



**ARCHITECT / ENGINEER
(A/E)
DESIGN GUIDE**

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**Department of Health and Human Services
Indian Health Service
Division of Engineering Services**



Architect / Engineer (A/E) Design Guide

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Comments regarding this Guide should be submitted in the format shown in the back of the A/E Guide and sent to the A/E Guide Update Committee at one of the following addresses or e-mailed to Ken.Harper@des.ihs.gov.

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Comments will be reviewed during periodic updating of the Guide.

I. INTRODUCTION

A. Introduction

1. This guideline defines the minimum requirements for each submission in the production of Indian Health Service (IHS) Pre-Design (PD), Concepts, Schematic Design (SD), Design Development (DD), and Construction Documents (CD). The design requirements are defined by the Scope of Work (SOW), the design criteria, and the Program of Requirements (POR) including templates developed under the Health System Planning (HSP) program described in Appendix D. This guideline is designed to give the A/E an understanding of what is required and what must be completed before the final construction documents are released for bidding. This guideline does not relieve the A/E of their professional responsibility to produce a correct, complete, and fully coordinated set of construction documents in accordance with the industry standard practice and Government criteria.
2. This guide provides:
 - a. Guidance for the development of design documents, specifications, and contract documents.
 - b. Guidance on architectural and engineering design features.
 - c. Guidance on submittals.
 - d. Supplemental information.

B. Definitions

| | |
|----------------------------------|--|
| Boiler Plate (Bidding Documents) | General conditions; bidding forms; FAR and DDHHSAR provisions and clauses; and other preprinted forms and text for the inclusion in the contract documents that do not require editing by the A/E |
| Submission Checklist | A checklist indicating the required actions to be completed for each submission. The respective checklist is to be filled out and certified by the A/E and included with the submission. Checklists are included in Appendix F. |
| Group I – Equipment | Fixed, built-in, attached, and installed equipment normally included in the construction contract. |
| Group II – Equipment | Major moveable equipment – items having a useful life of 5 years or more (Moveable equipment does not require attachment to the building or utility service, other than provided by an electrical plug or quick disconnect fitting. Examples include chairs, |

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|---------------------------|--|
| | beds, bassinets, desks, computers and printers, network file servers, typewriters, system furniture, sphygmomanometers, microscopes, centrifuges, portable whirlpool units, exercise bars, refrigerators, and linen carts.) |
| Group III – Equipment | Minor moveable equipment – items having a useful life of less than 5 years (These items are of relatively small cost and size and lend themselves to on-site storage for replacement of lost or worn out equipment. Examples include linens, blankets, gowns, washbasins, bedpans, pipettes, surgical instruments, silverware, and chinaware.) |
| Special Purpose Equipment | Group I, II, or III technical, medical, or scientific equipment needed to operate a laboratory, a hospital, a clinic, a clinical research patient care unit, an animal care facility, or equipment which is specific to a single purpose and not generally suitable for other purposes (Examples of such equipment include incubators, electric ovens, sterilizers, vacuum and pressure pumps, centrifuges, water baths, casework, sinks, shelves, patient headboards, workbenches for microscopes, and moveable apparatus for laboratory animals. Special-purpose equipment may be classified as either fixed or moveable equipment.) |
| Templates | Departmental layouts that have been developed to a level that is close to a Design Development level. The Templates include furniture and equipment layouts, equipment list, environmental requirements, etc. The templates are included as part of the POR. |
| Template Rule Book | Provides information and rules on how the Templates are to be used in designing an IHS facility. (See Appendix D) |
| Record Documents | An updated set of construction documents, specifications and drawings, edited to show the actual work performed in comparison with the original specifications. |
| Record Drawings | An updated set of drawings approved and noted as certified by the A/E and approved by the Project Manager. |
| Record Specifications | An updated specification edited to show the |

actual work performed in comparison with the original specifications.

Project Manager

As used in this document, Project Manager is the same as the term Project Officer.

C. Abbreviations

| | |
|----------------------|--|
| ACI | American Concrete Institute |
| ADA..... | Americans with Disabilities Act |
| ADAAG | Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities |
| A/E | Architect/Engineer (The design, technical consulting firm engaged for professional architectural and/or engineering services.) |
| AIA | American Institute of Architects |
| AIA Guidelines | American Institute of Architects Guidelines for Construction and Equipment of Hospitals and Medical Facilities. |
| ANSI..... | American National Standards Institute |
| ASTM | American Society for Testing and Materials |
| BGA | Building Gross Area |
| BOCA..... | Building Officials and Code Administrators International, Inc. |
| CAD | Computer-Aided Design |
| CAD Layers..... | American Institute of Architects CAD Layer Guidelines |
| CD..... | Construction Documents (includes drawings and specifications) |
| CO..... | Contracting Officer |
| CSI | Construction Specifications Institute |
| DD..... | Design Development |
| DFEE | Division of Facilities and Environmental Engineering |
| DGA | Departmental Gross Area |
| DNA | Departmental Net Area |
| DoE..... | Department of Energy |
| EPA..... | Environmental Protection Agency |
| ES | Engineering Services |
| ESDal..... | Engineering Services - Dallas |
| ESSea..... | Engineering Services - Seattle |
| FAR..... | Federal Acquisition Regulations |
| FGA..... | Floor Gross Area |
| HFBM..... | Health Facility Planning Manual |
| DDHHS | Department of Health and Human Services |
| DDHHSAR | Health and Human Services Acquisition Regulations |
| HSP..... | Health System Planning |

| | |
|-------------|--|
| IBC | International Building Code (formerly UBC) |
| IEEE | Institute for Electrical and Electronic Engineers |
| IES | Illuminating Engineering Society |
| IHS | Indian Health Service |
| IHSAR | Indian Health Service Acquisition Regulation |
| LSC | Life Safety Code (NFPA 101) |
| M&I..... | Maintenance and Improvement |
| M&M..... | Medicare / Medicaid |
| NAFTA | North America Free Trade Agreement |
| NBC | National Building Code |
| NCS | National CAD Standard |
| NEBB | National Environmental Balancing Bureau |
| NEC | National Electrical Code |
| NEMA..... | National Electrical Manufacturers Association |
| NESC | National Electrical Safety Code |
| NFPA | National Fire Protection Association |
| NIH..... | National Institutes of Health |
| NIST | National Institute for Standards and Technology (Formerly NBS National Bureau of Standards) |
| NSF | National Sanitation Foundation |
| OEHE..... | Office of Environmental Health and Engineering |
| O&M..... | Operation and Maintenance |
| OPH | Office of Public Health |
| PD | Pre-Design |
| PJD | Program Justification Document |
| PJDQ | Program Justification Document for Staff Quarters |
| PM..... | Project Manager |
| PO..... | Project Officer (Term PM used herein denotes same person) |
| POR | Program of Requirements |
| PORQ | Program of Requirements for Staff Quarters |
| PSD..... | Project Summary Document (Similar to a POR, used for smaller projects.) |
| SBCCI | Southern Building Code Congress International, Inc. |
| SD | Schematic Design |
| SI..... | International System of Units |
| SOW | Scope of Work |
| SSBC | Southern Standard Building Code |
| SSER | Site Selection and Evaluation Report |
| STC | Sound Transmission Coefficient |
| SU..... | IHS / Service Unit |
| TERO | Tribal Employment Rights Ordinance |

UBC Uniform Building Code now IBC
UFAS Uniform Federal Accessibility Standards
UL Underwriters Laboratories, Inc.
VE Value Engineering

II. RESPONSIBILITIES OF THE A/E

A. Quality Control and Reviews

1. The A/E is responsible for the professional quality, technical accuracy, and coordination of all designs, drawings, specifications, and other contracted services.
2. The A/E's work shall be subject to the Government's oversight, direction, control, and approval.
3. Government reviews are to assure all programs, statutory, and regulatory provisions are included or met. The review is not intended to indicate a complete or detailed check of all documents, calculations, codes, etc. It does not relieve the A/E of any responsibility for checking their own work; verifying existing conditions, complying with the codes, standards, and the Program of Requirements (POR); and producing a complete coordinated set of documents.
4. Reviews and approvals will be provided by Governmental Agencies on the new comment form provided in Appendix H. All review comments will be coordinated through the ES for submission to the A/E. The review comment form will be incorporated in the design documents before work on the next design submission begins.

B. A/E Project Manager

The A/E shall designate a project manager (PM). The A/E PM shall be familiar with the requirements in the A/E contract, performance schedule, Scope of Work (SOW), and this guide. The A/E PM will provide necessary design guidance for the successful completion of this work and coordinate with the assigned PM.

