose variances as determined necessary by the mechanical design engineer, licensed in the State of California.) Design considerations should include chillers sized to service the sensible heat load by complex with sufficient extra capacity to carry the entire load during maintenance and failures. This type of design strategy will reduce operating risk and allow for a more reasonable maintenance schedule. Individual roof mounted package units are not an acceptable design solution. However, in special cases such as SCIF space and telephone equipment rooms, standalone HVAC systems may be justified.
    - Entering Chilled Water Temperature: 45 degrees F (7.2 degrees C).

- Leaving Chilled Water Temperature: 55 degrees F (12.8 degrees C).
- Entering Heating Water Temperature: 180 degrees F (82 degrees C).
- Heating Water Reset: Reset temperature based on outside air temperature.
- Leaving Heating Water Temperature: 160 degrees F (71 degrees C).
- Cooling Leaving Air Temperature: 55 degrees F (12.8 degrees C).
- Heating Leaving Air Temperature: 105 degrees F (40 degrees C).
- Entering Condenser Water Temperature: Meet ASHRAE parameters.
- Leaving Condenser Water Temperature: Meet ASHRAE parameters.
- Leaving Condenser Water Temperature: 85 degrees F (30 degrees C).
- Entering Air Temperature: 77 degrees F (25 degrees C), wet-bulb; 88 degrees F (48 degrees C), dry-bulb.

- HVAC Reliability: The HVAC load calculations are based upon three load sources: sensible heat load from lighting and occupants, personal heat load from appliances and accessories powered from utility power and the heat load generated from computers and telecommunications equipment powered from technical power. The power requirements load tables in the following section estimate the loads attributed to utility power and technical power by functional area.

  - Chillers: Provide multiple chillers to deliver design load capacity (not less than two).
    - For 2 Chillers: Size each at 60 percent of design load capacity.
    - For 3 Chillers: Size each at 50 percent of design load capacity.
    - For 4 Chillers: Size each at 40 percent of design load capacity.
  - Boilers: Provide multiple boilers to deliver design load capacity (not less than two in each location for any alternative option).
    - For 2 Boilers: Size each at 60 percent of design load capacity.
    - For 3 Boilers: Size each at 50 percent of design load capacity.
    - For 4 Boilers: Size each at 40 percent of design load capacity.
  - Cooling Towers: Provide multiple cooling towers to deliver design load capacity (not less than two).
    - For 2 Cooling Towers: Size each at 60 percent of design load capacity.
    - For 3 Cooling Towers: Size each at 50 percent of design load capacity.
    - For 4 Cooling Towers: Size each at 40 percent of design load capacity.
  - Pumps: Provide multiple pumps to deliver design flow requirements (not less than two).
    - For 2 Pumps: Size each at 100 percent of design flow.
    - For 3 Pumps: Size each at 50 percent of design flow.
    - For 4 Pumps: Size each at 33.3 percent of design flow.

    - Provide a stand-by pump for each chiller, boiler, and condenser water pump.

  - Substantiation:
    - Preliminary Design: Identification of design strategies to minimize HVAC disturbances.
    - Design Documents: Identification of equipment that requires redundancy.
    - Construction: Functional performance testing.
    - Occupancy:
      - If equipment is damaged or malfunctions within one year after completion, report of the cause of equipment damage or malfunctions.
      - Corrective Action: Provide corrective measures necessary to eliminate equipment damage and malfunctions.
      - Corrective Action Report: Identification of corrective measures implemented to protect HVAC equipment. Verify that HVAC equipment is operating properly and without damage.

- Test, Adjust, and Balance (TAB) will be part of the project Quality Assurance program and as such will be provided by the commissioning authority. The assistance of an independent third party Commissioning Authority should be considered. These services should start at the inception of the project and extend through post construction system testing and documentation. The goals of the commissioning process should include:
  - Improve energy performance;
  - Improve operating strategies;
  - Provide building system documentation;
  - Improve operator training; and
  - Ensure proper application of new technologies.

  These goals should ensure a smoother building turnover from contractor to Air Force, improve building performance, reduce contractor callbacks, and improve worker safety and productivity.
  - TAB costs will not be the responsibility of the developer. Coordination and conformance with the TAB agency, however, will be the responsibility of the developer.
  - Successful testing, adjusting, and balancing of the HVAC systems will constitute an essential criterion for completion of the mechanical work and acceptance of the systems involved by the Air Force.

- DDC Controls contractor/vender will conduct two levels of Quality Assurance to verify that the required installation and performance of the Building Automation System has been met.
  - Static Commissioning:

    - A point to point examination and documentation of the successful installation of the BAS system and its components in its entirety.
    - The start up of all HVAC equipment and associated systems will not commence until this work has been completed and the documentation is received by the commissioning authority.
- Dynamic Commissioning:
    - A point by point demonstration and documentation of the successful performance of the BAS system and its components in its entirety.
    - The verification demonstrations of all HVAC equipment and associated systems will not commence until this work has been completed and the documentation is received by the commissioning authority.

The HVAC requirements are summarized in the following table.

Table 6.3-1 HVAC Requirements

Space Type	Temp.	Humidity	Notes
Office Space			1
Conference Rooms			1
Conference Facility			1
Presentation Rooms			1
Training Rooms			1
Specialty Areas			
Command Post	70F +/- 5F	50%+/- 20%	
BNCC	70F +/- 5F	50%+/- 20%	
SERF			1
Classified Work Rooms			1
SCIF	70F +/- 5F	50%+/- 20%	
Communications Space			
Consolidated NCC	70F +/- 5F	50%+/- 20%	
Classified Equipment Room	70F +/- 5F	50%+/- 20%	
Dial Central Office	70F +/- 5F	50%+/- 20%	
DCO Battery Room	70F +/- 5F	50%+/- 20%	2
Switchboard Operator Room	70F +/- 5F	50%+/- 20%	
MDF	70F +/- 10F	50%+/- 30%	
Cable Vault	70F +/- 10F	50%+/- 30%	
Telecommunications Closets	70F +/- 5F	50%+/- 20%	
Miscellaneous Spaces			
Photo Lab	70F +/- 5F	50%+/- 20%	
Video Lab			1
Art Services			1
Business Centers			1
Facility Spaces			3

Notes:

1 Design HVAC system for maximum calculated air flow utilizing no heat / no cool operation with fresh air intake

2 Provide positive ventilation capable of syncing with battery charge cycle

3 Temperature and humidity requirements shall not exceed manufactures recommended requirements for installed equipment

8.3 ELECTRICAL SECTION

8.3.1 General Requirements:

- Provide electrical power with the appropriate characteristics to operate all electrically operated devices. The terms 'offeror", "design/builder", and "developer" will be considered equivalent and used interchangeably. Each SAMS building shall have the capability of providing four basic types of power:
  - Non-essential Utility (NU) Power – for non-essential equipment and general purpose receptacles
  - Essential Utility (EU) Power – for emergency lighting, essential HVAC, receptacles, alarm and security circuits
  - Non-essential ADP (NA) (or technical) Power – for communications equipment, personal computers, printers and peripherals
  - Essential ADP (EA) Power – for critical communications and computer-related equipment

- Essential Power systems will include the required transfer switching devices to accommodate generator power as an alternate source to the Base electrical feed.

- ADP Power systems will include surge suppression and isolation systems such as K-13 rated transformers and Transient Voltage Surge Suppressors (TVSS) to deliver conditioned power to data processing devices.

- Uninterruptible Power Supplies (UPS) will be GFGI, but the building design should allow for a building-wide UPS system to be installed at a future date.

- The following tables provide estimated power loads for the SAMS project by area type.

Table 6.4.1-1 Office Space Power Requirements

	Tech Power					Utility Power		
Office Space:	**CPU (W)**	**Monitor (W)**	**TV (W)**	**Personal Printer (W)**	**STU/Peripherals (W)**	**Task Lighting (W)**	**Miscellaneous (W)**	**Notes**
OL-1	600	300	150	150	200	200	150	
OL-2	600	300	150	150	200	200	150	
OL-3	300	150	150	150	150	100	100	
OL-4	300	150	0	150	100	100	100	
OL-5	300	150	0	0	100	100	100	
SL-1	300	150	0	0	100	80	100	
SL-2	300	150	0	0	50	80	50	
SL-3	300	150	0	0	50	80	50	

Table 6.4.1-2 Conference Space Power Requirements

	Tech Power							Utility Power			
Conference Spaces:	**O/H or Rear Projection/VTC System (W)**	**Desktop Projector (W)**	**VTC Credenza or cart (W)**	**Personal Computer (W)**	**Laptop (W)**	**Network Printer (W)**	**Television (W)**	**Copier (W)**	**Shredder (W)**	**Miscellaneous (W)**	**Notes:**
CL-1	2800	0	0	450	1500	0	150	0	0	400	
CL-2	2800	0	0	450	1000	0	150	0	0	400	
CL-3	2800	0	0	450	1000	0	150	0	0	400	
CL-4	0	500	1000	450	800	0	150	0	0	400	
CL-5	0	500	0	0	500	0	150	0	0	400	
SCL-6	0	0	0	0	300	0	0	0	0	300	
SCL-7	0	0	0	0	300	0	0	0	0	300	
Conference Center	Note 1	0	Note 1	Note 1	0	0	Note 2	0	0	Note 3	
Presentation Room	2800	0	0	1350	0	0	Note 4	0	0	1000	
Court Room	800	0	0	2150	0	0	300	0	0	1000	

Notes:

1. Allow for one 800 W projector, one 1000 W VTC cart and one 450 W personal computer per partitioned area.
2. Allow for two 150 W televisions per partitioned area.
3. Allow for 1000 W of miscellaneous utility power load per partitioned area
4. Allow for one 150 W television placed every 30 ft along side walls.
5. Allow for one 450 W PC per seat

Table 6.4.1-3 Training Space Power Requirements

Training Space:	Tech Power				Utility Power		Notes:
	Overhead Projector (W)	Each Student Area (W)	Television (W)	Miscellaneous (W)		Misc. Loads (W)	
CZ Training Room	800	450 W per student	300	500		500	
CL Training Room	800	450 W per student	300	500		500	
AX Training Room	800	450 W per student	300	500		500	
DSMA Training Room Lg	1600	450 W per student	900	1500		1500	
DSMA Training Room Sm	800	450 W per student	300	500		500	
FM Training Room	1600	450 W per student	600	1000		1000	
MT Training Room	800	450 W per student	600	1000		1000	
PK Training Room	800	450 W per student	300	500		500	
XPM Training Room	1600	450 W per student	600	1000		1000	
61 CS Training Room Lg	1600	450 W per student	600	1000		1000	
61 CS Training Room Sm	800	450 W per student	300	500		500	

Table 6.4.1-4 Specialty Space Power Requirements

Specialty Space:	Tech Power					Utility Power		Notes:
	Rack/Server Suite Power (W)	Console Power (W)	Personal Computer (W)	Printer & Business Machine (W	Radios (W)	Miscellaneous (W)	Noise Generator	
Classified Work Area	4000	0	450W ea	3000	0	500	0	
MT SERF	4000	0	450W ea	3000	0	500	0	
Command Post Command Center	0	3000	0	3000	1000	500	0	
BNCC	4000	0	900	1000	0	300	0	
SCIF								
SCIF Equipment Room	10000	0	0	0	0	500	300	
IN								
Reservist Lab	0	0	10800	1500	0	500	-	
Research Center	0	0	6750	1500	0	500	-	
Computer Lab	0	0	8100	1500	0	500	-	
IN/PWW Equipment Room	28000	0	0	0	0	500	-	
Library (1 Large Room)	0	0	4500	3000	0	500	-	
PWW Server Room	10000	0	9000	0	0	500	-	
IN Server Room	0	0	8400	0	0	500	-	
XR								
Secret Equipment Room	20000	0	0	0	0	500	-	
Secret Computer Room	20000	0	13500	1500	0	500	-	
Top Secret Computer Room	4000	0	9000	1500	0	500	-	
Blue Room	2000	0	1250	0	0	500	-	1

Notes:

1. 2000 W includes VTC and projection equipment

Table 6.4.1-5 Miscellaneous Space Power Requirements

Miscellaneous Space	Tech Power			Utility Power		Notes:
	Production Equipment (W)	Overhead Projector & VTC System (W)	Personal Computers (W)	Production Equipment (W)	Miscellaneous (W)	
61 CS/SCSV						
Photo Lab						
Development Room	0	0	0	20000	1000	
Studio	4000	0	0	8000	1000	
Digital Development	12000	0	1800	2000	1000	
Office	0	0	3600	0	1000	
Storage	0	0	0	0	1000	
Video Lab						
Editing Suite	10000	0	450	0	500	
Tape Library	0	0	0	0	500	
Dubbing Room	2000	0	450	0	500	
Viewing Room	0	2800	0	1000	500	
Office Area	0	0	3600	0	1000	
Art Services						
Work Room	0	0	0	40000	1000	
Office/Work Area	0	0	2700	0	1000	
Processing Room	0	0	0	4000	1000	
Storage	0	0	0	0	1000	
Presentations						
VTC	0	2800	1350	0	1000	
Board Room	0	2800	450	0	2000	
Office Area	0	0	2700	0	1000	
Storage	0	0	0	0	1000	
Conference Room	0	2800	1350	0	2000	
Business Center	4800	0	0	3200	1000	
Consolidated Club	0	2800	10000	0	80000	
Child Development Center	0	0	10000	0	40000	

General Note: These power requirements must be validated by the government during the design process

Table 6.4.1-6 Communications Space Power Requirements

Communications Space	Tech Power		Utility Power		Notes:
	Rack Power (W)		Tools (W)	Battery Racks (W)	
Cable Vault (Entrance Facility)	Minimal Active Communications Equipment				
Main Distribution Frame (MDF)	Minimal Active Communications Equipment				
Telecomm Room (TR)	14000	0	500	0	
Dial Central Office (DCO)	60000	0	500	0	1
DCO Battery Room	0	0	500	11000	
Switchboard Operator Room	4000	2250	500	0	2
Consolidated NCC (CNCC)	55000	9000	2000	0	
CLASSIFIED Equipment Room (CER)	30000	0	500	0	
Satellite Classified Equipment Rm (CER)	14000	0	500	0	

Notes:

1. Actual power requirement will be dependent on the type and manufacturer of switch chosen.
2. Personal computer power based on 5 operators at 450 W per computer.

