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CHAPTER III

SECTION 1 - CONCEPT DESIGN

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CHAPTER III

SECTION 1 - CONCEPT DESIGN

1.0. Concept Design Submittal. The concept submittal shall consist of the following documents:

- Design Analysis
- Schematic Drawings
- Cost Estimate
- Other Items as required by the Scope of

Work

This Chapter will define, by discipline, requirements of the Design Analysis and Schematic Drawings. Format and quality of design analysis and drawings shall be per Chapter II, "Presentation of Data," of this guide. Concept drawings shall include sufficient information to outline the scope of work requirements and to show the general design of the project to approximately the 20 percent stage of completion.

Develop all drawings to a uniform level so that the entire project can be reviewed for conformance with authorized scope and criteria. Include features to depict the minimum required information in accordance with requirements hereinafter. If the size and/or complexity of the pertinent project requires additional information be presented to supplement the narrative description, show such information.

Guidance for preparation of the cost estimate is covered in Volume 2, Cost Estimating, and shall be a Code A or Code B estimate as defined in the scope of work. Standard definitive or other repetitive standard drawings shall be utilized if applicable and available, and only if specified in the scope of work.

1.1. Objective. This phase of design shall establish a fixed design direction for the project by demonstrating the appropriateness of one design solution over at least two (2) other alternatives. The submittal shall provide sufficient information to demonstrate that the users' functional needs and space requirements can be met within the programmed budget and scope of work. Applicable criteria shall be listed, and major design constraints and/or opportunities such as the following addressed:

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a. Identification of any apparent criteria and/or code violation that may occur if project is constructed as presently scoped.

b. Identification of construction interferences, and any required utility outages, including interior heating/cooling, power and lighting.

c. Recommendation of construction phasing, where appropriate.

d. Recommendations for revising the present scope of work to better improve the payback or alleviate any of the problems addressed in paragraphs a. and b. above.

e. Description of site conditions and reasons for site plan as presented. Any information needed to support the A-E's design approach shall be provided in a form appropriate for review.

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1.2. Civil Design.

1.2.1. Design Analysis - Narrative/Calculations. The various aspects of the civil design requirements shall be described. The type and extent of the civil features under consideration and the designer's recommendations for their design shall be presented. Calculations shall be provided to justify the recommendations made and shall be consistent with the level of detail of design involved in a concept submittal.

1.2.1.1. Siting. Describe site conditions including existing topographic features and improvements affecting or relating to the proposed work. Address any special or unusual conditions such as former refuse dump area, hazardous or toxic waste problems, potential for flooding, ground instability, rock outcroppings, drainage features, unusual soil conditions, and any contaminated soil or groundwater conditions.

1.2.1.2. Water Distribution System. Develop basic and controlling water demands and show required residual pressures, flows and tentative pipe sizes. Include fire, domestic and industrial average and/or peak demands, as applicable. Show adequacy of distribution system to supply controlling demands mindful that this controlling demand will be primarily dictated by the fire water flow demand and pressure (if applicable). Include information basic to this determination, such as known flow tests and/or computations. If added daily water requirements of project are considerable, state whether the capability of the supply system to meet total requirements has been determined or whether it requires analysis. Water meters will be included in the project design only if determined necessary by the Major Command. Water meters shall be considered where reimbursement to local authorities/agencies is required.

1.2.1.3. Water Treatment. State whether water treatment is required for this project.

1.2.1.4. Sanitary Sewer System. Discuss peak flow and average flow determinations in gallons per hour and day for building connections, individual sewers and force mains from population, measurement, or fixture units, as

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applicable. Describe the existing system, covering particularly the type, capacity, condition, degree of treatment, present flow and unsatisfactory elements of component parts for major extensions. Describe type of system proposed. Do not specify pipe materials. Provide engineering justification for deleting any pipe material options, such as those which must be deleted due to corrosive conditions.

1.2.1.5. Sewage Treatment. State type of waste involved, degree of treatment required, type of treatment plant proposed, and required effluent quality. Describe receiving stream and anticipated effect of treatment plant effluent. Provide a brief description of units involved including basic data (contributing population, wastewater allowances, etc.) which will be used in sizing units.

1.2.1.6. Storm Drainage and Grading. Discuss proposed drainage design. Basic information shall include design storm criteria, rainfall, and infiltration rates with the basis for their selection, method of computing runoff, times of concentration, ponding effects, if any, and other items affecting design discharges.