C. Document Distribution

The A/E shall distribute documents as required in the contract.

D. Scope Changes

Any proposed deviation from the project SOW must be reviewed with the PM and approved by the CO before any action can take place. When major changes in the SOW are required, the CO according to the Changes Clause of the contract will negotiate appropriate contract modifications with the A/E. During the progress of the work, if minor changes within the general project scope are required, the A/E will make the adjustments when directed by the CO.

E. Document Ownership

All tracings, designs, specifications, notes, computer aided design (CAD) files, and other related work shall become Government property.

F. Errors and Negligent Performance

The A/E shall correct or revise any errors or deficiencies in designs, drawings, specifications, estimates, and other services without additional compensation. The A/E shall remain liable (in accordance with applicable law) for all damage caused by the A/E's (or its consultants) negligent performance of any of the services furnished under the A/E's contract, or failure to comply with any applicable legal or contractual obligations.

Design errors or omissions, or other failure that constitutes negligent performance or breach of a contractual obligation, resulting in damages or extra cost to the Government will be evaluated for potential A/E financial liability. If the Government determines the A/E is liable for any such deficiency, the CO will notify the A/E. Any damages or extra costs incurred by the Government resulting from any such deficiency will be actively pursued.

G. Public Disclosure

The A/E shall make no public disclosure of pending construction contracts without written consent of the Contracting Officer.

III. GENERAL DESIGN REQUIREMENTS

A. General Requirements

In all design projects, the primary source of design criteria for Health Care Facilities will be the latest edition of the AIA Guidelines (refer to C1.h.1).

B. A/E Site Investigation

It is the A/E's responsibility to visit the site, inspect the location of the work, become acquainted with all local conditions, verify and identify existing conditions, review existing drawings, and consult with ES and area facility personnel.

C. Codes, Standards, and Guidelines

1. The design shall conform to the latest published edition of the following nationally recognized codes, standards, and guidelines. When more than one code, standard, or guideline covers the same field, the jurisdiction for the project will determine the code, standard, or guideline to be utilized.
 - a. National Fire Protection Association (NFPA) Codes and Standards
 - b. Vertical and Horizontal Transportation
 - c. American National Standards Institute (ANSI) A17.1, Safety Code for Elevators and Escalators.
 - d. Handicap Accessibility
 - e. American with Disabilities Act (ADA), 28 CFR Part 36, Appendix A, ADA Accessibility Guidelines for Buildings and Area Facility Personnel.
 - f. Energy and Water Conservation
 - (1) Executive Order 13123, Greening the Government through Efficient Energy Management
 - (2) Energy Conservation Voluntary Performance Standards for New Buildings; Mandatory for Federal Buildings. 10 CFR Part 435.
 - g. Lighting
 - h. Illuminating Engineering Society (IES) Lighting Handbook.
 - i. Radiation Protection
 - j. National Council for Radiation Protection and Measurement (NCRP) Reports #35 & #49.
 - k. Interim Life Safety Measures
 - (1) Joint Commission on Accreditation of Healthcare Organization (JCAHO) Accreditation Manual for Hospitals, Requirements for Interim Life Safety Measures.

(2) International Building Code (IBC) Series

I. Health Care

American Institute of Architects (AIA), Guidelines for Design and Construction of Hospitals and Health Care facilities

m. IHS Technical Handbook as excerpted in APPENDIX "G".

2. NFPA codes are the base codes for reference. Where there is a conflict between the NFPA codes and a building construction code being used, NFPA codes shall govern.
3. These requirements are considered minimum necessary to comply with PL 100-678 (refer to Appendix "A"). More restrictive requirements could be followed should it be required by a state and/or local authority having jurisdiction or by IHS. It is the practice of IHS to comply with state, local or tribal codes and ordinances whenever feasible.
4. Problems arising from specific project conditions shall be resolved through sound design practice and recognized standards and submitted for the record to the ES PM through the Contracting Officer.
5. When deviations from the criteria and standards are required to meet special conditions or concerns, determinations shall be the responsibility of the authority having jurisdiction (AHJ). Conflicts between code requirements shall be documented and copies submitted to the AHJ for consideration.

D. Metric

All measurements are to be rational SI metric dimensions. The metric dimensions are to be compatible with accepted metric modules. Existing measurements are to be changed to acceptable metric units of standard, should be hard metric dimensions. Refer to ASTM E621, Standard Practice for the Use of Metric (SI) Units in Building Design and Construction, for preferred symbols and standard conventions." Refer to Appendix "B" for additional information concerning the use of metric.

E. Value Engineering

It is the A/E's responsibility to use value engineering and life cycle principles throughout the design phase of the project, thereby making efficient and effective use of the construction and operational budgets. Depending on the size of a project, ES may require a formal value engineering (VE) study shall be accomplished with ES. If the formal VE study is required the owner will provide a VE consulting firm for the Value Engineering Study. The A/E will be required to brief the VE firm about the project requirements and design concepts, provide copies of design documents to the VE firm, and review and comment on the VE's recommendations. The A/E shall modify the construction documents to incorporate all accepted VE's recommendations at no cost to the government.

F. Value Engineering Study

A consultant independent of the A/E is required to conduct the VE studies. The VE team will be lead by a certified value specialist (CVS) registered with the Society of American Value Engineers (SAVE). VE team members are required to have, at a minimum, experience in health care and must have participated in related VE studies previously. All disciplines applicable to the project at each phase shall be represented on the team.

The A/E will not be a team member for the VE study. The A/Es only involvement in the study will be to provide information to the VE team and to attend the oral presentation.

The VE team will give an oral presentation of the team study results at the end of the study. Each VE study will be documented in report format and will contain the following:

1. A description of differences between the existing and proposed design, comparison of the advantages and disadvantages of each, justification when an item's function is altered, and changes affecting system or facility requirements. This may include but is not limited to sketches, calculations, models, etc.
2. Lists and analyses of design criteria or specifications that must change if the VE study item is accepted.
3. A separate detailed estimate of the impact on project costs for each VE study item. A description and estimate of costs the government may incur in implementing the VE study item, such as design change costs and test and evaluation costs
4. A prediction of any effects the proposed changes have on life-cycle costs and energy savings. All cost comparisons shall use a 30-year building life as a guideline. The discount rate shall be based on the composite yield on all outstanding T-Bonds neither due nor call able in less than ten years as reported by the Federal Reserve Board. All cost analyses shall use the current dollar or present worth approach. If other methods or assumptions are used, proper justification shall be included with the VE study.
5. The effect the VE study item will have on the design or construction schedule.

G. Energy Efficiency and Water Conservation

The design shall meet the requirements of Executive Order 13123 - Greening the Government through Efficient Energy Management. The design is to minimize the life cycle cost by utilizing energy efficiency, water conservation, or other renewable energy technologies. The design shall meet or exceed the energy performance standards applicable as set forth in 10 CFR 435.

H. Building System Commissioning

1. References:
 - a. National Institute of Health (NIH) Commissioning Guide
 - b. American Society of Heating Refrigerating and Air-Conditioning Engineers (ASHRAE) HVAC Applications – “Building Commissioning”
 - c. ASHRAE Guideline 1-1996, the HVAC Commissioning Process
 - d. ASHRAE 4-1933, “Preparation of Operating and Maintenance Documentation for Building Systems”.
2. The A/E is responsible for developing the requirements for the building systems commissioning plan during design, and documenting all requirements to be completed by the construction contractor during construction to ensure that building systems function in compliance with criteria set forth in the Project Contract Documents. The Commissioning Plan combines all system narratives, basis of design, assumptions and calculations for all systems into a single manual. When assembled with required as-built drawings and O&M manuals, this will provide an operating guide for the facility.
3. The Building System Commissioning Plan shall be outlined in the 65% construction document phase of the design as a submission separate volume.
4. In the final Construction Documents, the A/E shall provide a Division 17 Construction Specification dedicated to Building Systems Commissioning, which will address the various building systems to be commissioned. The document shall define “The Commissioning Team”. The team should consist of the following:

Owner: Contracting Officer, Project Manager;

O&M Staff: Facilities Manager;

Commissioning Specialist: Qualified person, Company or Agency (Government Official or Consultant designated to certify acceptance of the building systems.)

Designers: Architect, Mechanical/Electrical Design Engineer;

General Contractor (Team Leader) and Subcontractors: Prime Contractor, Construction Manager, Mechanical Sub-Contractor, Control Contractor, Equipment (Boiler, Chiller, Generator, ATS, Switchgear, etc.) Vendors; Testing Adjusting & Balancing Contractor.