- The power requirements for facility spaces such as Electrical and Mechanical Rooms is dependent on the building design. Other facility areas shall be calculated based upon sensible heat loads only.
- The electrical system comprises the following elements:
  - Electrical Energy Generation: Utility power sources, engine-generator systems, battery power systems, uninterruptible power supply systems and unit power conditioners.
  - Service and Distribution: Service entrance equipment, distribution equipment, transformers, motor control equipment, service and feeder wiring (conductors and raceways), monitoring, safety and control equipment, and other elements required for a complete functional system.
  - Branch Circuits: Branch circuit wiring and receptacles and other

branch circuit wiring systems.

- Utility Revenue Meters: Meter incoming electrical service on the low-voltage side of the service transformer (secondary metering).
- Substantiation: Continuity test of wiring systems prior to functional performance test

8.3.2 Exterior Electrical Equipment

- All Electrical systems and wiring shall conform to NFPA 70 (National Electric Code - 2002), NFPA 101 (Life Safety Code), NFPA 780 (Lightning Protection Code), and IEEE C2 (National Electric Safety Code).

- Each SAMS building shall have a single utility area where facility equipment such as generators, transformers and chillers are located. This area shall be located out of sight of main building entrances and courtyards, but accessible to service roads and equipment maintenance vehicles. The external equipment area shall be fenced and provided with force protection bollards around the perimeter. The space shall be sized to accommodate two transformer pads, two generator pads and chiller pads or other facility equipment as required.

- All exterior equipment shall be mounted on individual concrete pads, so that the distance between equipment items is no less than 10', and the personal egress space around pad mounted equipment is no less than 40". Transformer pad size shall be a minimum of 6'x8'. Generator pads shall be a minimum of 28'x8' with a 6" containment wall around the perimeter. Concrete shall be monolithic pour and shall be Class A 3000 psi.

- Each SAMS building shall have a minimum of one transformer per building to convert the Base electrical feed to 480/277 Volts(V), with appropriate conveyances and feeders to the main electrical room to accommodate the total capacity of the transformer. The second transformer pad, if not immediately used, shall be stubbed out with identical conveyances and feeders to the main electrical room. Size the transformer(s) to accommodate 125% of the total capacity of the main electrical switchboard.

- Provide electrical wiring pedestals at each generator pad and stub out both pads to the main electrical room. Size conveyances, ground wires and feeders to accommodate one 500KVA GFGI transformer at each pad.

8.3.3 Exterior Grounding

- Install a ring ground around each building IAW NEC Article 250-81 (d) with evenly-spaced ground rods and test wells. The impedance to ground

shall be no greater than 5 Ohms. Bond all equipment and other grounding systems to the earth electrode IAW NEC Article 250-81.

- Install a ring ground around each pad with a minimum of two ½" x 8' minimum size ground rods, one with a test well.

- Install one ½" x 8' minimum size ground rod per light pole.

8.3.4 Interior Electrical Equipment

- There shall be one main electrical equipment room per SAMS building. The room must be accessible, and as near to the pad-mounted exterior equipment area as possible. Size the room to accommodate Protection Equipment, Main Electrical Switch Board (MSB), Electrical Distribution Panels, transfer switches, transformers and circuit breaker panels feeding receptacles and devices in the immediate surrounding area. Allow extra space for a future building UPS and UPS transfer switch system.

- Small electrical rooms shall be provided on each floor to provide electrical branch circuits to each 10,000 sq ft of usable floor space. The rooms shall be equal in number and located adjacent to each Telecommunications Room. Size each room to accommodate a minimum of three circuit breaker panels and any transformer necessary for 208/110V panels, if not included in the Main Electrical Room. Each electrical room in non-SCIF areas shall have a minimum of the following:
  - One NU circuit breaker panel
  - One NA circuit breaker panel
  - One EU circuit breaker panel in a minimum of 50% of electrical rooms
  - One EA circuit breaker panel in a minimum of 50% of electrical rooms

- Provide one electrical room within the main SCIF, which will serve as a singular SCIF entrance facility for electrical and communications cables. Size the electrical room to accommodate a minimum of eight circuit breaker panels and four power line filters. The SCIF electrical room shall have a minimum of one of each type of circuit breaker panel. If separate RED power is required IAW NSTISSAM TEMPEST 2/95, a minimum of two of each type of circuit breaker panel is required

- Provide one electrical room within each SPO's SCIF area, which will serve as a singular SCIF entrance facility for electrical and communications cables for the particular SCIF. This electrical room may be consolidated with the equipment room.

- Configuration: Design wiring and protective devices so that outages caused by local overloads do not affect unrelated areas or systems.

- Provide all switchboards with adjustable rate setting switches.

- Branch-Circuit Panelboards:
  - Provide a dedicated panelboard for lighting that is separate from panelboards serving equipment and sensitive electronic equipment.
  - Provide individual power and lighting panelboards at each classified and critical area, at the SCIF, at the SERF, at the Command Centers, etc.

- Motor Control: Provide motor control centers for each group of 5 motors. Provide motors with the appropriate protective, control, and indicating devices.
- Locate monitoring read-out at one central location.
- Monitoring: Provide local and remote monitoring of the following per building:
  - Switchboard Monitoring:
    - Power Analysis Values:
      - Output voltage of each phase; phase-to-phase and phase-to-neutral.
      - Output current; each phase and ground.
      - Real power; per phase.
      - Reactive power; per phase.
      - Apparent power; per phase.
      - Power factor; per phase.
      - Frequency.
    - Demand Readings:
      - Demand current; per phase and peak.
      - Average power factor; 3-phase total.
      - Demand real power; 3-phase total.
      - Demand apparent power; 3-phase total.
      - Demand reactive power; 3-phase total.
      - Coincident reading.
      - Predicted Demands.
  - Locate monitoring read-out at one central location.
  - Motor Control Center Monitoring:
    - Power Analysis Values:
      - Output voltage of each phase; line-to-line and line-to-neutral.
      - Output current; each phase and ground.
      - Real power; per phase.
      - Reactive power; per phase.
      - Apparent power; per phase.
      - Power factor; per phase.
      - Frequency.
    - Voltage Regulation: Within 3 percent of design voltage at all

branch receptacles.

8.3.5 Distribution Equipment

- All electrical distribution equipment must be able to withstand maximum fault current without other current-limiting devices. Copper terminating equipment located at the building entrance facility will be equipped with primary protectors In Accordance With (IAW) UL497 and secondary protectors IAW UL497A

- The MSB will accept a 480/277V feed from the building transformer and be capable of delivering power for all four types of distributed power. The MSB shall be equipped with TVSS and shall be sized to accommodate 125% of the total capacity of the distribution panels and other loads it directly feeds. Spare cubicles shall be equipped with drawout mechanisms ready to accept circuit breakers for future growth.

- Distribution panels for each type of power shall be sized to accommodate 125% of total rated load of all circuit breaker panels served, and include circuit breakers for unused positions.

- The Essential Utility Distribution Panel shall have the following characteristics:
  - A 480/277V panel providing power for 24x7 HVAC & emergency lighting
  - The panel shall also provide 208/110V power distribution for receptacles, strobe lights & electronic security
  - The panel shall be sized to accommodate 125% of total capacity of all EU circuit breaker panels

- Provide a 480/277V tie circuit breaker system or Transfer Switch system to switch Essential Utility Distribution Panel feed from the MSB to generator power. The Transfer Switch shall be capable of running in automatic or manual mode. A Loss-of-commercial power alarm shall be routed to the Command Post for manual transfer switch operation. The Transfer Switch or Tie Circuit breaker system shall be connected to one or both generator pedestals, as determined by the government during the design-build process.

- The Non-Essential Utility Distribution Panel shall have the following characteristics:
  - A 480/277V panel for non-essential HVAC, lighting and other facility equipment
  - The panel shall also provide 208/110V power distribution for general-purpose receptacles, shredders, copiers, kitchen and break areas, and small equipment items.

    - The panel shall be sized to accommodate 125% of total capacity of all NU circuit breaker panels

- The ADP (Technical Power) Distribution Panel(s) shall have the following characteristics:
    - A 208/110V distribution panel for computer or communications-related equipment
    - Provide a 480-to-208V K-13 type transformer to feed the ADP distribution panel(s). Size the transformer to accommodate 125% of the total capacity of the panels it feeds.

- Provide a singular panel with a tie circuit breaker system segmenting branch circuits into Non-essential (fed from MSB only) and Essential (generator backup), or provide two separate panels, one essential and one non-essential.

- Provide a 208/110V tie circuit breaker system or Automatic Transfer Switch (ATS) system to switch the essential ADP feed from MSB to generator power.

- The Transfer Switch or Tie Circuit breaker system shall be connected to one or both generator pedestals, as determined by the government during the design-build process.

- Locate all circuit breaker panels in dedicated electrical rooms, if possible. Panels located in areas other than electrical or equipment rooms shall be flush mounted. All panels must be accessible, as defined by NEC Article 100.

- Panels located in the SCIF electrical room shall only feed circuits within the SCIF. No branch circuits within the SCIF shall originate from circuit breaker panels outside the SCIF.

- Wherever possible, ensure that each panel only provides circuits for the same floor in which the panel is located. Exceptions are:
    - Roof may be fed from top floor panel
    - Exterior perimeter and lighting may be fed from the basement

- Avoid daisy-chaining circuit breaker panels. Each panel should be fed separately from its distribution panel, or from a 277/480V panel and transformer.

- Allowable panel types are:
    - Busses Greater than 125A, 30 pole minimum
    - Busses 125A or less, 24 pole minimum

- Circuit breaker panels shall not be loaded to more than 75% of their maximum rated value, and breaker positions in any one panel must only be 80% populated at building occupancy. Include a minimum of three spare circuit breakers per panel.

- NA and EA Tech power panels must be fed from K-13 rated isolation transformers, must include internally mounted TVSS's, and must have a neutral buss sized to 200% of the panel's rated Amperage.

- Junction Boxes, Consolidation Points, Pull Points, Conduit boxes and other electrical enclosures must be accessible, as defined by NEC Article 100

- Emergency Power Off (EPO) Switches shall be required IAW NEC Article 645-10 for all equipment rooms and the SCIF electrical room. EPO switches shall provide disconnecting means for all ADP circuit breaker panels and all HVAC units located in that area.

8.3.6 Interior Grounding

- Provide a Telecommunications Main Grounding Busbar (TMGB) IAW ANSI TIA/EIA 607 in the main Telecommunications Equipment Room (ER), as close to the service entrance as practicable, and bond it directly to the Electrical Service Entrance Ground. Bond all primary cable protection equipment to the TMGB.

- Provide a lightning protection system in accordance with NFPA 780 and bond to the building's earth electrode system.

- All copper bonding conductors for telecommunications equipment and conveyance systems shall be stranded and shall be sized to a minimum of #6 AWG. Bonding conductors shall be made as short as possible and routed with minimum bends or changes in direction.

- Provide TGBs IAW ANSI TIA/EIA 607 in all TRs, telecommunications equipment rooms, and other special purpose raised floor areas with rack-mount equipment. Mount TGBs under the raised floor with minimum 2.4" insulators. If TGBs are installed in a room without a raised floor, mount them a minimum of 7' high on a telecommunications backboard and cover with a clear protective shield.

- Bond each TGB to telecommunications equipment and/or rack grounding bars located in that room, and to other permanent metallic systems in the area, if accessible. If building steel is not used for lightning protection, bond the TGB to the building steel.

- Bond Black TGBs to TMGB via a Telecommunications Bonding Backbone (TBB)
- Red TGBs are individually bonded to the TMGB.

  - Provide a TBB IAW ANSI TIA/EIA 607 within each building. The TBB shall be designed to take as direct a path as possible from the farthest BLACK TGB to the TMGB. For larger buildings, multiple TBBs may be used to decrease the distance to the TMGB. Interconnect multiple TBBs at the ends farthest from the TMGB

  - In rooms with Red non-TEMPEST-certified telecommunications equipment, provide a Red Ground IAW NSTISSAM TEMPEST 2/95 and AFSSM 7011, Section 8.35.4. Where possible, implement a Red equipotential grid under the Red equipment areas of the raised floor in SCIFs and Secret equipment rooms. For areas without raised floors, a single-point ground with 1/0 AWG insulated cable is acceptable. Bond Red Ground (grid or single point) to a Red TGB. Maintain 5 cm spacing from Black signal, power and ground wires, or 15 cm when wires are run in parallel.

  - Where possible, provide a BLACK equipotential grid under raised floors in black equipment areas. For areas without raised floors, a single-point ground with 1/0 AWG insulated cable is acceptable. Maintain spacing from Red signal, power and ground wires as specified for Red ground.

  - Separate RED and BLACK Power systems shall be required IAW NSTISSAM TEMPEST 2/95 if the power exiting classified areas is less than 100 KVA. Red power requirements for areas other than the SCIF shall be met with the use of in-line GFGI UPS equipment.