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1.2.1.7. Roads, Streets, Parking, Open Storage, Hardstands and Sidewalks. Discuss geometric features including widths of traffic lanes, shoulders, parking spaces and walks. Also discuss any required signing and striping.

1.2.1.8. Landscaping. State what general type of landscape treatment exists on the overall installation and in the immediate vicinity of the project. This project's landscaping shall be harmonious with adjacent landscape treatments and vegetative communities. Refer to the Base Design Guide or Base Plant List if available. The theme must consider future long range design continuity, compatibility with user needs, and maintenance constraints. Describe how the proposed landscape design satisfies these requirements. State if an irrigation system is authorized and/or required.

1.2.1.9. Dust and Erosion Control. State proposed type and method of providing dust and erosion control, reasons for selection, extent of area treated, etc. If no treatment is proposed, justify omission.

1.2.1.10. Railroads. State type of service for which railroad track will be provided, anticipated volume and type of traffic, and the ruling grade.

1.2.1.11. Fencing. Discuss any required fencing.

1.2.1.12. Include the Preliminary Geotechnical Report

1.2.2. Drawings. (See Chapter II for scale requirements.)

1.2.2.1. Site Plan. Provide site plan(s) showing new and existing building location, access roads, parking, traffic routes, topography, survey control points, bench marks, drainage, sidewalks and demolition requirements. Show finish floor elevations and finish grades at each building. Show existing site features, topographic features and proposed improvements. The drawings shall indicate the revisions which are to be made to existing topographic features and improvements, roads, drainage facilities, etc. Where drainage facilities are to be provided, the direction of flow and point of discharge shall be indicated by

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appropriate symbols or notes.

1.2.2.2. Utilities Plan. Show existing utility lines; proposed utility lines with tentative line sizes; points of connection to existing utilities; and any rerouting of existing utility lines.

1.2.2.3. Demolition Plan. Provide a separate demolition plan for all existing site features to be removed.

1.3. Architectural/Structural Design.

1.3.1. Design Analysis - Narrative/Calculations.

1.3.1.1. Architectural Motif. State what general type of architectural treatment exists both on the installation, and in the immediate vicinity of the proposed project. Although selected design features of this structure should be in conformance with those exhibited in existing

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structures, the design need not be identical. Motif shall follow the most recent, predominant, existing theme of the installation to insure future long range design continuity. Describe how the design satisfies these requirements.

1.3.1.2. Site Orientation. Adapt the building to the size, shape and orientation of the site to include benefits from natural warming and cooling affects afforded by the site. If setbacks are involved, establish the relevance of setback design provisions. State how location of the site relative to local climate affects the placement of entries, fenestration and roof overhangs due to prevailing wind, sun and noise. Discuss architectural features and relative costs, i.e., the use of tinted or thermal glass if required as opposed to conventional glazing.

1.3.1.3. Energy Conservation. Describe energy saving ideas/features considered and/or included in the project design. All energy saving ideas/features shall be compared against their effect on construction, maintenance and operational costs. Items to consider include:

- a. Various building configurations
- b. Various building orientations

c. Solar "features", including skylights for electrical lighting reduction; increased thermal insulation over AFR 88-15 minimum requirements; shading by landscaping; walls and roof color; optimum window shading orientation and glazing type; etc. For the purposes of this instruction, passive solar "features" should not be considered as a passive solar "system." Solar systems are addressed in AFR 88-15 and appropriate Air Force Engineer Technical Letters (ETL's). Coordinate with mechanical and electrical designers to insure that the target Energy Budget Figure for the facility being designed is satisfied as a minimum. See current Air Force ETL titled "Energy Budget Figures."

1.3.1.4. Economy of Building Construction. In order to apply life cycle cost effectiveness, economic wall and roof systems should be defined as early as possible in the design effort. Provide economic comparison of three (3)

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roof and wall systems per AFR 88-15 including details of proposed construction types and an analysis to verify the "U" values per current Air Force ETL are satisfied. Provide a narrative discussing the different systems, anticipated life of the functions to be accommodated, and additional supportive information for the system selected. Coordinate with structural and mechanical designers. At least three (3) structural systems must be evaluated in the wall and roof system analyses.

1.3.1.5. Programmed vs. Computed Floor Area. Gross and net areas shall be computed as indicated in Plate 18, Chapter IV. All enclosed space with an average ceiling height of less than seven (7) feet shall be excluded.

1.3.1.6. Finish Schedules. Provide schedules for proposed exterior and interior finishes (if not shown on the drawings). (See Plates 10, 11, 12 and 13, Chapter IV).