5. Responsibilities of the Commissioning Specialist include, but are not limited to, the following:
 - a. Scheduling and conducting all meetings as included in the commissioning plan, recording and distributing minutes.
 - b. Coordinating inspection and testing of all interacting building systems.
 - c. Provide the format for documenting systems testing, and functional performance testing.
 - d. Noting conditions of construction in conflict or different than the contract documents which prevent commissioning activities from being completed.
6. The A/E shall be responsible to identify the building systems to be commissioned such as:
 - a. Air-Handling System
 - (1) VAV (Variable Air Volume) terminal system
 - (2) Supply Exhaust/Return/Relief Fan system
 - (3) Ductwork system
 - (4) Chilled/Hot water Pumping system
 - b. Central Plant Equipment and Distribution
 - (1) Chiller
 - (2) Feed Water
 - (3) Potable Water
 - (4) Air Compressor (Medical, Vacuum, Control Air etc.)
 - (5) Unit Heater
 - c. Building Automation System
 - (1) Direct Digital Control (DDC) system
 - (2) Pneumatic or Electrical Control
 - d. Dental Air and Vacuum Systems
 - e. Medical Gas and Vacuum Systems (NFPA 99)
 - (1) Oxygen System (NFPA50)
 - (2) Flammable Inhalation Anesthetic System
 - (3) Medical Air System
 - (4) Laboratory Gas Supply
 - (5) Nitrous Oxide System

- f. On and Offsite Fuel Gas or Oil Systems
 - g. Potable Water (Domestic), Irrigation Water and other Water Systems
 - h. Backflow Preventer between Potable Water and Fire Protection System
 - i. Sanitary, Storm Drainage and other Medical Waste Disposal Systems
 - j. Nurse Call System
 - k. Public Address System
 - l. Telecommunication and Television Cable System
 - m. Fire Protection System
 - n. Fire Alarm and Control Systems
 - o. Electrical Distribution System
 - p. Emergency Generator System
 - q. Energy Management System (EMS)
7. In addition to the commissioning requirements, the A/E should insure the requirements of Testing Adjusting and Balancing (TAB) System for HVAC and other building systems are closely coordinated with the commissioning requirements. The A/E shall coordinate testing, adjusting, and balancing for installed air and water systems. The fluid testing and balancing contractor shall be an independent test and balance agency that is not associated in any manner with any firm involved in the construction of the project. All test and balance work shall be performed under the supervision of a certified NEBB or AABC manager. Systems for which TAB work is to be provided typically include:
- a. Air-Conditioning System
 - b. Boiler System
 - c. Chiller System
 - d. Chemical Feed System (Water Treatment)
 - e. Domestic Hot Water System
 - f. Medical Gas System
 - g. Oxygen System
 - h. Dental Air System
 - i. Fire Alarm System
 - j. Lighting Control System
 - k. Nurse Call System
 - l. Security System
 - m. Voice/data System

- n. Public Access System
 - o. Normal Power Distribution System
 - p. Emergency Generator System
 - q. Automatic Transfer Switch
 - r. Equipment grounding system which shall provide a 10 ohm ground and tested using the "Fall-of -Potential" Method referenced in IEEE standard 142.
 - s. Lightning Grounding System
 - t. Power Quality Testing for the Main Switchboard and all Electrical Panels.
 - u. Infrared survey of Electrical Switchboard and Electrical Panels.
8. The intent of the A/E requirements is to:
- a. Document design decisions, assumptions, calculations and narratives for intended building system operations in a Commissioning Guide.
 - b. Develop construction contract requirements that can be administered during construction for completion of commissioning activities by the construction contractor with participation by the Government.
 - c. Ensure completion and Government verification of component and system testing.
 - d. Ensure the training for each piece of equipment and each system is completed and documented.
 - e. Ensure prior to completion of the construction contract, that the Operation and Maintenance Manuals, Commissioning Reports, as-built drawings and other required contract information are submitted to provide complete documentation of the proper operation of building systems and successful completion of building systems commissioning.
 - f. Ensure functional performance tests for each system are completed to satisfy the design intent.

IV. DRAWING PREPARATION

A. Drawing Format

1. **Sheet Size:** Within a single project, all contract drawings shall be uniform in size. The standard sheet size is A1 (841 x 594) or as specified in the SOW.
2. **Match Lines:** Floor plans requiring division onto more than one sheet shall be provided with match lines. These shall be cross-referenced on each sheet.
3. **Key Plan:** Projects requiring more than one sheet for each floor plan shall include a key plan on each floor plan sheet. The key plan shall show the location of the partial floor plan in relation to the whole floor plan. The key plan shall be located near the title block and oriented to match the floor plan. All partial floor plans shall be oriented the same direction on the sheets.
4. **Standard Details:** Reference details that are typical and apply to the specific project are to be incorporated into the drawings by computer-aided design (CAD) equipment. However, such standard details must be applicable to the specific project.
5. **Quality of Drawings:** All drawings submitted for review shall represent the best professional quality of graphic presentation. Drawings shall be legible, accurate, and properly coordinated. Final drawings shall be in CAD format with layers based on AIA layering guidelines. If, in the Government's opinion, the quality of the drawings does not meet these requirements, the drawings will not be accepted.
6. **Placement of Drawings on Sheets:**
 - a. **General:** Drawings should be arranged on sheets with economical use of space and without crowding or overlapping.
 - b. **Combination of Drawings:** Different categories of drawings may be combined. Categories should be arranged in related groups. For example, exterior wall sections should be separated from interior details if both are shown on the same sheet. Similarly, plans should be separated from elevations. For small projects, the sheet numbering system (see IV.J) may be modified.
 - c. **Floor Plans:** One or more floor plans may be placed on a single sheet depending on the size of the project. If the entire project is shown on one sheet or if the plans and elevations are drawn on the same sheet, the plans should be placed at the bottom of the sheet.
 - d. **Elevations and Sections:** Several elevations and sections may be placed on one sheet as long as they remain legible. When more than one sheet is used, the elevation showing the main entrance should be placed on the first sheet.

7. Scales:
 - a. Scales shall be appropriately selected to clearly depict all aspects of the required work.
 - b. Conventional Scales shall be placed under the title of each Plan, Elevation Detail, etc (e.g. SCALE = 1:100).
 - c. Graphic scales including every scale used on the sheet shall be located at the lower right hand corner of each sheet.
8. Floor and Roof Plans:
 - a. Name of Spaces: On the floor plan in the center of each space, the name and number for the space should appear and be underlined.
 - (1) If the space is too small for space name and number, they should be placed in a clear area outside the space with an arrow pointing to the space.
 - (2) On mechanical and electrical floor plans, names may be omitted from the spaces to allow clarity of utility systems. Names should then be placed in schedules located adjacent to the plans.

B. Space Identification Numbers

Unique identification numbers shall be assigned in the SD phase. All design spaces shall be identified with a departmental identifier and sequential POR number. No space number shall be duplicated (i.e., 11-01 where 11 is for the Acute Care Nursing department and 01 is the first room/space in the POR space allocation list for the Acute Care Nursing department. 21-01 where 21 are the Laboratory department and 01 is the first room/space listed in the POR space allocation list for the laboratory department.) This numbering system will be replaced with “the Facility Room Numbers” after the DD phase documents are approved.

C. Facility Room Numbers

All room/spaces shall be numbered with a floor identifier (if required), a corridor/departmental identifier, and a sequential room number. The first digit or letter indicates the floor level (B101, 1101, 2101, P101, etc.), the second digit indicating the corridor or department, and the third indicating a sequential room number. When there are more than nine departments a fourth digit is to be used. No room number shall be duplicated. All rooms with access to a building or departmental corridor shall only have a numerical identifier. Rooms accessed through another room shall have an alpha character appended to the main room number (i.e., Patient Bedroom numbered 1101; the interior bath would be 1101a.) Room numbering shall follow a logical progression (way finding) on each floor. Space numbers shall be assigned to stairs, elevators, dumbwaiters, escalators, and major duct shafts. The same space number shall be repeated on each floor (Stair No. 1, Elevator No. 1, etc.). These room numbers shall not be assigned until after the floor plan is fixed (after the DD phase is approved).

D. Drawing Media

1. Media: Drawings shall be provided in both traditional and electronic media as required by Delivery Order or Service Contract.
2. Traditional Media: Drawings shall be provided on 4 mil drafting mylar.
3. Electronic Media: Drawings shall be produced with the most current release of AutoCAD by AutoDesk on Compact Disks. Layer designation shall conform to the AIA Guidelines included in the National CAD Standard.