8.3.7 Red / Black Power

- If Red power is required in the SCIF, provide LC power line filters installed between the power cabling entry point and each Red circuit breaker or distribution panel in the SCIF electrical room. Filters and Red electrical panels shall be placed as close to the cabling entry point as possible. Red power lines shall be kept separate from Black conductive signal lines, Black power lines and Black equipment by at least 6 inches.

- Refer to the following documents for further information:
  - DCID 1-21
  - NSTISSAM TEMPEST 2/95, para 4.7.2
  - AFSSM 7011, para 8.26 through 8.33 and Attachment 16

- Circuit breaker panels for Black power shall be located in the SCIF Electrical Room on a separate wall from the Red power equipment. Black power lines shall be kept separate from Red conductive signal lines, Red power lines and Red equipment by at least 6 inches.

8.3.8 Miscellaneous Power Requirements

- The standard branch circuit shall be 20A unless otherwise specified. The standard will be increased as needed where the equipment load, manufactures specification, or design require a higher current branch circuit. The following items require dedicated circuits:
  - Copiers
  - Shredders
  - Vending Machines
  - Overhead Projectors
  - Equipment Racks and Frames
  - All Essential Power receptacles and devices not located in office areas

- Size feeder cables to accommodate entire rated load of the device it serves (ie, breaker panel) and IAW NFPA 70, minimum size #12 AWG. Feeder or bus taps are not permitted. All cables shall be installed in separate raceways or conduits from telecommunications cabling

- No more than three single-phase circuits shall be contained in a single conduit. Feeders from separate sub-distribution systems shall not be contained in the same conduit. Conveyances shall be sized to accommodate the maximum number of feeder cables appropriate for the type of use required, but no smaller than ¼".

- Provide circuits and receptacles to all areas following the guidelines established in the NEC. In addition to those listed above, the following circuiting restrictions apply:
  - One duplex receptacle per single phase EA Power circuit, except when supplying office work areas
  - Three duplex receptacles per 120V, 20A EA Power circuit for office work areas.
  - Four duplex receptacles per 120V, 20A single phase NA power circuit
  - One duplex receptacle per single phase EU power circuit
  - Eight duplex receptacles per 120V, 20A single phase NU power circuit for general purpose receptacles
  - Two duplex receptacles per 120V, 20A single phase NU power circuit for hallways, receptacles used for floor cleaning machines, and drinking fountains
  - One duplex receptacle per 120V, 20A single phase NU power circuit for coffee and vending areas

- The following tables provide the recommended distribution of receptacles for the SAMS project by power and area type.

Table 6.4.8-1 Office Space Receptacle Requirements

Office Space:	Tech Power **Wall/Panel Duplex Receptacles**	Utility Power **Wall/Panel Duplex Receptacles**	**Notes**
OL-1	4	8	1,2
OL-2	4	8	1,2
OL-3	3	6	1,2
OL-4	2	5	1,2
OL-5	2	4	1,2
SL-1	2	1	3
SL-2	2	1	3
SL-3	2	1	3

Notes:

1. Space outlets evenly with a minimum of one utility outlet on each wall
2. 25% of Tech Power receptacles in SCIF offices shall be Essential Tech Power
3. Place one duplex utility power receptacle per 40 linear ft of exposed hard-wall space in SL areas

Table 6.4.8-2 Conference Space Receptacle Requirements

	Tech Power							Utility Power			
Conference Spaces:	**Rear Projector (Ceiling J-Box)**	**O/H Projector (Duplex Above-Ceiling Receptacle)**	**Duplex Floor Receptacle**	**Podium (Duplex Floor Receptacle)**	**Clock/Display Duplex Receptacles (18" Below Finished Ceiling)**	**VTC Control, cameras & sound system**	**Perimeter Duplex Wall/Panel Receptacle**	**Motorized Screen (Ceiling J-Box)**	**Projector Lift (Ceiling J-Box)**	**Perimeter Duplex Wall/Panel Receptacle**	**Notes:**
CL-1	1	2	2	1	2	3	12	2	2	12	1, 11
CL-2	1	2	2	1	2	3	10	2	2	10	1, 11
CL-3	1	1	2	1	1	2	10	1	1	10	1, 11
CL-4	0	1	2	0	0	2	8	1	1	8	1
CL-5	0	1	2	0	0	0	5	1	1	5	1
SCL-6	0	0	1	0	0	0	4	0	0	4	1
SCL-7	0	0	1	0	0	0	2	0	0	2	1
Conference Center	0	Note 2	Note 3, 5	0	Note 4, 5	0	Note 6	0	Note 2	Note 6	
Presentation Room	1	2	2	3	Note 4	3	Note 7	2	2	Note 7, 8	11
Court Room	0	1	7	0	2	0	Note 7	1	1	Note 8	10

Notes:

1. Locate floor receptacles under conference/work tables
2. Place one ceiling projector duplex receptacle and one projector lift J-Box in each partitioned area
3. One quad receptacle per 400 ft^2 of floor space. Covers shall be load bearing, flush with floor, and coordinated with room finish.
4. Place recessed clock/display receptacles 18" Below Finished Ceiling, 1 per 40 ft of linear wall space.
5. Coordinate placement of receptacles or J-Boxes within partitioned areas.
6. One Tech Power and one Utility Power duplex receptacle per every 12 ft of linear wall space, plus one per support column.
7. Place one duplex receptacle 18" Below Finished Ceiling and one 18" Above Finished Floor in each corner of the room.
8. Place one duplex utility power wall receptacle every 16 ft of linear wall space.
9. Place Wall receptacles at the rear of the room for LAN equipment, printers, photocopiers and shredders.
10. Coordinate placement of floor receptacles under tables/desks and at the front of the spectator gallery.
11. Each Room will have either a rear projection or an overhead projection system, but not both.

Table 6.8.1-3 Training Space Receptacle Requirements

Training Space:	Tech Power					Utility Power			Notes:
	Projector (Above-Ceiling Duplex Receptacle)	Each Student Area (Under-Table Duplex Outlet)	Television (Duplex Ceiling Receptacles)	Perimeter Duplex Wall Receptacles	Podium (Duplex Floor Receptacle)	Motorized Screen (Above-Ceiling J-Box)	Projector Lift (Above-Ceiling J-Box)	Perimeter Duplex Wall Receptacles	
CZ Training Room	1	1 per student	2	1 per 12 ft	0	1	1	1 per 12 ft	1
CL Training Room	1	1 per student	2	1 per 12 ft	0	1	1	1 per 12 ft	1
AX Training Room	1	1 per student	2	1 per 12 ft	0	1	1	1 per 12 ft	1
DSMA Training Room Lg	2	1 per student	6	1 per 12 ft	1	2	2	1 per 12 ft	1,2
DSMA Training Room Sm	1	1 per student	2	1 per 12 ft	0	1	1	1 per 12 ft	1
FM Training Room	2	1 per student	4	1 per 12 ft	1	2	2	1 per 12 ft	1,2
MT Training Room	1	1 per student	4	1 per 12 ft	0	1	1	1 per 12 ft	1,2
PK Training Room	1	1 per student	2	1 per 12 ft	0	1	1	1 per 12 ft	1
XPM Training Room	2	1 per student	4	1 per 12 ft	1	2	2	1 per 12 ft	1,2
61 CS Training Room Lg	2	1 per student	4	1 per 12 ft	1	2	2	1 per 12 ft	1,2
61 CS Training Room Sm	1	1 per student	2	1 per 12 ft	0	1	1	1 per 12 ft	1

Notes:

1. 1 per 12 ft = 1 duplex receptacle per 12 ft of linear wall space
2. Place television receptacles in pairs on opposite walls. Space each pair of receptacles evenly among partitioned areas

Table 6.4.8-4 Specialty Space Receptacle Requirements

Specialty Space:	Tech Power				Utility Power		Notes:
	20A Essential Power Circuits - Rack	30A 208/220V Essential Power Circuits - Racks	Essential Power Wall/Panel Duplex Receptacles	Non-Essential Power Wall/Panel Duplex Receptacles	Essential Utility Duplex Wall Receptacles	Non-Essential Utility Duplex Wall Receptacles	
Classified Work Area	2	0	0	1 per seat	1 per 4 NUs	1 per 12 ft	1
MT SERF	2	0	0	1 per seat	1 per 4 NUs	1 per 12 ft	1
Command Post Command Center	0	0	Note 2	0	Note 3	1 per 12 ft	
BNCC	2	0	4	0	1	4	
SCIF							
SCIF Equipment Room	5	0	0	0	4	4	
IN							
Reservist Lab	0	0	24	0	1 per 4 NUs	1 per 12 ft	1
Research Center	0	0	0	15	1 per 4 NUs	1 per 12 ft	1
Computer Lab	0	0	18	0	1 per 4 NUs	1 per 12 ft	1
IN/PWW Equipment Room	14	0	0	0	1 per 4 NUs	1 per 12 ft	1
Library (1 Large Room)	0	0	0	10	1 per 4 NUs	1 per 12 ft	1
PWW Server Room	0	5	15	0	1 per 4 NUs	1 per 12 ft	1
IN Server Room	0	0	14	0	1 per 4 NUs	1 per 12 ft	1
XR							
Secret Equipment Room	10	2	0	0	1 per 4 NUs	1 per 12 ft	1
Secret Computer Room	10	2	0	30	1 per 4 NUs	1 per 12 ft	1,4
Top Secret Computer Room	2	0	0	20	1 per 4 NUs	1 per 12 ft	1
Blue Room	0	0	8	0	0	8	5

Notes:

1. NU = Non-essential Utility Wall receptacles, 1 per 12 ft = 1 duplex receptacle per 12 linear feet of wall space
2. One Essential Tech Power receptacle per every other console bay, plus four in consolidated business area for printers
3. 1 Duplex receptacle per 12 linear feet of wall space, plus four in business area for copiers & shredders
4. Place 20 duplex receptacles in the walls, 10 duplex outlets in the floor
5. Provide the same AV presentation receptacles and junction boxes as a CL-4 conference room

Table 6.4.8-5 Miscellaneous Space Receptacle Requirements

Miscellaneous Space	Tech Power			Utility Power			Notes:
	Duplex Wall Receptacles	Duplex Floor Receptacles	Overhead Projector Ceiling Receptacle	Duplex Wall Receptacles	Motorized Screen Ceiling J-Box	Projector Lift Ceiling J-Box	
61 CS/SCSV							
Photo Lab							
Development Room	0	0	0	12	0	0	
Studio	4	0	0	8	0	0	
Digital Development	10	0	0	4	0	0	
Office	2 per seat	0	0	1 per 12 ft	0	0	1
Storage	0	0	0	1 per 12 ft	0	0	1
Video Lab							
Editing Suite	1 per 12 ft	0	0	1 per 12 ft	0	0	1
Tape Library	0	0	0	1 per 12 ft	0	0	1
Dubbing Room	6	0	0	1 per 12 ft	0	0	1
Viewing Room	4	0	1	1 per 12 ft	1	1	1
Office Area	2 per seat	0	0	1 per 12 ft	0	0	1
Art Services							
Work Room	0	0	0	1 per 6 ft	0	0	
Office/Work Area	2 per seat	0	0	1 per 12 ft	0	0	1
Processing Room	0	0	0	1 per 12 ft	0	0	1
Storage	0	0	0	1 per 12 ft	0	0	1
Presentations							
VTC	1 per 12 ft	2	1	1 per 12 ft	1	1	1,2
Board Room	8	2	1	8	1	1	1,2
Office Area	2 per seat	0	0	1 per 12 ft	0	0	1
Storage	0	0	0	1 per 12 ft	0	0	1
Conference Room	1 per 12 ft			1 per 12 ft			1,2
Business Center	8	0	0	6	0	0	
Consolidated Club	Note 3	Note 4	1	Note 5	1	1	6
Child Development Center	Note 3	0	0	Note 5	0	0	6

Notes:

1. 1 per 12 ft = 1 duplex receptacle per 12 feet of linear wall space
2. Tech Power circuits to be on Essential Power
3. 2 duplex receptacles per office work area
4. Floor receptacles 1 per 400 sq ft or as required in large function areas
5. 1 duplex receptacle per 12 ft of linear wall space, plus one duplex receptacle per food service, bar or kitchen device
6. Power circuits/receptacles for additional equipment to be coordinated with Government

Table 6.4.8-6 Communications Space Receptacle Requirements

Communications Space	Tech Power					Utility Power		Notes:
	20A Essential Power Circuits - Racks	30A 208V 3-Phase Essential Power Circuits - Racks	20A Non-Essential Power Circuits - Racks	30A Non-Essential Power Circuits - Racks	Wall/Panel Duplex Receptacles	Essential Utility Duplex Wall Receptacles	Non-Essential Utility Duplex Wall Receptacles	
Cable Vault (Entrance Facility)	0	0	1 per rack	0	0	1	4	1,5
Main Distribution Frame (MDF)	0	0	1 per rack	0	0	2	8	1
Telecomm Room (TR)	0	0	3	2	0	1	4	
Dial Central Office (DCO)	0	3	0	0	0	2	8	
DCO Battery Room	5	0	0	0	0	1	4	
Switchboard Operator Room	2	0	0	0	6	1	6	
Consolidated NCC (ER)	50	3	0	0	Note 2	Note 3	Note 4	
CLASSIFIED NCC (CER)	12	0	0	0	0	1	4	
Satellite Classified Equip Rm (CER)	5	0	0	0	0	1	4	

Notes:

1. Number of racks will be determined by number and configuration of SAMS buildings.
2. 1 duplex receptacle per 12 ft of linear wall space in server room, TIF, and assembly area, plus 3 workstation outlets in server room.
3. 1 essential duplex receptacle for every four non-essential utility receptacles in all CNCC rooms.
4. 1 duplex receptacle per 12 ft of linear wall space in all CNCC rooms.
5. Cable Vault receptacles must be GFI.