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1.3.1.7. Fire Protection Summary. Provide a Fire Protection Detail Summary based on the current editions of the National Fire Protection Association (NFPA) Standards and codes in accordance with AFR 88-15. Include any code and criteria exceptions. For Medical Facilities follow AFR 88-50. The Summary will list applicable NFPA paragraph/code number references as well as "required" and "actual" conditions in design. Provide statement of construction type per AFR 88-15, e.g.: Fire-resistive, protected non-combustible, etc. Provide "means of egress" sketch to show that exit requirements of NFPA are satisfied.

1.3.1.8. Fallout Shelter. State whether a fallout shelter has or has not been provided. If fallout protection is required, state protection factor and number of shelter spaces being provided. See AFR 88-15 and DOD Directive 3020.35 reference 14c.

1.3.1.9. Handicapped Data. Follow the "Uniform Federal Accessibility Standards," (7 August 1984 Federal Register) for purposes of determining handicap requirements.

1.3.1.10. Special Requirements for Addition/Alteration Projects.

1.3.1.10.1. Asbestos. If required by your Scope of Work, perform an asbestos survey to determine the presence of asbestos. Identify and quantify all areas that contain asbestos. Asbestos surveys must be performed by certified Industrial Hygienists. If the project does not contain asbestos, so state. Attach the results of the survey as an appendix to the Design Analysis.

1.3.1.10.2. Life Safety. Perform a life safety survey to identify existing violations of means of egress and fire separation per NFPA 101, NFPA 220 and the U.B.C. and describe how new work will affect existing life safety. State the building construction types and occupancy classification. Provide "means of egress" sketches to identify existing violations and recommended corrective actions.

1.3.1.11. Type and Method of Construction. State whether the proposed facility is Permanent, Semi-Permanent, Temporary, or Protective per AFR 88-15.

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1.3.2. Drawings. (See Chapter II for scale requirements.)

1.3.2.1. Floor Plans. Provide floor plan for each floor showing: (a) overall dimensions and dimensions of important elements, (b) functional arrangement.

1.3.2.2. Functional Floor Plan. On occasion, prior to development of a full concept submittal, a functional floor plan submittal will be required. If required by your scope of work, the functional floor plan will be prepared as described below (this plan is not required as part of a normal concept submittal):

a. Provide a single line floor plan identifying each of the functions as outlined in the PB and as discussed at the Predesign conference. Rooms shall be sized and arranged as required by the functional requirements. Exit requirements and column spacing shall be considered.

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b. Provide a gross area tabulation for each of the functions and for the total building.

c. Provide a narrative description of the proposed functional floor plan describing the rationale behind the A-E's design decisions.

1.3.2.3. Principal Elevations. Provide a minimum of two principal elevations indicating type of material used. Show exterior mechanical and electrical equipment which affects the appearance of the structure.

1.3.2.4. Roof plan. Provide roof plan indicating valley/ridges/slopes.

1.3.2.5. Sections. Show at least one principal section of the floor and roof framing, suspended ceilings, floor-to-floor heights, floor-to-ceiling heights, concealed or open ducts, relation of fenestration to supporting columns or walls, etc. Show building section, one at entry and one typical for each building, showing room and building height and selected structural system.

1.4. Mechanical Design

1.4.1. Design Analysis - Narrative/Calculations. The various aspects of the mechanical design requirements shall be described. The type and extent of the mechanical features and systems under consideration and the designer's recommendations for their design shall be presented. Calculations shall be provided to justify the recommendations made and must be consistent with level of detail involved in a concept submittal.

1.4.1.1. Energy Conservation. Describe energy saving ideas/ features considered and/or included in the project design. All energy saving ideas/features shall be compared against their effect on construction, maintenance and operational costs. Buildings with high internal loads will require special attention to insure energy efficiency. Use of waste heat to assist in heating domestic water and cooling and heating the building will be considered. Other items to consider include:

a. Various types of HVAC systems (for example,

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dual duct vs. multi-zone vs. variable air volume; water vs. air-cooled condensers; centrifugal vs. reciprocating vs. absorption chillers, air to air or other types of heat recovery systems) and automatic programming devices to shut off or curtail HVAC systems during periods (nights and weekends) when not required.

b. Utilization of existing central heating and/or cooling systems for the new facility if adequate and economically feasible.

c. Active and Passive solar systems if specifically required by your scope of work. See appropriate Air Force ETL's for analysis requirements.