E. Title Blocks and Borders

Title Block: The ES standard title block (Appendix "E") shall be used, unless otherwise noted in the SOW.

F. Drawing Title

Each drawing (floor plan, roof plan, elevation, section, detail, etc.) shall have a title. All site, floor, and roof plans shall have a project North Arrow.

G. Abbreviations and Symbols

Abbreviations and symbols for project documents shall conform to current industry standards. Legends for abbreviations and symbols shall be included in the construction documents and shall be consistent throughout the documents.

H. General Notes and Key Notes

All general (sheet) notes and keynotes placed on a sheet of drawings shall be edited and apply to that sheet.

I. Quality Control Review

The A/E shall perform a quality control review of all drawings before each submittal. Reviews for technical accuracy, coordination of work within each discipline, coordination of work among disciplines, and coordination between drawings and specifications shall be included. When required in the SOW, the A/E shall provide a redlined check set of drawings as evidence that this review has been accomplished. Refer to paragraph II-A.

J. Drawing Numbers

Numbering: The standard drawing numbering system is as follows (Optional drawing numbering systems may be submitted to DES for approval):

- | | |
|------------------|--------------------|
| 1. Civil (Site) | C - 1, C - 2, etc. |
| 2. Landscaping | L - 1, L - 2, etc. |
| 3. Architectural | A - 1, A - 2, etc. |
| 4. Structural | S - 1, S - 2, etc. |

5. Mechanical M -1, M - 2, etc.
6. Plumbing P - 1, P - 2, etc.
7. Medical Equipment EQ -1, EQ - 2, etc.
8. Fire Protection FP - 1, FP - 2, etc.
9. Electrical E -1, E - 2, etc.
10. Fire Alarm Control FA - 1, FA - 2, etc.
11. Special System (Telephone, Data)

Additional sections (e.g., demolition, site utilities, kitchen equipment, and laboratory furniture) may be added as warranted by specific projects.

K. A/E Certification and Signatures

The design of architectural, civil, structural, mechanical, electrical, or other engineering features of the work shall be accomplished, reviewed and approved by registered architects or engineers. The architect or engineer shall be registered to practice their respective disciplines in a state or possession of the United States, Puerto Rico, or the District of Columbia. If the project is for a facility that is not Government-owned, professional registration is to be in compliance with the applicable laws of the State where the project is located. In geographic areas of seismic level three or higher and permafrost activity, specific state licensing is required to ensure knowledge of these particular issues for responsible and adequate system design.

The title and/or index sheet shall be signed and sealed by a registered professional Architect or Engineer of the A/E firm having the contract with Division of Engineering Services. Each drawing, other than the title and/or index sheet, shall be signed and sealed by the Registered Professional Architect or Engineer in charge of the work depicted on that drawing. Drawings prepared by consultant to the prime A/E may be signed and sealed by the consultant. Final drawings (full size) shall bear original signatures and seals.

L. Drawing Changes

All drawing changes shall be coordinated and made in the original CAD application. When changes are made to the originals, appropriate change symbols must be used to indicate the changes. The "Revision" section of the title block on the sheet is to be completed with the required information, symbols, signatures, and dates.

M. Record Drawings

When the contract option for Record Drawings is accepted, the A/E shall receive the marked-up redlined documents from the CO when construction is complete. The A/E is to update the original construction documents (including the CAD files). The update is to include all amendments and modifications issued. When shop drawings are included, record a cross-reference at the corresponding location on

the contract drawings. After the documents are updated, they are to be marked "RECORD DRAWINGS" and dated. The record documents are to be turned over to the CO and individuals listed in the A/E SOW within 30 days after receipt from the CO.

- N.** All drawing templates, line, letters, etc. used on AutoCAD shall be AutoCAD standard templates as supplied with the software. Personal or custom-made software for designing standard details, programming that may not generally be available to the owner (government) is not acceptable.

V. SPECIFICATION PREPARATION

A. Specification Format

1. The project specifications shall be based on the Construction Specifications Institute (CSI Document MP-2-1) "MASTERFORMAT" sixteen divisions, three-part format. Copies can be purchased from AIA Service Corporation, 44 Industrial Park Drive, P.O. Box 753, Waldorf, Maryland 20601 or the local State Society of Architects.
2. Guide specifications will not be provided by ES unless specifically noted in the POR or A/E contract.
3. Contract specifications shall be based upon materials and performance characteristics established by the American National Standards Institute (ANSI), the American Concrete Institute (ACI), the American Society for Testing and Materials (ASTM), and other Government and industry standards. All references shall be the latest edition.
4. Contract specifications shall be prepared using the most current version of MS Word, or provided in a format fully compatible with Word, and submitted to the PM on compact disks.

B. Boiler Plate

Boiler Plate documents (bidding documents) will be provided by ES. The construction documents for each project are to be coordinated with the Boiler Plate by the A/E. The Boiler Plate includes general conditions; bidding forms; FAR and DDHHSAR provisions and clauses; and other preprinted forms and text for inclusion in the contract documents.

C. Coordination of Specifications and Drawings

The contract drawings and specifications shall be coordinated for respective functions. Specifications shall include tests, materials, referenced standards, shop drawings, descriptive literature, samples, certifications, performance requirements, descriptive characteristics, finishes, workmanship, installations, and related work.

D. Cover Sheet

The A/E shall provide covers with an ES approved design for each volume of specifications.

E. Bid Items

The A/E shall coordinate all bid items and the bid schedule with ES, CO.

F. Quality Control Reviews

The A/E shall perform a quality control review of all specifications before each submittal. Reviews for technical accuracy, coordination of work within each

discipline, coordination of work among disciplines, and coordination between drawings and specifications shall be included. When required in the SOW, the A/E shall provide a redlined check set of specifications as evidence that this review has been accomplished. Refer to para. II-A.

G. Proprietary, Restrictive, or Approved Equal Specifications

1. Whenever possible, ensure that references in specifications refer to widely recognized standards or specifications promulgated by Governments, industries, or technical societies.

Trade names and proprietary systems and designations may be referenced to establish required characteristics and level of quality. Whether or not trade names are used, specifications must include a complete description or listing of all major salient features.

2. Specifications shall be developed to ensure competitive bidding without proprietary (sole-source) restrictions (in accordance with FAR Part 11) except where proprietary, sole source procurement is approved by the CO. When identification of material or equipment by manufacturer's name, trade name, or catalog number is unavoidable, three acceptable brands should be listed and the essential physical and functional characteristics required should be set forth.
3. When using a brand name is unavoidable, it shall be qualified by the words "or equal." When "brand name or equal" descriptions are necessary, specifications must clearly describe those salient physical, functional, or performance characteristics of the brand name item that an "equal" item must meet to satisfy the requirements.
4. Proprietary, sole source procurement is allowed in specific situations only if justified to and approved by the CO.

H. Selection of Materials

Selection of materials and procedures shall be based on project location, design requirements, cost analysis, and availability. Readily available material and equipment should be specified whenever possible. In no case shall materials or equipment containing components excluded by law, such as asbestos or lead, be selected, specified, or installed without written approval of the CO.

I. NAFTA

The North America Free Trade Agreement (NAFTA) applies to construction, alteration, and repair projects.

J. Testing

1. HVAC Testing, Adjusting, and Balancing in accordance with ASHRAE4-1993.
 - a. Testing, Adjusting, and Balancing services shall be performed by an independent sub-contractor.

- b. System Testing, Adjusting, and Balancing shall be accomplished before final inspection and shall include: air, heating water, domestic water, chilled water, medium or high temperature hot water, boiler combustion, steam, distilled water, and deionized water.
 - c. The balancing process shall include the adjustment of all equipment within the system such as air terminal boxes, coils of all types, heat converters, pumps, fans, unit heaters, and air handling units.
 - d. Before any testing or balancing can be performed, all systems must be complete. All controls must be installed and operational.
2. Other Systems
 - a. Testing of specialized systems, such as medical gases, shall be in accordance with appropriate codes and standards.
 - b. Material testing shall be in accordance with approved standards.

K. Record Specifications

When the contract option for Record Specifications is accepted, the A/E shall obtain the marked-up redlined specifications from the CO when construction is complete. The A/E shall update the original specifications to show the actual installation. The update is to include all amendments and modifications issued. Particular attention shall be given to substitutions, selection of options, and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. After the documents are updated, they are to be marked "RECORD SPECIFICATIONS" and dated. The record documents are to be turned over to the CO within 30 days after completion of the construction.