Table 6.4.8-7 Facility Space Receptacle Requirements

Facility Space	Tech Power Duplex Wall Receptacles	Utility Power Duplex Wall Receptacles	Notes:
Computer Storage Room	4	7	
File Storage Room	0	7	
Janitor Closet	0	4	
Electrical Room	2	1 per 16 ft of linear wall space	
Mechanical Room	2	1 per 16 ft of linear wall space	
Hallways	0	1 per 40 ft of linear wall space	
Restrooms	0	1 GFI per room	1
Lobby	0	1 per 40 ft of linear wall space	2
Stairwell	0	1 at basement level plus every 2nd floor	3
Entry and Stairway Doors	1 per doorway	0	4,5
Secured Interior Doorways	1 per doorway	0	4
Building Exterior	0	1 GFI receptacle per 100 ft	
Roof	0	1 GFI receptacle per antenna grid	

Notes:

1. In bathrooms with showers, install one duplex GFI receptacle per lavatory
2. Stairwell receptacles shall be on Essential Utility Power
3. Coordinate additional receptacles for scanners, metal detectors and access control systems with Government
4. Doorway receptacles shall be located at ceiling height and shall be on Essential Tech Power
5. Entry Doors inclue Roof exits. All exterior receptacles shall be GFI

8.3.9 Systems Furniture Power Requirements

- Spine Wall panels must be able to provide electrical power distribution with a four circuit, 8-wire factory-installed power harness system at baseline
  - One separate Line-Neutral-Ground circuit (utility power)
  - Three separately phased line circuits with common Neutral and Ground (tech power)

- The baseline power harness must be retrofittable in the field without dismantling the system. Snap-in duplex receptacles at the baseline must be field-interchangeable without a licensed electrician. The baseline panel must have the capacity for two duplex receptacles per panel side on all panels wider than 30 inches. The harness must be capable of drawing 80 Amps of power and have an oversized neutral for the three-phase circuit.

  - Receptacles shall be color-coded or otherwise clearly identified to distinguish which of the four circuits they pertain to. Allocate the tech power phased outlets evenly within a workstation cluster.
    - Utility power receptacles shall be of the same color tone as utility power wall receptacles and faceplates
    - Tech power receptacles shall be easily distinguishable from utility outlets

  - A maximum of six workstations shall be fed from one 4-circuit feed.
  - Baseline wire management side covers must be hinged for easy access

- The power cabling management system must accommodate ceiling access at any point along the spine wall or end-of-panel floor or hard-wall access. Connection from furniture electrical harness to building power shall be in liquid tight flexible metal conduit.
  - Length of conduit shall be appropriate to placement of furniture entry point in respect to the junction box
  - Exterior conduit shall be concealed
  - Coordinate junction box placement with furniture placement to minimize exposure of conduit
  - Cord and plug assemblies shall not be used for any portion of external links to building power

8.3.10 Special Lighting Requirements

- Office lighting systems shall be designed to control brightness and glare, particularly with respect to video display screens.

- Conference rooms shall have a “layered” lighting system with independent dimmer controls, including incandescent lighting around perimeter of conference tables and wash lighting on walls.

- Lighting control and other energy management features shall be implemented IAW Air Force directives, local codes and ordinances. Occupancy sensors shall be required in CL level conference rooms, hard walled offices, normally unoccupied equipment rooms, TRs, and other “minimal use rooms, such as training rooms and janitor closets. Open office areas near skylights or windows shall have photo-sensing daylight controls.

- Exterior lighting shall minimize sky glow and light trespass on adjacent properties, and shall be photocell controlled and integrated with the facility’s overall security requirements. In the perimeter areas of the buildings, photo sensor controls shall be utilized where appropriate to reduce the electric lighting in proportion to the available daylight.

8.3.11 Energy Management

- Facility design shall incorporate energy efficient criteria consistent with the ENERGY STAR program and other Federal Energy Management Program (FEMP) initiatives.
  - The facility design shall encourage sustainable design and shall provide for verification of building performance. Off-grid generation systems such as photovoltaics, fuel cells and other alternatives shall be considered and employed where such systems are lifecycle cost-effective.

- Energy for lighting and other uses shall comply with ASHRAE/IES 90.1-1999 or other applicable state or federal standards.

- Microprocessor-based metering units shall be provided on utility services and feeders within the facilities to monitor the quantity and quality of energy used.

8.3.12 Electrical Submittals

- Electrical System One-line diagram
- Electrical Site Plan
- Generator pedestal and transformer design detail

- Circuit and receptacle layout diagrams
- Grounding System One-line diagram
- Grounding System Components detail
- Lighting systems layout diagrams
- Cut sheets on lights and electrical equipment
- Power Load tables
- Circuit Breaker Panel Schedules

8.3.13 Applicable Codes and Standards

- Material and equipment shall be installed in accordance with the current standards and recommendations of the National Electrical Code, the National Electrical Safety Code and with local codes that apply. Utility service and connection shall be done in strict conformance with the requirements of the utility companies.

- Electrical material and equipment shall be new and shall bear the label of the Underwriters' laboratories, Inc., or other nationally recognized independent testing laboratory wherever standards have been established and label service regularly applies.

- Electrical material and equipment shall conform to the latest approved standards of the National Electrical Manufacturers Association (NEMA), American National Standards Institute (ANSI), Institute of Electrical and Electronic Engineers (IEEE), and National Fire Protection Association (NFPA).

8.3.14 Amenity and Comfort:

Convenience:

- Provide an interface between the electrical monitoring and the building automation system including the following (the BAS may, in fact, provide a single source monitoring at the discretion of the Design-Builder, considering economics, effectiveness, and system design requirements):
  - Motor Control Center:
  - Switchboard Monitoring:
    - Power Analysis Values:
      - Output voltage of each phase; line-to-line and line-to-neutral.
      - Output current; each phase and ground.
      - Real power; per phase.
      - Reactive power; per phase.
      - Apparent power; per phase.
      - Power factor; per phase.
      - Frequency.
    - Demand Readings:

- Demand current; per phase and peak.
- Average power factor; 3-phase total.
- Demand real power; 3-phase total.
- Demand apparent power; 3-phase total.
- Demand reactive power; 3-phase total.
- Coincident reading.
- Predicted Demands.

8.3.15 Electrical Hazards: Design in accordance with all NFPA standards that apply to the occupancy, application, and design.

- Control access to spaces housing electrical components and allow access only by qualified personnel.
- Provide electrical distribution equipment with locking cabinets, doors, and panels when it is located in public areas.
- Hazardous Locations: Comply with code.

8.3.16 Emergency Systems: Provide emergency power when normal power is interrupted, for the following:

- Systems and areas as required by code.
- Elevator system.
- Smoke exhaust system.
- Air handlers.
- Computers.
- Interior Lighting: In general all lighting in critical areas, Command Areas, Classified Areas, etc. shall be served by emergency power.

8.3.17 Hazardous Locations: Comply with requirements of NFPA 70 chapter on Hazardous (Classified) Locations.

8.3.18 Durability:

- **Moisture Resistance:** Water-resistant equipment includes transformers, raceways, enclosures, panelboards, and switchgear.
- **Enclosures:** As required to protect equipment from environment in which it is installed, complying with NEMA 250 and:
    - Areas to be Hosed-Down, or Equivalent, Exterior or Interior: Type 4.
    - Exterior, Exposed to Weather and Wind: Type 3S.
    - Exterior, Other Locations: Type 3R.
    - Interior, Subject to Settling Dust/Falling Dirt/Dripping Liquids: Type 5.
    - Interior, Subject to Circulating Dust: NEMA Type 12.

- Interior, Other Locations: Type 1.

8.3.19 Power Consumption and Efficiency:

- Comply with requirements of IEEE Standard 739.
- Comply with requirements of ASHRAE 90.1 and Title 24.
- Metering: Provide meters to measure power consumption of lights, receptacles, HVAC systems, water heaters, elevators, and loads greater than 20 kW.

8.3.20 Load Characteristics:

- Maximum Harmonic Current Distortion: Plus or minus 2 percent of design current.
- Transient Suppression: Limit voltage transients below damage curve of the electrical system and connected equipment.

8.3.21 Protection Against Disturbances:

- Provide circuits which serve sensitive electronic equipment with electrical characteristics within the ranges defined in IEEE Standard 1100 and as follows:
  - Transient Limit: 200 volts.
  - Swells and Sags: Voltage fluctuation limit of plus or minus 5 percent.
  - Overvoltage and Undervoltage: Voltage fluctuation limit of plus or minus 5 percent.
  - Conducted RFI/EMI Limit: 0.3 volts.
  - Radiated RFI/EMI Limit:
    - Less than 200 kHz: 10 kV per m.
    - Greater than 200 kHz: 0.5 kV per m.
  - Voltage Distortion Limit: 3 percent.
  - Phase Imbalance Limit: 1 percent.
  - Substantiation:
    - Preliminary Design: Identification of design strategies to minimize electrical disturbances.
    - Design Documents: Identification of circuits that require power conditioning equipment.
    - Construction: Functional performance testing.
    - Occupancy:
      - If equipment is damaged or malfunctions within one year after completion, reporting of the cause of equipment damage or malfunctions.
      - Corrective Action: Provide corrective measures necessary to eliminate electrical disturbances that caused equipment damage and malfunctions.
      - Retest Report: Identification of electrical characteristics after corrective equipment has been installed and all equipment is

operating properly and without damage.

- Noise Protection: Limit frequency excursions between 90 to 110 percent of design frequency.
  - Protect the circuits as indicated on the drawings. Pay specific attention to the following areas:
    - Receptacles serving personal computer terminals.
    - Receptacles serving network servers.
    - Power supply to fire alarm panel.
    - Power supply to telephone system.
  - Substantiation:
    - Preliminary Design: Identification of circuits that require noise protection.
    - Design Development: Description of noise protection devices to be used.
    - Construction: Measurement of frequency excursions on protected circuits.
- Surge Protection: Voltage excursion limit of 2 times design voltage.
  - The following areas require specific attention:
    - Receptacles serving personal computer terminals.
    - Receptacles serving network servers.
    - Power supply to fire alarm panel.
    - Power supply to telephone system.
    - Power supply to laboratories.
    - Entire building service.
    - Motors over 5 horsepower.
  - Substantiation:
    - Preliminary Design: Identification of circuits that require surge protection.
    - Design Development: Description of surge protection devices to be used.
    - Construction: Measurement of voltage excursions on protected circuits.

8.3.22 Availability: Provide an electrical system that is available to deliver power at least 99 percent of the time.

8.3.23 Reliability Indexes:

- System Interruption Frequency: Calculated in accordance with IEEE 493.
- System Expected Interruption Duration: Calculated in accordance with IEEE 493.
- Service Interruption Definition: Voltage of zero for 1 minute or longer.
- Failure Modes and Effects Analysis: Determine the components or combination of components whose failure causes a service interruption.
- Substantiation:

- Design Development: Reliability evaluation calculated using the "minimal cut-set method" described by IEEE 493.

8.3.24 Allowance for Change and Expansion:

- Spare Capacity - System Wide:
  - Load: 50 percent, minimum.
  - Rated Capacity: 50 percent, minimum.
  - Number of Additional Circuits: 20 percent, minimum.
- Future Capacity - System Wide: 25 percent, minimum.
  - Load: 40 percent, minimum.
  - Rated Capacity: 40 percent, minimum.
  - Number of Additional Circuits: 40 percent, minimum.

8.3.25 Operating Expense: Minimize operating expenses by providing peak-shaving capability, if cost effective.

- Evaluation of Cost Effectiveness: Simple payback is less than 3 years.
  - Provide a calculation of simple payback based upon utility rate structure, demand charges, capital expense, and energy management.

8.3.26 Acceptance Testing and Verification (ATV): Will be part of the developer's Quality Assurance Program.

- Acceptance Tests costs will be the responsibility of the developer.
- Successful testing, adjusting, and verification of the power systems will constitute an essential criterion for completion of the electrical work and acceptance of the systems involved by the Air Force.
- The developer will perform the coordination study for the system, test the distribution gear, and set the ratings on the switchboards.
  - The developer will provide fully operational, synchronized, and tested emergency generator plants in each building serving departmental areas.
  - The developer will provide point by point light modeling of the project with the design development submittal demonstrating compliance with the requirements of IES and Title 24.

8.3.27 Fire Alarm System: The developer will provide a fully operational, synchronized, and tested fire alarm system in each building serving departmental areas. The system will be centrally controlled from one location, but will be served by sub-control stations in each building as well. The entire site system will be tested inclusive of each building separately and each building interfaced collectively.

- The fire alarm system will be fully digital and fully addressable.
  - The submittals for the fire alarm system will be due 60 and 90 days

following the completion of design and award of the construction contract. The commissioning authority will be copied on the submittals.

  - The 60 day submittal will contain cut sheets of all equipment to be supplied on the project, a complete input/output address matrix, sequences of operation of all equipment and systems served, ad thorough description of performance during each programmed emergency operation.
  - The 90 day submittal will contain a one line graph of the entire system architecture, an electronic copy of the system code, and the system graphics that will be displayed.

- The fire system will be centrally monitored and controlled, but each building will have a separate control station located in its lobby fully compliant with fireman control standards.

8.4 COMMUNICATIONS REQUIREMENTS

The communications requirements for the SAMS Project include Voice, Data and Video systems. These systems provide the SAMS users with connectivity to local and remote services such as the Internet, the Unclassified but Sensitive Internet Protocol Router Network (NIPRNet), Secret Internet Protocol Router Network (SIPRNet), the Joint Worldwide Intelligence Communications System (JWICS), various Video Teleconferencing Systems (VTC), Community Access Television (CATV), Direct Satellite System (DSS) television, and a number of contractor and subcontractor hosted systems and services.