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Coordinate with architectural and electrical designers to insure that the target Energy Budget Figure for the facility being designed is satisfied as a minimum. See current Air Force ETL titled "Energy Budget Figures." Coordinate specifically with the architectural designer on heat transmission coefficient (U-value) determination.

1.4.1.2. Design Temperature Parameters. State indoor and outdoor design temperatures for heating and cooling, proposed "U" factors for walls, roofs, floors, etc., personnel load, equipment heat release (if any), outside air or ventilation requirements, and any other special conditions as required by AFR 88-15.

1.4.1.3. HVAC Systems. State type of heating plant and justification for its selection including the capacity, operating pressure and temperature. For ventilating system, state whether it is a gravity or mechanical system. State requirement for outside air, i.e., number of air changes per hour, CFM per person, or other factors. The use of air conditioning and evaporative cooling shall be in accordance with guidelines in AFR 88-15 and applicable Air Force ETL's. State system proposed for use.

1.4.1.4. EMCS. (Energy Monitoring & Control System). Indicate if base-wide EMCS is existing or planned. For existing EMCS identify system in operation and to what extent interfacing will be provided for this project. Current AF policies require the EMCS be terminated at the Data Terminal Cabinet (DTC) for new buildings at bases with an existing EMCS. The actual connection to the Base-Wide System will be done at a later date and shall therefore not be a part of this contract. If a base-wide EMCS is non-existent and not planned, describe feasibility of locally controlled systems for the equipment.

1.4.1.5. Fire Protection. Coordinate with the civil and architectural designers and provide a description of the type of fire protection/suppression proposed for the project. Coordinate with the civil designer on available water flow and pressure for any proposed fire sprinkler systems.

1.4.1.6. Fuel. State type, source and metering arrangements. For natural gas identify if firm or

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interruptible. Indicate adequacy of existing distribution system(s) and excess capacity, if any. State type of stand-by fuel for interruptible gas.

1.4.1.7. Specialty Items.

1.4.1.7.1. Cold Storage Projects. For cold storage projects, indicate room holding temperatures and commodities to be held in cold storage.

1.4.1.7.2. Clean Rooms. Specify cleanliness required and describe system selection and design proposed to achieve compliance.

1.4.1.7.3. Hazardous Waste. Specify EPA approved materials, equipment and systems proposed for use.

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1.4.2. Drawings. Provide mechanical site plan showing items such as steam or hot water lines from a central plant, fire lines, storage tanks, fire pumps, etc. If a functional floor plan is submitted, make sure the mechanical room is of sufficient size to accommodate anticipated equipment, piping, valves, etc. and servicing and replacement of same. Show mechanical equipment proposed for exterior location. See Chapter II for scale requirements.

1.5. Electrical Design.

1.5.1. Design Analysis - Narrative/Calculations. The various aspects of the electrical design requirements shall be described and the type and extent of the electrical features and systems under consideration and the designer's recommendations for their design shall be presented. Calculations shall be provided to justify the recommendations made and shall be consistent with the level of detail involved in a concept submittal.

1.5.1.1. Energy Conservation. Describe energy saving ideas/ features considered and/or included in the project design such as various types of lighting systems, automatic programming devices to shut off lights during periods when not needed, switching in the lighting layout to allow occupant control of areas and improvements to base electrical power factors by use of capacitors or synchronous equipment. All energy saving shall be compared against their effect on construction, maintenance and operational costs. Coordinate with architectural and mechanical designers.

1.5.1.2. Circuits. Provide electrical characteristics (phase, voltage, and number of wires) of primary and secondary circuits to be utilized in the project.

1.5.1.3. Primary and Secondary Voltage. State basis for selection of primary and secondary distribution voltages, and overhead or underground construction. Include justification for underground line.

1.5.1.4. Tempest/EMP shielding. For TEMPEST/EMP shielding, if included in project, include a statement that the attenuation requirements for TEMPEST and for EMP will be provided in those rooms or areas described in project book

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in accordance with DM 4-805-4 (See Chapter V).

1.5.1.5. Communications Prewiring. Describe existing communications system at or near building site and any changes necessary to accommodate new project communication requirements. Include discussion of local area or wide area network requirements, if applicable.

1.5.1.6. Other Systems. Briefly describe need and basis for selection of lightning protection, cathodic protection, intrusion detection, Master Antenna Television (MATV), central sound and fire alarm systems. Include discussion of how these will be tied into existing systems (if applicable).

1.5.2. Drawings. Provide electrical site plan, separate from civil site plan, including power and communication service lines to the building and exterior location of proposed electrical equipment. See Chapter II for scale requirements.

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