L. Project Manual

The A/E shall include a section in the specifications that instructs the construction contractor to provide the following information in three ring binders. The binders are to be a maximum of 76 mm thick. The information is to be organized in sections and tabbed. The manuals are to be submitted to the ES prior to final payment. When the contract option for "RECORD SPECIFICATIONS" is accepted, the A/E shall obtain the manuals from the construction contractor and submit them with the "RECORD SPECIFICATIONS" within thirty days after completion of the construction. The project manual shall include the following.

1. Record Product Data: One copy of each product data submittal shall be marked to show significant variations in actual work performed in comparison with information submitted. Include variations in products delivered to the site. Also, include variations from the manufacturer's installation instructions and recommendations.
2. Record Sample Submitted: Samples of material used for record purposes.
3. Maintenance Manuals: Operation and maintenance data that includes the following information:

- a. Copies of warranties
- b. Emergency instructions
- c. Recommended maintenance cycles
- d. Inspection procedures
- e. Fixture lamping schedule
- f. Spare parts list
- g. Wiring diagrams
- h. Shop drawings and product data
- i. Field Test Reports (e.g.: testing, adjusting & balancing of HVAC system, grounding, fire alarm system, etc.)
- j. Training Video Tapes, VHS (e.g.: nurse call system, fire alarm, DDC, etc.)

M. User Manual

Prior to project completion, the A/E shall prepare a user manual that will explain how the new health facility is intended to be operated. The manual shall address the use or functional organization of the health facility and explain how to use the health facility in simple language. Major considerations in planning, layout, and design are highlighted. Significant design features, cultural aspects, major pieces of equipment, and potentials for flexibility and expansion are made clear.

The manual is intended for all staff members working within the health facility. Since the informational needs will vary among staff, the manual will provide information on the functions and systems at different levels of detail. The manual also needs to be flexible for both its day-to-day use and for the addition of updated material as it is developed.

The manual shall include, but not limited to the following topics: introduction/executive summary; an overview of the facility design and operational concept; building circulation/individual department review; HVAC systems; plumbing systems; electrical systems; fire protection systems; communication systems; site design; energy conservation; code conformance/waivers; signage/way finding; and any supplemental information.

N. Utility Markings

The following color codes are to be used for utility piping and physical hazards: (1) "Piping--American National Standards Institute - A13.1, Scheme for Identification of Piping Systems;" (2) "Medical Gases Signage-- National Fire Protection Association - 99, Health Facilities, Information and Warning Signs for Gas Systems;" (3) "Gas Cylinder-- CGA Pamphlet C-9, Standard Color Marking of Compressed Gas Cylinders intended for Medical Use;" and (4) "Physical Hazards-- Occupational Safety and Health Act - 29 CFR 1910.144, Safety Color Code for Marking Physical Hazards."

VI. COST ESTIMATE PREPARATION

A. General Requirements

1. The A/E shall be responsible for completing the design within the estimated construction contract price (construction budget). Any changes that may be necessary to bring construction costs within the available funds are not reimbursable unless the cost of proposed construction is affected by events beyond the A/E's control. The A/E shall devote sufficient time and attention to assure that the cost estimates are adequate and accurate. Cost estimates shall be submitted the same time as the drawing submittals. The construction cost estimate is used to determine the adequacy of the previous working estimates and to ensure that the planned design does not exceed the project funding. The final estimate shall be used to develop the Government Estimate and will be used to evaluate bids, plan negotiations, and serve as a guide in establishing a schedule of payments. The estimate shall be summarized to reflect the bid schedule.
2. Cost estimates shall include but not be limited to the following: general conditions, utility and site development, demolition, including removal and disposal of hazardous materials, building costs, fixed equipment, and construction management, as outlined in "Estimate Format" below. Direct costs (labor, material, equipment rentals, etc.) should be shown separately from indirect costs (overheads, profit, bonds, taxes, insurance, TERO fees, etc.).
3. Each cost estimate submittal shall contain at least one summary estimate and one detail estimate for each building and facility as required. All cost estimates shall be developed based on the Construction Specifications Institute (CSI Document MP-2-1) "MASTERFORMAT" sixteen divisions. All units of measure shall be metric (SI) units.
4. The Summary Estimate shall be summarized by: (1) each building, including all construction costs within a one and a half meter line from exterior walls around the building, and (2) supporting site costs outside the one and a half meter line which includes:
 - a. Electrical service distribution system;
 - b. Water supply distribution system;
 - c. Gas supply and distribution system;
 - d. Sanitary collection and disposal sewage system;
 - e. Stream distribution system;
 - f. Roads, streets, parking areas, and shoulders;
 - g. Walks;
 - h. Curbs and gutters;
 - i. Fencing;
 - j. Storm drainage;

- k. Unusual foundations for the primary facility such as drilled piers, piles, mat foundation, or spread footing;
- l. Site improvements such as borrow, cut and fill material, rough grade, fine grade, topsoil, seeding, and landscaping;
- m. Demolition;
- n. Communications system; and
- o. Entertainment and educational/ broadband cable system/ fiber optic.

A detailed estimate shall be developed for each facility or system in the estimate summary. The detailed estimate shall be a breakdown of all items of work required to construct the facility or system. Avoid lump sum pricing. Where lump sum pricing is unavoidable, establish a basis for the assumption of the price. The unit price for each item of work shall be broken into labor and materials. Equipment costs may be included in each item or at the end of the estimate at the A-E's option. Where there are significant equipment hours, the equipment costs will show number of work hours with an appropriate operating rate. Operator cost will be shown separately. The unit prices shall be exclusive of overhead and profit. The price for labor shall be the basic cost of labor plus fringe benefits including travel pay, overtime, insurance and taxes. Labor wage rates shall be developed using applicable DOL labor rates. The A-E shall estimate the number of labor-hours required for each item of work and apply the cost per labor hour to the total labor hours required for each facility or system. The unit price for materials shall be current catalogue prices or prices quoted from a supplier and will be documented. Items of work which are normally subcontracted shall be estimated as stated above plus an allowance (percentage) for subcontractor overhead and profit. The subcontractor total will then be included in the direct cost to the prime contractor. Costs for labor, materials, equipment, and subcontractor items shall be individually totaled and then added together for each facility system. Allowances (percentages) for prime contractor overhead and profit shall be added to arrive at a total facility or system cost. Apply all sales tax as appropriate for the locale. TERO fees shall be shown as separate items. Overhead and profit shall be shown as separate items.

Backup showing computations shall be included to support the quantities used in the Detail Estimate. The backup shall be clear, organized, summarized, and indexed. The backup shall show computations of lengths, areas, volumes, weights, and numbers of items. Sheet number shall relate the quantities to the drawings. Quantities shall be neat line, plus sufficient contingencies to cover waste or loss where applicable. All computations shall be checked and signed by the originator and the checker. All backups supporting the cost estimate shall be submitted with each estimate. Allowances for compaction or swell shall be included and clearly identified.

- 5. The A/E shall submit a cost estimate with each submittal. The estimate cost of construction at the mid-point of construction that would be expected shall show the estimated cost of construction that would be expected if bids were received from a construction contractor. The level of detail for this estimate

shall be consistent with the completeness of the drawings submitted. If a construction element is shown, it must be priced; if it is shown in detail, it must be priced in detail. For detailed elements, **“LUMP SUM” OR “ALLOWANCES” WILL NOT BE ACCEPTED.** The final cost estimate will become the Government Estimate and shall be prepared in as much detail as though the Government were competing for the contract award. The final cost estimate shall be summarized to reflect the bid schedule.

6. Cost Estimates shall be prepared using the most current version of MS Excel, or provided in a format fully compatible with Excel, and be provided to Engineering Services on Compact Disks.
7. Cost Estimates prepared by the A/E at any project submittal are proprietary and shall not be released outside the Government.