8.4.1 General Requirements

- The SAMS Project communications requirements are similar to the requirements of a modern office facility with multiple tenants. Communications has the same high availability and reliability requirements described in the HVAC and Electrical systems sections. Unlike a commercial facility, SAMS has added security requirements, which if not addressed early in the design, could significantly impact project cost and schedule due to rework requirements to meet accreditation guidelines.

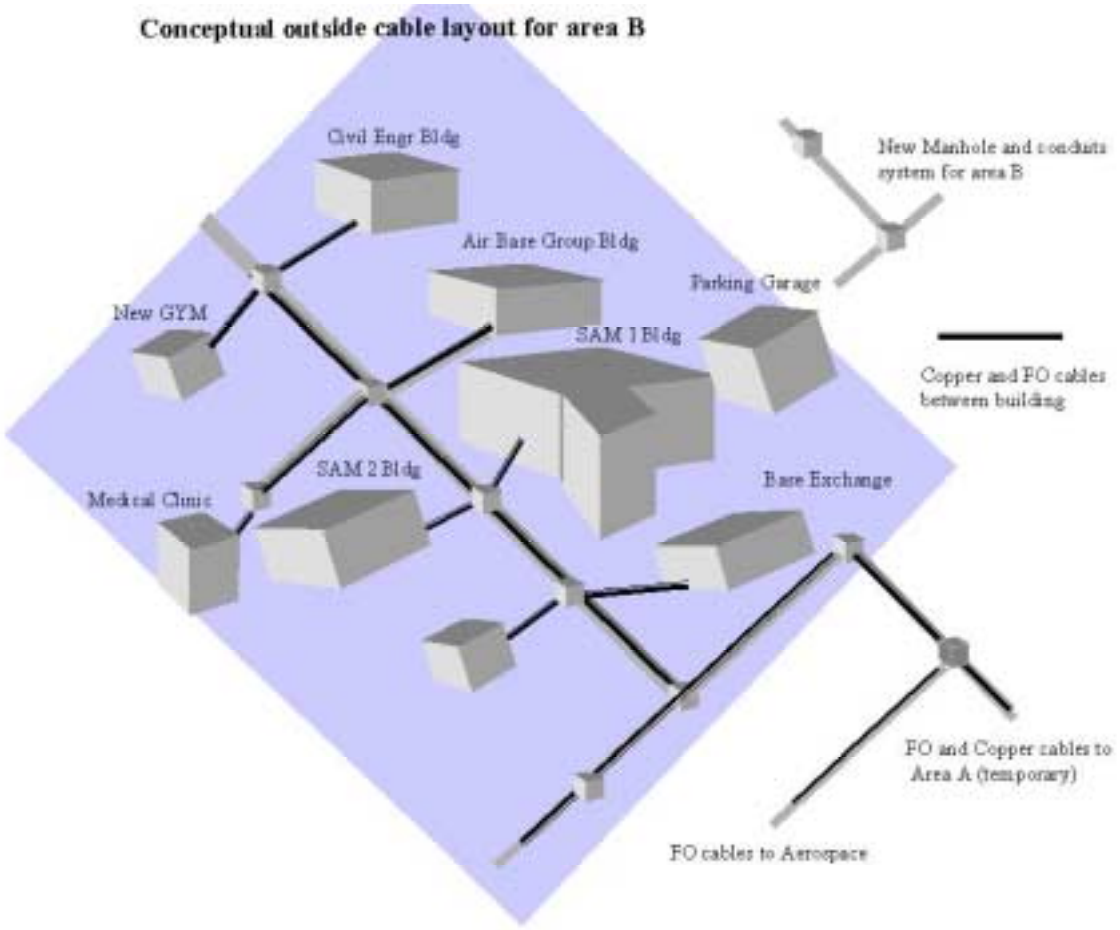
- The SAMS complex will be the heart and pulse of LAAFB. SAMS will host the Dial Central Office (DCO), which houses the base administrative telephone switch, which services all of LAAFB and Fort MacArthur. The DCO also provides access to all commercial and Department of Defense (DoD) telephone services. Additionally, the SAMS project will host the Consolidated Network Control Center (CNCC), which houses the majority of the base servers to include those supporting the Internet, NIPRNet and SIPRNet. The CNCC will also serve as the POP for Defense Information

Systems Agency (US DoD) services. The CNCC will integrate LAAFB into the One Air Force, One Network concept.

- The Air Force will consider all value engineering proposals that streamline and improve the inside wiring architecture, such as omitting some or all of the Category 5E cable and going to fiber optic cable. However, Air Force telecommunications, LAN network and computers are not fiber optic compatible. Therefore, a fiber optic proposal must also include the costs to make existing equipment fiber optic compatible.

8.4.2 Outside Plant Requirements

- The OSP requirements for LAAFB shall be design build to mesh with existing and proposed base improvement initiatives. Currently, LAAFB CE has a plan to design and construct an Area B duct bank system to support all communications requirements. This plan includes construction of a base loop that will interconnect the Commissary, Base Exchange, Fitness Center, and Clinic with commercial services to the west and south east and contractor services to the south east. The loop will border the proposed SAMS site location. The extent of common duct bank and access to SAMS will depend on the final site selection and campus configuration. The following figure provides the conceptual OSP layout for SAMS Area B.



- Duct Bank
  - The SAMS project shall provide duct bank connection between each SAMS building and the Area B loop. The connectivity is to support copper and fiber optic cable distribution. The size and quantity of ducts will depend on the final site selection, number of SAMS buildings and the campus layout. The following table is intended to provide a design guide for the Offeror and all information will need to be validated during design.

Table 6.5.2.1 Communications Duct Bank

	Copper		Fiber (3 Cell)		
Building	**Quantity**	**Size**	**Quantity**	**Size**	**Notes**
Main SAMS Bldg	Note 1	Note 1	Note 2	Note 2	
Satellite SAMS Bldgs	Note 3	Note 3	2	4	
SAMS Parkin	1	4	1	4	4
Commissary	2	4	1	4	5
Base Exchange	2	4	1	4	5
CBC	3	4	2	4	5
Fitness Center	2	4	1	4	5
Clinic	2	4	1	4	5
Aerospace	1	4	1	4	5
.					

Note:

1. Size dependant upon quantity and size of any Satellite Bldgs.
   Size at 2 copper pairs per occupant per satellite building in addition to other buildings listed.
2. Size dependant upon quantity and size of any Satellite Bldgs.
   See estimated cable requirements for sizing information.
3. Size at 2 pairs per occupant.
4. Connectivity to the parking structure is provided to meet current and future communications and security requirements

5. Quantity and size of conduits for other facilities are provide as a guide to the offere and are estimated based upon current information

General:

1. OSP shall meet the requirements of TIA/EIA-758
2. OSP shall be underground from the buildings entrance facility to and including the first MH.
3. Duct bank between MHs is beyond the scope of SAMS.

- Manholes provided by the SAMS project will be compatible in size, construction and configuration to those provided by LAAFB in the Area B loop. The manhole and conduit system will be installed in accordance with T.O. 31W3-10-12.

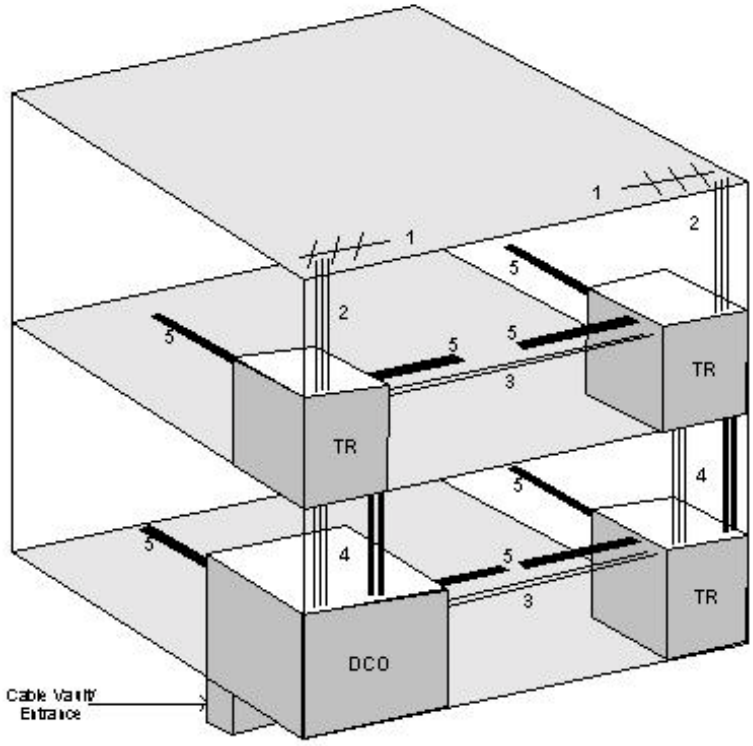
- OSP Cable Requirements
  - The OSP cabling required to interconnect the SAMS buildings with the remainder of LAAFB is a design build item. The OSP duct bank is required to support 6,000 cable pairs initially and is expandable to 10,000 pairs. SAMS Building 1 should be designed for this cable volume. At this time, the estimated cable required to interconnect all LAAFB facilities is provided in the following table.

Table 6.5.2.2 OSP Cable Requirements

Building	Copper pairs	Fiber Quantity	Notes
Main SAMS Bldg	Note 1	Note 1	
Satellite SAMS Bldgs.	2 pairs per occupant	24/48 Hybrid	2
SAMS Parking	50	6/12 Hybrid	2
Commissary	100	6/12 Hybrid	2
Base Exchange	100	6/12 Hybrid	2
CBC	2000	24/48 Hybrid	2
Fitness Center	100	6/12 Hybrid	2
Clinic	400	6/12 Hybrid	2
Aerospace	600	72SM/72MM	2
CE/LG Warehouse	200	6/12 Hybrid	2
Note:			
1. Quantity of cables/pairs will equal sum of all other buildings on the campus.			
2. All fiber shall be home run to the Main SAMS building.			
General:			
1. OSP shall meet the requirements of TIA/EIA-758.			
2. Fiber quantities are estimates.			

8.4.3 Inside Plant Requirements

- The Inside Plant cable requirement for SAMS is generally broken down into horizontal and riser cabling. The horizontal cables extend from the work area outlets to the Telecommunications Rooms (TR). Backbone cables interconnect TR with equipment rooms such as the CNCC and MDF. The following figure illustrates how the backbone and horizontal cables will be distributed and supported.



1. Antenna Grid with power and ground.
2. Conduits with service head from top-floor TRs to roof.
3. 2, 3-inch conduits interconnecting TRs on same floor.
4. Slots and sleeves interconnecting vertically-aligned TRs and ERs.
5. Cable tray to horizontal and backbone cabling

8.4.4 Horizontal Cable Requirements

- The standard horizontal telecommunications cable for SAMS will be Category 5e (CAT 5e) plenum rated (or most current standard at time of contract award) unshielded twisted pair (UTP). Each work area outlet shall be connected to the TR with three plenum cables, one for Voice,

Data A and Data B. Each cable represents a different service and will be a unique color. These cables will terminate in dual-gang wall-mount or floor mount boxes at the work areas and on standard 19-inch rack mount patch panels in the TR. At the patch panel, reserve one future CAT 5e jack for Data C for each user outlet.

- In addition to the Horizontal CAT 5e cable requirement, up to 60 users require access to the Classified LAN. These fiber optic horizontal cables are transported through the building wide PDS system.

- All components are to be of one manufacturer and shall be performance tested against current specifications for the selected product. The following table provides the general horizontal cabling requirement.

Table 6.5.3.1 Horizontal Cabling Requirements

From	To	Category 5e	Fiber Pairs	Notes:
Each Unclassified Work Station Connects to	Nearest TR	X		1,2,3,
Each OL-1, OL-2, and OL-3 Classified Work Station Connects to	Nearest CER		X	1,4,5,6
Other Classified Work Station Connects to	Nearest CER		X	1,4,5,6
SCIF Connectivity				
Each Unclassified Work Station Connects to	Nearest TR		X	1,4,6
Each Secret Work Station Connects to	Nearest TR		X	1,4,6
Each SCI Work Station Connects to	Local ER		X	1,4,6
Each Voice Outlet in the SCIF	Nearest TR	X		1,2,7

Notes:

1. Plenum rated cables required for all horizontal cabling. Splices are not permitted.
2. All pairs of the cables shall be terminated to CAT 5E patch panels within the TR.
3. Each of the 4 cables (voice, Data A, B,and C.)shall be a different colored sheath
4. Fiber cables shall be 62.5 Micron MM, OFNP rated cables. Splices are not permitted.
5. Provide end-to-end PDS with lockable enclosures.
6. Each Fiber Pair is home run under separate sheath and terminates in a FDP.
7. Voice outlets within the SCIF require separate Faceplates and conveyance.

8.4.5 Telecommunications Outlet Requirements

- A typical Unclassified telecommunications outlet (TO) shall support up to 4 Category 5 jacks
  - 1 Voice Jack
  - 3 Data Jacks

- A typical telecommunications outlet for an office outside of the SCIF requiring Secret LAN access shall include the 4 jacks specified for an Unclassified outlet, plus one duplex fiber optic jack.

- A typical SCIF telecommunications outlet shall support 6 strands of fiber optic cable and one Category 5e cable. Each duplex fiber connector shall be unique, either of different types (SC, ST, etc) or the same type of connector with keyed plug and socket assemblies.

- The following tables provide the minimum requirements for Telecommunications Outlets by functional areas.

Table 6.5.3.2-1 Office Space TO Requirements

Office Space:	Quantity of TOs	Cable TV	Secret LAN	Notes
OL-1	4	Yes	Yes	1
OL-2	4	Yes	Yes	
OL-3	3	Yes	Yes	
OL-4	2			
OL-5	2			
SL-1	1			
SL-2	1			
SL-3	1			
Notes:				
1. Up to 60 total Secret LAN drops to be detrermined during design.				
See Table 6.5.3.2-4 for SCIF TO requirements				

Table 6.5.3.2-2 Conference Space TO Requirements

Conference Spaces:	Quantity of TOs	Cable TV	SECRET LAN	Internal LAN	Front Projection	Rear Projection	Sound Prewire	Notes:
CL-1	2 (Under Conf. Table)	Yes			Yes	Yes	Yes	1,3
CL-2	2 (Under Conf. Table)	Yes			Yes	Yes	Yes	1,3
CL-3	2 (Under Conf. Table)	Yes			Yes	Yes	Yes	1,3
CL-4	2 (Under Conf. Table)	Yes			Yes		Yes	3
CL-5	2 (Under Conf. Table)	Yes			Yes		Yes	3
SCL-6	1	Yes			Yes			3
SCL-7	1	Yes			Yes			3
Conference Center	2 (Under Conf. Table)	Yes			Yes		Yes	4
Presentation Room (RPC)		Yes				Yes	Yes	4
Court Room		Yes			Yes		Yes	2,4

Notes:

1. Front OR Rear Projection and control rooms are to be coordinated with Government.
2. Build IAW AF design guide for Court Rooms.
3. Additionally, co-locate 1 TO with each perimeter ADP Power Outlet.
4. Co-locate 1 TO with each ADP power outlet.

Conference Rooms in the SCIF shall accommodate Secret and SCI LAN connections

Table 6.5.3.2-3 Training Space TO Requirements

Training Space:	Quantity of TOs	Front Projection	Cable TV	Notes:
CZ Training Room	1 Per Student	Yes	Yes (2)	1,2,3
CL Training Room	1 Per Student	Yes	Yes (2)	1,2,3
AX Training Room	1 Per Student	Yes	Yes (2)	1,2,3
DSMA Training Rooms	1 Per Student	Yes (2)	Yes (6)	1,2,3
DSMA Training Rooms	1 Per Student	Yes	Yes (2)	1,2,3
FM Training Room	1 Per Student	Yes (2)	Yes (4)	1,2,3
MT Training Room	1 Per Student	Yes	Yes (4)	1,2,3
PK Training Room	1 Per Student	Yes	Yes (2)	1,2,3
XPM Training Room	1 Per Student	Yes (2)	Yes (4)	1,2,3
61 CS Training Room	1 Per Student	Yes (2)	Yes (4)	1,2,3
61 CS Training Room	1 Per Student	Yes	Yes (2)	1,2,3

Notes:

1. Co-Locate additional TOs with each ADP power perimeter outlet.
2. Student areas based on 80 S.F. Per Student.
3. Coordinate TV drops with Television power receptacles.

Table 6.5.3.2-4 Specialty Space TO Requirements

Specialty Space:	Quantity of TOs	Cable TV	Unclass LAN	SECRET LAN	SCI LAN	Notes:
Classified Work Area	1 per WA			1 per TO		
MT SERF	1 per WA			1 per TO		
Command Post	1 Per WA			1 per TO		
BNCC	2			1 per TO		
SCIF	1 Per WA	Note 1	1 per TO	1 per TO	1 per TO	2
SCIF Equipment Room						
IN						
Reservist Lab	1 per WA		1 per TO	1 per TO	1 per TO	
Research Center	1 per WA		1 per TO	1 per TO	1 per TO	
SERF	1 per WA		1 per TO	1 per TO	1 per TO	
IN/PWW Equipment Room						
Library (1 Large Room)			1 per TO	1 per TO	1 per TO	
PWW Server Room						
IN Server Room						
XR						
Equipment Room						
TS Computer Room						
Secret Computer Room						
Blue Room	1 per WA		1 per TO	1 per TO	1 per TO	

Notes:
WA = work area
1. Provide one isolated CATV drop per SCIF
2. Standard SCIF TOs include unique Fiber Optic connector for the Unclassified LAN, SECRET LAN and the internal SCI LAN

Table 6.5.3.2-5 Miscellaneous Spaces TO Requirements

Miscellaneous Space	Quantities of TOs	Cable TV	Secret LAN	SCI LAN	Internal LAN	Front Projection	Rear Projection	Sound Prewire	Notes:
61 CS/SCSV									
Photo Lab									
Development Room	1								
Studio									
Digital Development	4								
Office	8		Yes						
Storage									
Video Lab									
Editing Suite	1	Yes							
Tape Library									
Dubbing Room	1								
Viewing Room									
Office Area	8		Yes						
Art Services									
Work Room									
Office/Work Area	6		Yes						
Processing Room									
Storage									
Presentations									
VTC	3	Yes	Yes					Yes	1
Board Room	1	Yes					Yes	Yes	
Office Area	7		Yes						
Storage									
Conference Room	3	Yes					Yes	Yes	
Business Center	8		Yes						
Consolidated Club		Yes							2,3,4
Child Development Center		Yes							2,3,5

Notes:
1. 1 drop per each of 3 VTC Areas.
2. Provide pay phone bank.
3. Provide 2 TOs per office area.
4. Provide Tos for cash register, bar, hallway phone, ATM, and kitchen
5. Proivde Tos per reception area

Table 6.5.3.2-6 Communications Space TO Requirements

Communications Space	Quantity of TOs	Cable TV	SECRET LAN	SCI LAN	Notes:
Cable Vault (Entrance Facility)	1				1
Main Distribution Frame (MDF)	1				1
Telecomm Room (TR)	1				1
Dial Central Office (DCO)	1				1
DCO Battery Room	1				1
Switchboard Operator Room	1 per Operator				
Consolidated NCC (ER)	1				1
CLASSIFIED NCC (CER)	1				1

Notes:

1. 1 Voice outlet with wall mounted telephone for each facility

Table 6.5.3.2-7 Facility Spaces TO Requirements

Facility Space	Quantity of TOs	Notes:
Computer Storage Room	1	
File Storage Room	1	
Janitor Closet		
Electrical Room	1	
Mechanical Room	1	
Hallway	1	1
Restroom		
Lobby	1	1
Each Personnel Entrance and Delivery Door	1	2
Outside each SCIF door	1	3

Notes:
1. Voice outlet only.
2. Wall mounted telephone in a waterproof, wallmounted enclosure outside.
3. Provide wall mount.

8.4.6 Horizontal Pathway Requirements

- The use of pathways in the plenum ceiling space and below raised floor is an acceptable design. The preferred cable pathway for the SAMS project is cable trays and other conveyances installed below the raised floor.

- The conveyance system shall seamlessly connect all work areas and spaces to patch panels, cross-connects and racks. The conveyance systems will be a blend of cable trays, ladders, conduits and J-hooks. Special consideration is required in identifying firewalls and providing the necessary fire-stop in and or around all conveyances transitioning a firewall. A cable pathway and conveyance guide is included in the following table.

Table 6.5.3.3 Horizontal Pathway Requirements

From	To	Cable Tray	Conduit	J-Hook / Sling	Notes
TR	Work Area	X	AR	AR	1, 2, 3
Cable Tray	Outlet Stub-out		AR	X	2, 3
Outlet Stub-out	dual-gang outlet		X		4
Cable Tray	Systems Furniture		X		4

Notes:

1. Provide cable tray as the primary conveyance. Tray is sized at 50% maximum fill calculated with four CAT 5 and one fiber optic cables per WA plus all cables required to support conference rooms, training rooms, specialty areas, and other unique comm
2. Provide conduit support as required (AR) for dedicated runs and transitioning firewalls.
3. Provide cable support for all cables not in tray or conduit at 5 ft. (maximum) intervals..
4. Size conduit for four cables per WA.

General:

1. Pathways shall meet the requirements of TIA/EIA 569-A
2. Support other than cable tray is acceptable in areas that receive less than 40 CAT 5 Cables.
3. All pathway material shall be plenum rated.
4. Use of poke-throughs is prohibited

8.4.7 Backbone Cable Requirements

- Backbone cable requirements are specified by type of service. Backbone cabling is required to support voice, video, data and unique telecommunications requirements.

- The standard voice backbone or riser cable for SAMS will be 300 pair Category 3 (CAT 3) (or the most current standard at time of contract award) plenum rated unshielded twisted pair (UTP). These cables shall extend from the MDF to each TR. The copper backbone cable will terminate in standard 19-inch rack mount patch panels in the TR. These patch panels will be compatible with the horizontal cable patch panels and of the same manufacturer. In the MDF, the backbone cables will terminate in standard 110 Insulation Displacement Connector Blocks that will be installed adjacent to the DCO wall field for easy cross-connection.

- The standard data backbone or riser cables for SAMS will be two hybrid fiber optic cables. One cable will contain 6 Single Mode (SM) and 12 Multi Mode (MM) fiber strands and the second cable will contain 12SM and 24MM strands. Both cables will be plenum rated. Two cables are required to support mission and contractor unique requirements.

- These cables shall extend from the DCO to each TR. The fiber optic backbone cables will terminate in standard 19-inch rack mount fiber distribution and patch panels in the CNCC and TR.

- In addition to the above, backbone cables are provided to interconnect the SCIF, SERF and Classified equipment and workrooms. The following table summarizes the backbone cables.

Table 6.5.3.4 Backbone Cable Requirements

		Fiber Riser		Copper Riser	
From	**To**	**Qty**	**Size (Strands)**	**Size (Pairs)**	**Notes:**
DCO	TR	1	6/12		
	TR	1	12/24		
	SCIF	2	6/12		1
	CP	1	6/12		
	Classified ER	2	6/12		1
Classified ER	SERF	1	6/12		
	Classified WA	1	6/12		
	SCIF	1	6/12		
Entrance Facility	DCO	2	48/48		
Entrance Facility	SCIF	2	12/24		
Entrance Facility	Classified ER	2	12/24		
MDF	TR			600	2

Notes:
1. One cable for circuits and one for data
2. Number of pairs equals 150 users per 10 kft x two phone outlets

8.4.8 Backbone Pathway Requirements

- The use of pathways in the plenum is an acceptable design. The preferred cable pathway for backbone cables is dedicated conveyance systems.

- The conveyance system shall seamlessly connect all work areas and spaces to parch panels, cross-connects and racks. The conveyance systems will be a blend of cable trays, ladders, conduits, slots, sleeves and J-hooks. In general, copper backbone cables transition between floors in sleeves. Within an area, the cables can be conveyed in the same manner as horizontal cables. Fiber optic cables and coax cables transition between floors in slots. Both slots and sleeves are connected vertically with cable ladder. Special consideration is required in identifying firewalls and providing the necessary fire-stop in and or around all conveyances transitioning firewalls and floors. A cable pathway and conveyance guide is included in the following table.

Table 6.5.3.5 Backbone Pathway Requirements

From	To	TRAY	CONDUIT		SLOTS		SLEEVES	
		Size	**Trade Size**	**Quantity**	**Size**	**Quantity**	**Trade Size**	
DCO (ER)	TR	Note 1						
DCO (ER)	TR				Note 2	Note 2	4	No
DCO (ER)	TIF	12 in.						
TR	TR		3	2				
TR	TR				Note 4	Note 4	4	No
TR (on top floor of buildings)	Roof		2	3				

Notes:

1. For spaces on the same floor, size cable tray by usable floor space, 3 cables per Work Area, 50%
2. For vertically aligned spaces, size Slots and Sleeves by usable floor space.
3. Interconnect all TRs on the same floor with two trade size 3 conduits.
4. For vertically aligned spaces, size Slots and Sleeves by usable floor space.
5. Size horizontal distribution tray by usable floor space served. 3 cables per Work Area, 50% Fill
6. Install an antenna mounting grid, power, and ground to each area on roof receiving conduit
7. Install waterproof service entrance head on each conduit.

General:

1. Pathways shall meet the requirements of TIA/EIA 569-A.

8.4.9 SAMS Provided Equipment

- SAMS will provide all racks, wall boards, patch panels, fiber optic distribution panels, horizontal and vertical cable management required to terminate and support all SAMS installed cables. The following table estimates the type and quantity of items to be provided by SAMS.

Table 6.5.3.6 Provided Equipment

Communications Space	Wallboards	O/H Cable Ladder	Racks	Notes:
Cable Vault (Entrance Facility)		Yes	AR	1
Main Distribution Frame (MDF)	Yes	Yes	AR	2
Telecomm Room (TR)	Yes	Yes	5	3
Dial Central Office (DCO)		Yes		
DCO Battery Room			4	
Switchboard Operator Room				
Consolidated NCC (CNCC)	Yes	Yes	12	4
CLASSIFIED Equip. Rm (CER)	Yes	Yes	12	4
Satellite CER	Yes	Yes	5	4

Notes:
1. Size as required. Calculate based on 2 copper pairs per occupant.
2. Size as required.
3. 5 racks per TR; 2 for data, 2 for horizontal terminations, and 1 for riser Terminations.
4. The minimum number of racks required to support transition.

- Racks shall be supplied in accordance with the following requirements:
  - All racks shall meet the requirements of ANSI/TIA 310-D
  - A full-length copper bus bar shall be installed within each equipment rack.
  - Each equipment rack shall have a power controller
  - Each equipment rack shall have a power strip which plugs into the power controller
- Racks in non-raised floor areas shall not have side panels
- Racks in raised floor areas shall have a rear door, side panels, vented tops, and access to the under-floor area.