B. Estimate Format

1. Cost Estimate Narrative: As a part of the submission of cost estimates at all submission phases, the A/E shall provide a brief narrative description of the methodology used in the development of the estimate, including any factors that may have a significant impact on the estimate and the sources of data used in the estimate. If estimating software is used to produce the estimate, provide summary details of the software.
2. Pre-Design/Concepts Estimate: This is a lump sum budget estimate (square meter) cost is per square meter.
3. Schematic Design Estimate: This estimate (square meter) costs shall be based on schematic design sketches and documents and shall include the major components (i.e., site, building, and fixed equipment). The estimate is to be within the construction budget.
4. Design Development Estimate: This estimate shall be based on design development drawings and documents and shall be prepared using the cost of major project components (i.e., site, building, plumbing, heating and air conditioning, electrical, outside utilities, fixed and movable equipment). The estimate is to be within the construction budget.
5. Intermediate Construction Document Estimates: This estimate shall be based on intermediate construction drawings and documents. It shall be prepared from quantity takeoffs by CSI format for the complete project. The estimate shall be divided into the standard sixteen divisions including taxes (such as State & tribal), Bonds & other fees, and Contractor overhead & profits. It should be recognized that the cost breakdown for any features shall be commensurate with the design status. Lump-sum and allowances prices are to be avoided. The estimate must not exceed the construction budget. Special feature costs incorporated in the facility design are to be included in the estimate as separate line items.
6. Final Construction Documents Estimate: This estimate shall be based on the final construction documents. Unit prices or Assemblies prices shall be avoided. If assembly price is used then the detail of each assembly price shall be provided. This estimate will be considered the “Government

Estimate” after it has been reviewed and accepted by ES. The estimate shall provide detailed labor and material cost of each item and shall not exceed the construction budget.

VII. SUBMISSION OF DRAWINGS, SPECIFICATIONS, AND COST ESTIMATES

A. General Requirements for Submission of Drawings, Specifications, and Cost Estimates

1. The number of submittal stages and the number of copies required for each submittal are specified in the A/E contract or the A/E task order. All resubmissions of drawings, specifications, and cost estimates shall include a completed review comments form as shown in Appendix H, in accordance with the instructions included.
2. Technical specifications shall conform to SI format as described in V. SPECIFICATION PREPARATION. The specifications shall be uniformly developed in all divisions and sections and shall thoroughly describe all materials, equipment, processes, systems, etc. Multiple volumes may be used if necessary. Performance specifications will not be allowed without specific approval of the CO.
3. Construction documents shall be coordinated with all furnishings, equipment, and communication systems.
4. Construction document drawings shall be laid out and drafted in a manner that is suitable for reduction to 1/2-size sheets size A3 (420 x 297).
5. All construction documents shall be reviewed, signed, sealed, and dated by a professional architect or engineer with respect to their specific field of registration.
6. Provide the comment "All dimensions are in millimeters unless noted otherwise" on all drawings.
7. Provide large-scale drawings of showers, toilet rooms, laboratories, utility corridors, mechanical rooms, and all other areas that are too congested to be clearly understood at a smaller scale.
8. Design calculations shall be in metric.
9. Civil Documents
 - a. Provide the comment "Coordinate with architectural drawings for detailed information" on all drawings.
 - b. Coordinate site utility drawings with other disciplines.
 - c. All units of measure shall be shown in metric (SI) units.
 - d. Provide a separate drawing for each of the following with a drawing scale of 1:250 or as acceptable to the Project Manager:
 - (1) Site Location Map
 - (2) Site Topography and Demolition Plan (including location and

- instructions for identified hazardous materials.)
- (3) Site Development Plan
 - (4) Site Grading and Drainage Plan
 - (5) Site Utilities Plan (domestic water, exterior fire protection, sanitary sewer and gas, etc, as appropriate)
 - (6) Legal description
- e. Equipment such as water meter, electric meter, etc., piping, and valves to be furnished and installed by the utility company shall be shown and identified on the drawings. Delineate the division of work between the utility companies (or Government) and the construction contractor.
- f. Calculations
- (1) Calculations are to be a progressive refinement of the basic design until the final submission.
 - (2) Calculation sheets shall note all decisions, data sources, codes, etc., necessary to complete the understanding of the computations.
 - (3) Each revised sheet can be crossed out and have "REVISED" written on it.
 - (4) Calculation sheets shall have a minimum 25 mm binding border with the remaining borders at least 10 mm wide (Nothing shall be written in these borders.).
 - (5) Each sheet shall be identified by the project name, date, and page number.
 - (6) All lettering shall be legible and all reproductions complete.
 - (7) Civil calculations are to include all paving, exterior drainage and utility systems and all equipment selection information, fire protection, and other special systems.
 - (8) When civil software is used, provide information on the software to explain the input and output parameters so that the results can be easily understood.
- g. Water, Sewer, and Gas Data
- (1) Provide fire hydrant flow test results with flows rates, static pressures, and residual pressures for existing hydrants within close proximity of the site. The local jurisdiction shall be notified and a letter secured indicating that the local system is adequate to handle the proposed loads. If the existing water system is not large enough to handle the proposed loads then the design should include an upgrade that has been coordinated with all concerns. The cost estimate shall include the necessary costs to upgrade and extend the system to the site.
 - (2) Provide the size and capacity of all pumped or gravity sewers.

The local jurisdiction shall be notified and a letter secured indicating that the local system is adequate to handle the proposed loads. If the existing sewage system is not large enough to handle the proposed loads then the design should include an upgrade that has been coordinated with all concerns. Refer to the SSER for requirements on upgrading the system. The cost estimate shall include the necessary costs to upgrade and extend the system to the site.

- h. Provide sizing of all tanks and service lines to buildings.
- i. Furnish load data and information on equipment capacities. If the design is based on the use of existing equipment, demonstrate the adequacy of the existing equipment.
- j. Bind the final calculation submittal. Include catalog information for all equipment proposed for the job. (All equipment proposed shall have three manufacturers that can meet the specified requirements.)

10. Structural Documents

- a. Provide the comment "Coordinate with architectural drawings for detailed information" on all drawings.
- b. Provide a separate drawing for each of the following when the drawing scale is 1:100 or less.
 - (1) Design Criteria and Abbreviations Sheet
 - (2) Foundation Plan
 - (3) Framing Plan (Floors and Roof)
 - (4) Elevations
 - (5) Sections and Details
 - (6) Schedules
- c. Calculations
 - (1) Calculations are to be a progressive refinement of the basic design until the final submission.
 - (2) All decisions, data sources, codes, etc., are to be identified.
 - (3) Each revised sheet can be crossed out and have "REVISED" written on it.
 - (4) Calculation sheets shall have a minimum 25 mm binding border with the remaining borders at least 10 mm wide (Nothing shall be written in these borders.).
 - (5) Each sheet shall be identified by the project name, date, and page number.
 - (6) All lettering shall be legible and all reproductions complete.
 - (7) Structural calculations are to include all structural element selection. Provide a key drawing/sketch indicating the location of all structural elements. Coordinate the

identification of elements between the key drawing, the calculations and construction drawings.

- (8) When structural software is used, provide information on the software to explain the input and output parameters so that the results can be easily understood.

- d. Sketches
- e. Furnish rough sketches used to calculate loading condition for wind and seismic and for design of connections.
- f. Bind the final calculation submittal. Include catalog information for any special elements.

11. Mechanical Documents

- a. Provide the comment "Coordinate with architectural drawings for detailed information" on all drawings.
- b. Coordinate site utility drawings with other disciplines.
- c. Show quantities of air in metric units for each run or branch. This will aid the Testing, Adjusting, and Balancing contractor in setting the dampers or balancing cocks to the proper quantities.
- d. Provide a separate drawing for each of the following when the drawing scale is 1:100 or less.
 - (1) Demolition (including location and instructions for identified hazardous materials)
 - (2) Ductwork
 - (3) Piping (other than process piping)
 - (4) Process piping
 - (a) Chilled Water Supply & Return (CHWS & CHWR)
 - (b) Cooling Tower Water Supply & Return (CWS & CWR)
 - (c) Heating System Water Supply & Return (HWS & HWR)
 - (d) Steam and Condensed Water (S&C)
 - (5) Plumbing (domestic water, waste, vent, gases, vacuum, compressed air, etc.)
 - (6) Fire protection
 - (a) Fire and Smoke Damper
 - (b) Smoke Detector, Heat Sensor
 - (c) Fire Alarm Control Panel and Annunciation Panel

- (d) Fire Alarm Pull Station
 - (e) Fire Alarm (Strobe Light & Alarm)
 - (f) Fire Extinguisher
 - (g) Fire Hydrant
 - (h) Back Flow Preventer
- (7) Special systems
- (a) Medical Gas (Oxygen, Nitrogen)
 - (b) Dental Air and Vacuum
 - (c) Nitrogen Oxide
- e. Provide riser diagrams for all systems including ductwork, domestic water, steam, heating and/or chilled water, waste, drainage, vent, fire standpipe, and process piping. Each component shown on a riser shall also be shown in plan view. Provide cross-identification.
- f. Equipment such as water meter, electric meter, etc., piping, and valves to be furnished and installed by the utility company shall be shown and identified on the drawings. Delineate the division of work between the utility companies (or Government) and the construction contractor.
- g. Control sequences for all systems shall be included.
- h. Schedules for all equipment shall be shown on the drawings.
- i. Calculations
- (1) Calculations are to be a progressive refinement of the basic design until the final submission.
 - (2) All decisions, data sources, codes, etc., are to be identified.
 - (3) Each revised sheet can be crossed out and have "REVISED" written on it.
 - (4) Calculation sheets shall have a minimum 25 mm binding border with the remaining borders at least 10 mm wide (Nothing shall be written in these borders.).
 - (5) Each sheet shall be identified by the project name, date, and page number.
 - (6) All lettering shall be legible and all reproductions complete.
 - (7) Mechanical calculations are to include all systems and all equipment selection information about HVAC, plumbing, fire protection, and other special systems.
 - (8) Block and Room Loads
 - (a) Block load calculations shall be made for both heat loss

and gain. The block loads shall be used to determine the size of the primary heating and cooling units for the building or the facility. Block loads are to determine at what time the maximum loads occur and the quantity of these loads.