- Wall boards shall be constructed in accordance with the following requirements:
  - Wall boards shall cover two adjacent walls from floor to ceiling
  - material shall be a minimum of ¾-inch, void free, AC grade plywood
  - Wall boards shall be securely attached to the framing members in order to support any equipment mounted on it
  - Wall boards shall be painted on all sides using two coats of white, fire retardant paint

8.4.10 Protected Distribution System

- The Offeror is required to design and build a building wide Protected Distribution System (PDS) for conveying cables carrying Classified data in uncontrolled areas. Design and build the PDS per Air Force Systems Security Instruction AFSSI 3030.

- The PDS shall interconnect the SCIF and classified work areas with the classified equipment rooms. Additionally, the Government requires PDS connectivity to approximately 60 users located in office areas outside of the SCIF and Classified rooms. These 60 users include all OL1 through OL3 offices. The remainder of the locations will be determined during the design phase. The following table summarizes the SAMS PDS requirements.

Table 6.5.3.7 PDS Requirements

From	To	Trade Size	Quantity	Notes:
Classified CNCC (CER)	TR	2	1	
Classified CNCC (CER)	SERF	2	2	
Classified CNCC (CER)	SCIF	2	2	
Classified CNCC (CER)	CNCC	4	2	
Classified CNCC (CER)	Common Classified Work Area	2	2	
Classified CNCC (CER)	Command Post	2	2	
Satellite CER	Satellite Classified Work Area	2	2	
Satellite CER	TR	2	1	
TR	SIPRNet User Outside the SCIF	1	1	1
Notes:				
1. A Total of approximately 60 users will be identified at a later date.				
General: If outside a SCIF, PDS Terminates to a Lockable Enclosure.				

8.4.11 Cable Management

- All racks, wall boards, wall fields, patch panels, fiber optic distribution panels, cable conveyances, horizontal and backbone cables, and telecommunications outlets and spaces will be identified and labeled in a manner approved by the government. In the work area, the telecommunications outlet will be labeled identifying each cable by color and type of service.

8.4.12 Telephone System

- The Offeror is required to design the DCO including a new telephone switch system sized for a minimum of 6,000 lines and having the capability to expand to 10,000 lines. The switch will be equipped to provide voice mail and ISDN service, and include the trunk interface to local and long distance carriers. The new switch will have the capability to connect to the existing remote switch located at Ft. MacArthur.
- The telephone system includes the switch, wall fields for trunks and ports, programming terminal, battery backup and documentation. The telephone

system shall be capable of operating for eight hours from battery power. The battery backup system shall include rectifiers and ventilation control as part of the requirements. The battery room shall be equipped with an eye wash system.

8.4.13 Other Communications Requirements

- **Building PA**
  - The Offeror is required to design the facility to support a GFGI building PA System. The PA system requires power at the base station and conveyance system connectivity to all building areas. The Government will identify a location in the Command Post for the base station during the design phase.

- **Campus PA**
  - The Offeror is required to design the facility to support a GFGI Campus PA System. The PA system requires power at the base station and conveyance system connectivity to all building areas throughout Area B. The Government will collocate the base station with the building PA system.

- **White Noise Generator**
  - The Offeror is required to design the facility to support a GFGI White Noise Generator in the SCIF. The system requires power at the base station, ceiling speakers and conveyance system for connectivity. The Government will locate the base station within the SCIF. During the design phase, the Government will determine if each SCIF requires an independent noise source depending on physical layout and adjoining space allocation.

- **CATV Distribution**
  - The Offeror is required to design and install a CATV distribution system. The CATV head end will be located in the CNCC and feed all SAMS buildings. Feeders will extend from the equipment room to every Telecommunications Room. From the TR, CATV will extend into a wall outlet in every OL-1 through 3 offices, all Conference Rooms, the Conference Center, the Presentation Room, all Training Rooms, the Court Room, the Club and the Child Development Center. The CATV system requires connectivity to the OSP and to the roof antenna grid for connectivity to a GFGI DSS.

- **Video Teleconferencing**
  - The Offeror is required to design and install a VTC distribution system. The VTC will provide connectivity between the various VTC control rooms and all Conference Rooms, the Conference

Center, the Presentation Room, all Training Rooms, and the Court Room. The VTC system requires tri-BRI connectivity to each location. The Conference Center and the Presentation Room require two feeds.

- **Force Protection**
  - The USAF Force Protection Design Guide will be used in the design of all elements of the site and buildings. The Force protection guide may be found on the Air Force Center for Environmental Excellence (AFCEE) web-site at the following address: http://www.afcee.brooks.af.mil/dc/products/dcproducts.asp#dcd. Force protection measures should be based upon the assessment of the threat. The Force Protection Guide is a balance competing considerations such as building codes and regulations, aesthetic concerns and overall project cost. The ultimate responsibility for force protection rests with the Installation Commander.

- **Land Mobile Radio Repeater System**
  - Install a repeater system for the Land Mobile Radio (LMR) system to eliminate the "dead spots" on Site B and within each SAMS building. The preliminary design will occur in the phase following the Core and Shell Design. A detailed frequency analysis of Site B may be required to support the design.

- **Security System Requirements**
  - The SAMS facilities have a requirement for a state-of-the-art Security System. The Offeror shall design and install a security system that provides the SAMS Classified work areas, equipment rooms, and telecommunications rooms with physical protection, intrusion detection and alarms. The system shall be compatible with the Security System installed in the new ABG building. As a minimum, the Security System shall provide the following:

    - Provide state-of-the-art cipher locks for all computer rooms, equipment rooms and telecommunications rooms
    - Provide state-of-the-art XO7 or equivalent locks for each SCIF entrance
    - Provide direct motion detectors for intrusion detection in computer rooms, equipment rooms, and telecommunication rooms, the SCIF, the DCO and MDF. Ref. a. (AFI) Air Force Instruction 31-102, Physical Security, May 91. b. (DoD) Department of Defense 5200. 1-R Appendix G, Physical Security Standards, Jan 97 and Air Force Systems Security Instruction 3030, Protected Distribution Systems, 1 May 97.
    - Provide BMS on all exterior doors, doors leading into all computer rooms, equipment rooms, telecommunications rooms, the SCIF,

the SERF, the DCO and MDF, Command Post, BNCC, roof entrances, and all mechanical and electrical rooms.

- Provide Access Control Proximity card readers on all exterior personnel entry doors, doors leading into all computer rooms, equipment rooms, SCIF, SERF, DCO, MDF, BNCC and Command Post
- Provide Closed Circuit Television (CCTV) at all building personnel entrances
- Provide CCTV at all SCIF and Command Post personnel entrances
- Provide CCTV in all elevators
- Provide CCTV to monitor the perimeters of all SAMS facilities to include roofs
- Provide CCTV monitoring of all major hallways, corridors and stairways
- Provide low light CCTV capability with audio input and pan, tilt and zoom control
- Provide Duress Alarms in the Command Post, at the Guard position, in each SCIF and in the OL-1 Office

9.0 ENVIRONMENTALLY PREFERABLE BUILDING MATERIALS AND PRACTICES

LAAFB is committed to sustainable construction and maximizing the efficiency of operating costs and resources over time. Adhere to Executive Orders 13101, Greening of Government through Waste Prevention, Recycling, and Federal Acquisition, September 14, 1998; and 13123, Greening of the Government through Effective Energy management, June 3, 1999.

9.1 HAZARDOUS MATERIALS AND WASTE MANAGEMENT PLANS

- During the design/build phase the Offeror shall submit:

- Plan for hazardous material and waste management;
- Plan for solid waste management and recycling of construction demolition debris; and
- Plan for storm water pollution prevention management.

- *Hazardous Waste Management Plan.* The Hazardous Waste Management Plan is required under the Resource, Conservation and Recovery Act (RCRA), California's Hazardous Waste Control Law and AFI 32-7042. Hazardous waste is regulated by the Environmental Protection Agency (EPA), Title 40 CFR, the State of California Environmental Protection Agency (CAL-EPA)-DTSC, Title 22 CCR and the local CUPA—El Segundo Fire Department. These regulations require tracking and record keeping from "cradle to grave" of hazardous waste, as well as specific

procedures for labeling, storage, transportation, and disposal. The purpose of this plan is to establish policies, procedures, and personnel responsibilities to ensure LAAFB's compliance with these regulations.

- *Emergency Response Plan* (ERP): The ERP is required by Title 40, Code of Federal Regulations and Title 22, California Code of Regulations, for generators of hazardous waste. The ERP is designed to minimize hazards to human health and the environment resulting from fires, explosions, unplanned sudden or non-sudden releases of hazardous materials/waste, or their constituents to land, air or sea. This applies to all base activities.

- *Spill Prevention, Control and Countermeasures Plan*: 40 CFR, Part 112 outlines requirements for both prevention of and response to oil spills. The prevention aspect of the rule requires preparation and implementation of the Spill Prevention, Control, and Countermeasure (SPCC) Plan. The regulation established spill prevention procedures, methods, and equipment requirements for non-transportation-related onshore and offshore facilities with aboveground oil storage (ASTs) capacity greater than 1,320 gallons (or greater than 660 gallons in a single container or buried underground oil storage capacity greater than 42,000 gallons). Regulated facilities are also limited to those that, because of their location, could reasonably be expected to discharge oil in harmful quantities into the navigable waters of the United States or adjoining shorelines.

10.0 Demolition

- During the design/build phase the Offeror shall:
  - Receive authorization from and coordinate with the Contracting Officer prior to beginning demolition;
  - Provide 30 day advance notification in writing for planned interruptions for power, water, gas or communications services
  - Conduct demolition and removal processes in accordance with Base requirements for hours of operation, ingress and egress, disposal and clean up processes, and all applicable Local, State and Federal laws and regulations; and
  - Prevent damage to existing utilities not scheduled for demolition. If damages occur, make repairs to the satisfaction of the Contracting Officer at no cost to the Government.

11.0 DESIGN AND CONSTRUCTION PROCEDURES

Management and Coordination

- Adjacent Buildings: Adjacent buildings will be occupied during the construction period.

- Coordination with Occupants:

    - No disruption of services to areas that continue to be occupied during hours during which they are occupied; all disruptions arranged at least 48 hours in advance with the Air Force.

- Existing Utility, Life Safety, and Fire Safety System Elements:
    - Prevent accidental disruptions to facilities outside the project limits by investigation of existing utilities and protection during construction; remedy accidental disruptions at no cost to Air Force.

- Changes In The Work:

    - Progress Schedule: As specified in the Conditions of the Contract.

    - Submit updated schedule whenever adjustments that change the Contract Times or Milestones are approved.

- Progress Documentation for Air Force Information:

    - During Preliminary Design, Design Development, and Construction Documents Periods: Graphic displays sufficiently detailed to allow individual departments to identify the status of the design of their new spaces.

    - During Construction and Closeout: Photographs and graphic displays sufficiently detailed to allow individual departments to identify the status of the construction of their new spaces.

- Progress Documentation for Air Force's Project Record:

    - During Construction: Daily digital photographic record of each major portion of the work, taken from consistent locations, distances, and angles.

    - During Closeout: Detailed digital photographic record of each interior room and space, each exterior elevation, the roof, and all site areas.

- Reference Documentation:
    - Where any conflict or ambiguity seems apparent between the directions and/or definitions as described herein and Appendix A, view the directions and/or definitions of Appendix A as having precedence. Furthermore, for issues described as having to be "Considered" in one document and "Required" in another, the term "Required" shall have precedence.
    - The terms “Offeror”, “design/builder”, and “developer” will be considered equivalent and used interchangeably.

11.1 DESIGN SUBMITTALS

- Upon selection of an Offeror and the signing of necessary business documents a formal design process will be undertaken. This section defines

the Air Force's requirements for the development of construction drawing and specifications.

- The Air Force anticipates that a proposal submitted in compliance with the requirements of this RFP will represent a 10 percent interim design.

- Throughout the design process the Offeror must integrate communications into the facility. An information technology consultant with expertise in this area must be used during the design of the facility. As a minimum, the Offeror is required to have all communications submittals approved by a BiCSi Registered Communications Distribution Designer.

- The Air Force requires a charette with the Offeror's architect at the 20 to 25 percent design stage. The goal of the charette is to open a dialog between the Air Force and the architect, provide meaningful input to the design, and minimize changes at the 35% design stage. The architect will make a presentation and solicit comments from the Air Force in relation to facility siting, traffic flow, primary exterior architectural elements, and construction phasing.

- After award of the contract, the design will proceed with the Successful Offeror submitting a 35% interim design package for review and approval by the Air Force. The schedule for submitting the 35% design will be established in the design contract. The Air Force will review the 35% design package against the requirements established in the contract, which will include these specifications, along with the elements contained in the LAAFB design guide and the Concept Design materials.