- (b) Provide individual cooling, heating, and ventilation requirements for rooms. Include suggested equipment to meet these loads
 - (c) The total of all the room loads will usually exceed the cooling block load for refrigerant equipment. Room or terminal unit loads are used for room or zone unit sizing
 - (d) The calculations shall include riser diagrams, room layouts, pump and fan curves, equipment data, pipe and duct sizing, tank capacities, and all pertinent data and sketches to completely clarify the design intent.
- j. Water, Sewer, and Gas Data
 - (1) Coordinate service requirements with the Civil Engineer.
 - (2) Provide fixture unit factors for water, waste, and vent.
 - k. Sketches and Hookups
 - (1) Furnish rough sketches used to calculate duct and piping system layouts and sizing. Duct systems shall include supply, return, exhaust, and special systems. Piping systems shall include: domestic cold and hot water, waste and vent, heating water, chilled water, ethylene glycol solutions, oxygen, vacuum, compressed air, refrigerant gas, nitrogen, and other special systems.
 - (2) Furnish equipment piping hookups and details for installation of special systems such as engine-generator sets, unit heaters, and steam for sterilizers, deionized water, and gases (air, oxygen, nitrous oxide, nitrogen, etc.).
 - l. Provide sizing of all tanks and service lines to and within buildings for gases and liquids such as propane, natural gas, fuel oil, oxygen, and water.
 - m. Furnish load data and information on equipment capacities. If the design is based on the use of existing equipment, demonstrate the adequacy of the existing equipment.
 - n. Bind the final calculation submittal. Include catalog information for all equipment proposed for the job. (All equipment proposed shall have three manufacturers that can meet the specified requirements.
12. Electrical Documents
- a. Coordinate all drawings with other disciplines, such as site utilities, reflected ceiling plans and duct plans.

- b. Provide a separate drawing for each of the following when the drawing scale is 1:100 or less.
 - (1) Demolition
 - (2) Power
 - (3) Lighting
 - (4) Special Systems
 - (a) Communications & Data System – all telephone and data outlet location and typical conduit with pull wire rope detail.
 - (b) Nurse Call System – location of all call system outlet and required equipment.
 - (c) Security System
 - (d) Fire Protection system – show all equipment per Para A.11.
 - (e) Grounding System
 - (1) Building grounding system
 - (2) Lightning protection grounding system
- c. Identify all circuits with panel and branch designation. Circuits requiring two or three-pole protection shall be clearly identified in the panel schedules. All wiring shall be easy to follow on the drawings and easy to identify the branch circuit or home run for each device or circuit and the related panel and circuit number or switch leg. Provide a minimum of 20 percent future load connection capacity on each panel. Identify grounded conductors, graphically or in schedules, similar to phase or neutral conductors. Do not rely on separate notes or specifications to identify these conductors.
- d. Provide larger scale drawings and/or elevations of electrical equipment layout on pads and in electrical rooms when appropriate for legibility.
- e. Show interrupting capacities for switchboards, motor control centers, and panel boards. In panel boards, separately identify each special single-pole load and each multi-pole load.
- f. Provide riser diagrams (block diagram will not be accepted) for all systems. Provide a one-line diagram of the incoming service and the secondary distribution system. When necessary show, in plan view, each component shown on the riser or the one-line diagrams. Provide cross-identification.
- g. Show and identify the equipment to be furnished and installed by the utility company. Delineate the division of work between the utility company (or Government) and the construction contractor.
- h. Identify load requirements (kW, volts, phase) for each outlet such as motor, heating device, or special equipment on the equipment schedules.

- i. Furnish calculations to support each design phase.
 - (1) Illuminance calculations for lighting.
 - (2) Load calculations including overcurrent, voltage drop, short circuit and ground fault considerations. (In both preliminary and final load calculations, indicate connected loads and demand factors for each load category.)
- j. Obtain available short circuit voltage and current data from local power company and include the information with the load calculations.
- k. Furnish load data and information on equipment capacities. (If the design is based on the use of existing equipment, demonstrate adequacy of the existing equipment.)
- l. Bind the final calculation submittal. Include all equipment catalog information proposed for the job. All equipment shall have a minimum of three manufacturers that meet the specified requirements.

13. Distribution of Submittal Documents

The A/E is to bind all drawings into correlated sets.

14. Code Analysis

Provide in writing which codes are used in the design of the facility to ensure compliance with each applicable code.

B. Pre-Design Submittal

This phase includes all work by the A/E before the Concepts Phase. It shall include the following applicable tasks.

- 1. Program Verification: Review and compare the PJD, POR, SSER, SOW, contract, and environmental criteria. Summarize the review in a written report, and list all questions and unresolved issues.
- 2. Site Analysis: Prepare a rough sketch to show the character of the site and the surrounding area. The sketch shall show all observations, site conditions, and environmental issues that will affect the project development.
 - a. Prepare the Site Analysis using the site survey and a local land map, city map, county map, and/or United States Geological Survey map, as required. Show general topographic survey information such as boundaries, grades, roads, walks, water features, structures, tree masses, major utility lines (including electrical, communications, data and cable TV), and property lines.
 - b. Prepare additional sketches or overlays, at a scale of 1:200 or smaller, to show conditions outside the survey area that will affect the project development.

3. Survey: Review and document existing conditions to establish the basis for work during the design stages.
 - a. Obtain and verify Record Drawings or other drawings of existing structures, if available.
 - (1) Investigate and document the condition of existing structures during the field survey, including inspection for the presence of asbestos-containing materials, pursuant to 40 C.F.R. § 61.145(a) and 15 U.S.C. § 2646(a) (1).
 - (2) Make or correct record drawings (include photographs if needed).
 - b. Document in a pre-design survey report all findings regarding the conditions of the existing structures or systems in a format that can be reproduced readily.
4. Report Format: Bind results in a booklet with a tab for each of the above items.
5. Refer to Appendix "F" for submission checklist.

C. Concepts Submittal

The purpose of concepts is to investigate alternative site layouts, building organizations, and building massing arrangements.

1. Conduct work sessions with the IHS and the client agencies. During the work sessions the A/E is to note the client agencies concerns, discuss the interdepartmental relationships, and review the site constraints, and the PJD and POR.

The work sessions are intended to develop a level of understanding of the site, the program, and departmental concerns among the A/E, the client agencies, and the ES.

2. Site Layout
 - a. Examine alternative schemes for site layouts. The alternatives should include major site features such as buildings, building entrances, recreational areas, yards, walks, drives, loading dock, emergency drop-off, emergency entrance, fuel storage tanks, staff and visitor parking, etc. Unless directed otherwise, develop three schemes.
 - b. Show location of existing utility services (including electrical, communications, data and any cable TV), prospective connection methods, and access routes. Coordinate with the building concepts described below.
 - c. Provide a Topographic Survey of the existing project site in such detail as necessary to be used for the analysis of site layout including, but not limited to: Property boundaries, site boundaries, topographic features (surface contours and spot elevations for surface features), and any other information

affecting the use of the site for the desired development. Provide also the results of a Geotechnical Survey of the site, including information required to analyze the site and provide a basis for design of the building foundation systems and roads and walks.

3. Incorporate conceptual design activities with the site planning work described above. Examine the facility building plan and massing arrangement alternatives. Space planning shall be done at DGA block scale. Identify alternatives for foundation, structural, and mechanical systems and their impact on architectural features. Show alternatives for foundations, framing, and building system distribution spaces in simple wall and building sections. Integrate concepts with value engineering and energy conservation recommendations.
4. Building Organization and Massing

The building concepts are to show the most desirable general organization of the project, both internally and on the site.