- For the purposes of this RFP, the Air Force considers the following to be the elements of a 35% design (final definition of 35% design will be contained in the design contract):

11.1.1 General

- Prepare a construction cost estimate
- Establish the legend sheet (symbols)
- Establish consistent terminology
- Identify major interfaces (be sure you understand existing conditions)
- Define and verify current conditions for existing facilities
- Include the table of contents for specifications
- Develop the list of particular specifications, highlighting nonstandard specifications and confirming that requirements identified in Appendix A are understood and can be met
- Develop the drawing list
- Develop the hydraulic profile
- Include the process flow diagram

- Include the preliminary list of section drawings
- Identify changes from Design Report (letter or report format)
- Identify proprietary technology or equipment
- Identify clients' equipment preferences
- Include description of operation
- Identify hazardous areas and their classification
- Identify toxic areas and the regulatory agencies involved
- Identify ventilation issues
- Identify noise requirements
- Identify the LAAFB permit and code requirements
- Identify concept and strategy for telecommunications and LAN
- Coordinate line work (interceptors, force mains, etc.) that is constructed outside the building site with private utilities (telephone, electric, gas, cable TV)

11.1.2 Civil Sanitary

- Soil report
- High point and low point of floor slab
- Discussion of pipe sizes for pipe hung from the underside of the structural frame or concrete supports
- Location, weight, rotational speed(s), and equipment manufacturers' literature for all large equipment
- Location and size of opening in concrete walls
- Select major equipment
- Prepare conceptual layouts for all buildings showing locations for major equipment
- Develop the preliminary site plan with roadway (access) patterns, major subsurface piping, and utilities established
- Develop operational and control descriptions of major systems
- Develop the motor list
- Identify scope of lab functions (if any)
- Locate chemical storage, usage, and impacts
- Obtain soils report
- Define property limitations/site assessment/hazardous waste
- Finalize Engineering Technical Design Report
- Draft specifications for major equipment
- Type of foundations
- Identification of Americans with Disabilities Act (ADA) or other architectural restrictions
- Type of framing (steel vs. concrete)
- Agreement on method of equipment removal (e.g., use of cranes vs. individual lifting hooks)
- Preliminary identification of hazardous (explosive or corrosive) areas

11.1.3 Structural

- Locate and show all expansion joints on plans
- Develop a legend sheet
- Identify foundation requirements
- Identify structural systems to be used
- Identify major interfaces with existing facilities
- Show column coordinate system, letters, and numbers on plans

11.1.4 Architectural

- Final overall building size
- Development of a preliminary floor plan and systems furniture layout
- Final column spacing
- Sizing for all major openings such as stairs, elevators, and roof skylights
- Typical exterior of all sections
- Interior partition materials
- Anticipated floor depressions
- Location and size of the knock-out panels
- The roof slopes for pitched roofs
- Final heights of all floors of building
- Develop the preliminary legend sheet
- Develop preliminary building code and ADA study
- Develop the preliminary layout of new and modified buildings
- Develop preliminary elevations
- Develop preliminary building sections
- Identify construction systems
- Establish material selections
- Coordinate structural system
- Acquire Art Commission /Architectural Review Board approval
- Outline specifications
- Identify type of fire alarm system required and compatibility with existing system

11.1.5 HVAC

- HVAC drawings or specifications are not required at the 35% stage
- Define equipment and system (heating and cooling) philosophy (type - gas, oil, electric)
- Identify major pieces of equipment locations and size
- Prepare preliminary calculations
- Identify roof type and its use
- Locate mechanical and HVAC room

- Provide the preliminary motor list

11.1.6 Plumbing

- Discuss with Civil Sanitary designer any special requirements
- Discuss with Civil Sanitary designer Structural sump pit locations and sizes
- Include provisions for use of recycled or industrial water in the interior and exterior of the facility (purple pipe).

11.1.7 Electrical

- Identify distribution system and expected demands
- Establish preliminary siting of major equipment and major duct banks
- Establish standby-power requirements
- Identify existing system demands
- Identify extent of lightning protection required
- Coordinate preliminary hazardous area designations (explosive/ corrosive)
- Provide equipment and panel schedules

11.1.8 Instrumentation and Controls

- Develop the specification section list
- Establish control philosophy with Civil Sanitary and Electrical designers
- Determine system block diagram/function location
- Identify the interface with existing equipment/systems
- Determine communication and life safety systems
- Develop all P&ID's for major systems and equipment showing critical field instruments and identifying panels

    - After approval of the 35% design by the Air Force, the Successful Offeror shall proceed with the design through the final design. After approval of the 35% design submission the Air Force will require monthly over the shoulder design reviews through the final design. In addition, using the charette format, the Air Force will require the review and approval of the floor plans and systems furniture layouts at approximately the 65% design stage.

    - The Successful Offeror will submit completed specifications and drawings as the final deliverable of the design contract. The specifications and drawings will be reviewed by the Air Force to ensure that they are complementary. In serving this function, they should meet the requirements outlined in Appendix A. As the graphic means of describing the construction project, the drawings should show the shapes, dimensions, locations, and the relationships between components and

materials. The order of the drawings should facilitate the work of the contractor and follow the natural order of construction. The design contract will specify in more detail the requirements for the final specifications and drawings.

11.2 QUALITY REQUIREMENTS

Design Criteria: During Preliminary Design, the design and performance criteria must be refined, finalized, and documented.

11.2.1 Design Documentation: Record all design and performance criteria that will be of use during occupancy and operation of the project, including all items specified for maintenance manuals, below.

- Design Criteria Documentation Included in Construction Documents: Organized logically (from the point of view of operations staff) and placed in a prominent location in drawing sets.
- If desired, documentation may consist of annotated modifications to and amplification of the Conceptual Documents, with changes that affect Contract Times or Contract Price documented as required for modifications.
- If required, shop drawings may be used to accomplish design documentation.
- Air Force will maintain the project program document, modified to reflect changes made during refinement of the design.
- Drawings: Prepared using AutoCAD 2000, using Air Force specified drawing and layering conventions.
- Shop Drawings: Prepared using same CAD software.
- Mock-Ups: Where necessary to clarify design intent and obtain approvals, construct full-scale mock-ups.
- Substantiation Requirements:
  - Substantiation Submittal Procedures:
    - Time Frames: As specified. If there is a conflict between the degree of detail or completion specified and the progress of the design or construction, obtain a clarification before submitting.
    - Number of Copies: No more than 5 copies for Air Force's use and records; Air Force will return not more than one additional copy.
    - For time periods that constitute Milestones, all substantiation submittals required during that period must be complete and accepted before the Milestone can be considered achieved.
    - Submit complete sets of documents containing all substantiation at end of the following periods:
- Proposal period.
  - Preliminary Design period – 35% design stage.

- Design Development period – 65% design stage.
- Construction Documents period – 95% design stage.

- Resubmissions: Clearly identified as such, with all changes made since the original submittal clearly marked.
- Air Force's Review of Substantiation: Unless otherwise indicated, Air Force will make formal acceptance of substantiation submittals.
  - If a submittal is not acceptable Air Force will notify Design-Builder within 10 working days.
  - Allow minimum of 15 working days for review of major "end of period" submittals.
  - As part of the project Quality Assurance program each submittal will undergo a Technical Review of the Design Documents as defined by GSA. The design team is required to respond to all comments made in each review and incorporate the ensuing resolutions in the subsequent design release.
- Substantiation Schedule: Prepare and maintain a complete schedule of substantiation items, showing:
  - Contents, for each item:
  - Anticipated and actual item, with chapter and paragraph number and drawing identification, if any.
  - Anticipated submittal date, or time period(s) during which submittal is required.
  - Actual submittal date.
  - Action taken or other status.
  - Identification of future re-submission requirement, if any.
    - If desired, schedule may be incorporated into overall progress schedule, provided substantiation data can be reported separately from other progress information.
    - Submission: To Air Force, within 30 days after notice to proceed.
    - Form: Computer database format for Air Force's use in tracking submittals; database structured so Air Force's added information will not be overwritten or deleted by incorporation of updated data from Design-Builder.
    - Updates: To Air Force, monthly in hard copy and same database format.
- Field Testing and Inspection: Perform all testing, observation, and inspection required by code and as specified. (The actual inspections will be conducted on this project by the Air Force or the Air Force designee. The developer will conform in all respects to the compliance of the code and the rulings of the code inspectors in this regard.)

- Exception: Tests and inspections indicated to be performed by Air Force's commissioning agent or other independent agency.

- Qualifications of Testing/Inspection Agencies:
- Qualified and equipped to perform applicable tests/inspection.
- Regularly engaged in testing and inspection activities on a commercial basis.
- Employed by Design-Builder directly.
- Authorized to operate in the State in which the project is located.
- Acceptable to Air Force.
- Substantiation: Submittal of qualifications, based on ASTM E 329 and ASTM E 548.

- Reports: Written report of each test/inspection; including complete details of conditions, methods, and results, signed by responsible individual.

▪ Reference Standards: Where products or workmanship is specified by reference to a document not included in the Contract Documents, comply with the requirements of the document, except where more stringent requirements are specified.

▪ Date of Issue: As indicated in each instance except where a specific date is established by code.

▪ Copies on Site: Keep copies of referenced standards that prescribe installation or workmanship standards on site until completion.

11.3 TEMPORARY FACILITIES AND CONTROLS

▪ Owner will provide the following:

- Electrical power consisting of connection to existing facilities. The Design-Builder will comply with energy conservation measures as specified by the Air Force during construction.

- Water supply, consisting of connection to existing facilities.

▪ New permanent facilities may be used during construction.

▪ Vehicular Access and Parking: Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

- Parking for Construction Workers: By Design-Builder.

- Do not allow vehicle parking on existing pavements.

- Provide one parking space reserved for use of Air Force.

▪ Traffic Controls: Provide as necessary during construction to maintain

safe campus traffic conditions. Change as often as necessary during construction to adhere with project phasing.

- Security: Protect the work, existing facilities, and Air Force's operations from unauthorized entry, vandalism, and theft; by Design-Builder.
- Erosion and Sediment Control: See Volume G.
- Dust Control:
  - Exterior: Minimize raising dust, preventing dispersal of air-borne dust into atmosphere and over adjacent property.
- Noise Control:
  - Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
- Waste Control: Provide waste storage and removal as required to maintain site in clean and orderly condition.
  - Waste Removal Service: Daily; including dumpsters.
- Pest and Rodent Control:
  - Pest Control Service: Weekly treatments.
- Pollution Control: Comply with federal, State, and local regulations.
- Project Identification Sign: By Design-Builder to Air Force's design.
  - No other signs allowed on site without Air Force permission except those required by law.
- Removal of Temporary Facilities, Utilities, and Controls: Prior to Substantial Completion; including clean up, restoration of existing facilities used to original condition, restoration of permanent facilities used to specified condition, and repair of damage.

11.4 EXECUTION

- Pre-Construction Survey: To be prepared by Air Force; control and reference points will be indicated.
- Health and Safety:
  - Use of explosives is not permitted.
  - Construction operations will comply with NFPA 241, including applicable recommendations in Appendix A.
  - Removal, abatement, handling, and disposal of hazardous materials will comply with 29 CFR 1926 and state and local regulations.
  - Use physical barriers to prevent access to areas that could be hazard-

ous to workers or the public.

- Substantiation:
  - Proposal: Summary of health and safety plan.
  - Design Development: Identification of hazards in existing structures and on site, with preliminary plan for abatement.
  - Construction Documents: Detailed specifications for hazardous material removal, abatement, and disposal.
  - Final Cleaning: By Design-Builder.

11.5 CLOSEOUT SUBMITTALS

- Maintenance Manuals: Assemble system design information, operation and maintenance data, and copies of warranties into manuals, organized by functional system (e.g. plumbing, HVAC, etc.) or material type (e.g. flooring, wall finishes, etc.) as appropriate using specification numbers where applicable. O and M manuals will be submitted on CD(’s) in Adobe Acrobat inclusive of the following requirements:
  - Binders: 3-ring, D-ring, with hard cover, project title on spine, Table of Contents in each volume, and stiff dividers with labeled tabs; contents divided into logical binders not more than 3 inches (75 mm) thick. (as well as electronic copies)
  - Directory: Names, addresses, telephone numbers, of all design and construction entities, including subcontractors and suppliers, with names of products supplied.
  - Software-Operated Systems and Equipment: Detailed program documentation, a general review of the programming approach, description of use on this project, and description of possible user-modifications.
  - Drawings: Bound into manuals, folded to size of binder. (as well as electronic copies)
  - Product Listing: Manufacturer's brand name for each major product actually installed, in alphabetical order by generic product name, cross-referenced to specification numbers and Table of Contents of manuals. Include also a complete directory of manufacturer’s representatives serving this project inclusive of complete company name, contact name(s), full address, telephone and facsimile numbers, e-mail addresses and web sites.
  - Warranties: Photocopies of originals.
- Project Record Documents: During construction maintain on site one set of all documents forming the contract, including drawings, recording all changes made by addenda, by formal modifications, and in performing the work, for Air Force's future reference.

- Storage: Separately from documents used for construction, in location where they can be kept clean and safe from fire and damage.
- Changes to be Recorded Include:
  - Actual measured locations (horizontal and vertical) of foundations and concealed utilities and appurtenances, referenced to visible permanent appurtenances.
  - Field changes of dimension and detail and details not on original documents.
  - Actual products used, in specification, with brand name or model number.
- Submittal Copy of Drawings: All marks copied to a clean set of prints.

Submit an updated copy of as-built drawings in Autocad 2000 format within 60 days of completion of the facility (acceptance and beneficial occupancy).

11.6 CONSTRUCTION SUBMITTALS

- The Successful Offeror shall during construction:
  - Provide and distribute submittal data during the construction phase in an orderly sequence so as to prevent delays in the work;
  - Construct mock-up as required during the construction phase allowing adequate time for on-site review;
  - Establish, maintain, and distribute copies of the submittals register to the Air Force; and
  - Maintain a submittal approval file at the job site for review by project personnel.

11.7 OPERATIONS AND MAINTENANCE MANUALS & AS-BUILT DRAWINGS

- The Successful Offeror shall submit operations and maintenance manuals for all equipment and materials included in the project where such data are available from the manufacturer. The Successful Offeror shall provide training to designated LAAFB personnel from manufacturer trained technicians on the operation and maintenance of all building systems for which maintenance is required. In addition, the Successful Offeror will provide the Air Force with a copy of as-built drawings of the completed facility. Drawings will be in AutoCAD format.

11.8 WARRANTEES & GUARANTEES

- The Successful Offeror shall submit a complete set of warrantee and guarantee information and certificates. The submittal shall be itemized and organized into binders by discipline, system and equipment.