- a. Provide the following:
 - (1) Interdepartmental proximity diagrams (“scaled blocks”).
 - (2) Functional diagrams.
 - (3) Locations and types of building access.
 - (4) Other drawings as directed.
 - b. Present at least three well-developed plans and alternative concepts with distinct feasible features general plan alternative concepts, one for each site layout. Provide supporting alternative sub concepts for framing, vertical development, mechanical systems, and electrical systems. Provide preliminary cost data, including operation and maintenance cost implications for each alternative presented.
 - c. Provide a Space Comparison Report: Refer to Appendix C: The comparison process begins in the Concept Phase of Design, with submission of a Space Comparison Report.
 - d. Provide a cost estimate: Refer to Chapter VI.
 - e. Provide a brief written analysis of all planning and systems concepts and recommend a general overall approach to the next phase, schematic design. Carefully consider consequences for all major building service systems.
5. Refer to Appendix “F” for submission checklist.
 6. After the Concepts review make a record drawing of the final Site Layout and Building Organization and Massing plan and submit.

D. Schematic Design Submittal

The purpose of the schematic design is to establish the size, shape, general construction (framing system and building envelope), general mechanical and

electrical systems, and room-by-room layout. This submittal represents approximately 10 percent of the design phase.

1. Integrate all preceding design efforts and all design-related special studies.
2. Conduct work sessions with the ES and the client agencies. Meet with the assigned staff to review the circulation within the departments, the type of spaces, and the interdepartmental relationships developed in the concepts phase. The work sessions are intended to develop a level of understanding of the circulation and type of spaces within the departments, and any special concerns the client agencies may have concerning the departments.
3. Refine the approved conceptual design. Establish the preferred building scheme, integrating a workable structure. Develop the floor plan to include all rooms listed in the POR including non-template spaces. Define all general assemblies, materials, and floor plans to show all walls with double lines. Show general building dimensions (horizontal and vertical).
4. Verify capacity of scheme to accommodate all supporting systems and equipment. Establish general concepts of type, location, and distribution of mechanical and electrical systems. Provide preliminary calculations for structural, mechanical, and electrical systems.
5. Specific Requirements
 - a. Provide a narrative of the design thought process.
 - b. Provide an outline technical specification.
 - c. Update the Space Comparison Report as prescribed in Appendix "C."
 - d. Note the name or function, space identification number (Refer IV.B), and the net area in each individual room or space.
 - e. Provide a cost estimate: Refer to Chapter VI.
 - f. Drawings
 - (1) Provide plans, elevations, and building sections at 1:100 minimum. Provide typical wall sections at a larger scale.
 - (2) Provide a site plan, floor plans, a roof plan, elevations, and longitudinal and transverse sections.
 - (3) Verify that each space in the POR space schedule and POR functional diagram are shown on the drawings.
 - (4) Show entrances, circulation areas, stairs, elevators, mechanical equipment space, electrical equipment, toilet rooms, stacks, and wire closets.
 - (5) Show all required smoke and/or fire partitions on the floor plans.
 - (6) Show typical window arrangement and exterior materials.
 - (7) Provide sections through the building in both the longitudinal

and transverse direction. All major rooms are to be shown and labeled (abbreviated if necessary), with floor-to-floor dimensions noted.

- (8) Designate the floor that is approximately on the same level as the main entrance as the "first floor." If the site slopes downward from the main entrance area, and one or more secondary entrances are below the first floor, designate that level the "ground floor." Floors below grade are to be designated as "basements."
- (9) Indicate planned or possible future building expansions by dotted outlines on the plans and elevations. They shall be noted with the words "future expansion."

(10) Mechanical

- a. Submit an economic analysis of at least three mechanical systems. The analysis shall be approved and the type of system selected before the Design Development stage. Provide narrative of each mechanical system including diagram/sketches, required equipment, piping, controls, and cost estimates of each system (lump-sum will be allowed). Provide justification and detail analysis of the mechanical system selected compare to other systems.
- b. Provide a psychometric analysis for air handling systems. Provide an economic analysis to show comparative costs and recommendations for fuels for heating. Also include an economic analysis for a snow-melting system if required.
- c. The schematic drawings should indicate space for all mechanical considerations including space for the maintenance and operation of the equipment.
- d. Verify that adequate space has been provided for mechanical equipment on floor plans.

(1) Electrical

- (a) Location of major equipment and required maintenance space per NEC including Switchgear, Panels, Transformers, Generator, ATS, Communication panel, Data/LAN servers
- (b) Provide an early building electrical load analysis based on watt/sq.m basis for each category of load such as lighting, receptacles, misc. equipment, and HVAC equipment. Provide copy of design analysis with support document or identify per NEC article.
- (c) Provide one-line electrical diagram (block diagram will not accepted) including all three-phase equipment, 3-pole OCPD size, conduit/wire size, and metering device (Voltmeter, ammeter, Watt-hour meter)
- (d) Provide lightning protection grounding detail.

- (e) Provide Primary side of the main transformer wiring detail (if the transformer supplied by the NTUA) including concrete pad size.

E. Design Development Submittal

The purpose of the design development (DD) submittal is to describe the size and character of the project in detail from the owner's point of view and confirm that all engineering requirements can be accommodated in the final design. This submittal constitutes approximately 35 percent of the design phase.

1. Integrate all preceding design efforts and all design-related special studies.
2. Refine the approved schematic design documents. All interior and exterior systems and materials that the medical staff and patients will use, encounter, see, hear, or are dependent on for their safety must be identified.
3. Provide general and detailed floor plans, exterior elevations, and major building sections at 1:100. Provide all major types of wall sections at a larger scale.
4. Conduct work sessions with the ES and the client agencies.
 - a. Meet with the client agencies to develop detailed locations and connections for all related Group I and Group II equipment, telephone equipment, layout of cabinet elevations (doors, drawers, heights, shelves, etc.), function of door hardware, finishes, location of power and communication requirements, location and type of lighting, refine room and departmental circulation, etc.
 - b. Revise architectural floor plans and interior elevations at 1:50.
 - c. Meet with client agencies for final approval of each area or department before completing the DD submittal.
5. Provide all design specialty services needed for a complete facility design including radiation shielding, dietary, trash disposal, medical gas storage and dispensing (includes dental), and all storage and internal transportation devices.
6. Show calculations for anticipated energy usage that comply with the annual Energy Use Budget.
7. Update the Space Comparison Report as prescribed in Appendix "C." Provide project outline specifications in developmental draft form. The sections are to be formatted into three parts:
 - a. Preliminary statement of all major systems.
 - b. Materials.
 - c. Types of major equipment components.
8. Provide a cost estimate: Refer to Chapter "VI."
9. Site Plan: Provide a well-articulated site plan showing the location and size

of the facility and facility-support systems. The following note shall appear on the site plan: "**BASED ON TOPOGRAPHIC SURVEY DATED _____.**"

10. Floor Plans (Provide the following information)
 - a. Floor plans shall have the following note: "BASED ON PROGRAM OF REQUIREMENTS DATED _____ AND ON SCHEMATIC DRAWINGS APPROVED _____."
 - b. Floor plans shall indicate wall thicknesses, door swings, and door sizes.
 - c. Each room or space shall be identified by name (abbreviated when necessary) and number. Refer to IV.C for room name and number requirements.
 - d. Materials of all partitions shall be indicated by either symbol or note to agree with those materials described in the supporting data.
 - e. Floor plans shall include section lines showing locations of longitudinal and transverse sections.
 - f. Precisely locate and size vertical structural members and rough size horizontal members to assure there are no conflicts with other systems.
11. Fire Protection: Provide drawings showing all protection features for the project site and for each floor of the building reflecting NFPA 101, "Life Safety Code" requirements and a written description of assemblies and materials. Plans are to be at 1:100.
12. Elevations: Provide elevations with the major features and materials noted directly on the elevations. This shall be in generalities such as brick, stone, granite, architectural cast concrete, bronze, aluminum, etc. Terminology and materials must agree with the supporting data submitted.
13. Longitudinal and Transverse Sections: Provide at least one longitudinal and one transverse section through the major portion of the building shall be included. All major rooms exposed by the section shall be shown and identified by name. Complete floor-to-floor dimensions from the lowest floor to the roof shall be given. Ceiling heights throughout the building shall be indicated.
14. Wall Sections: Provide one wall section cut on a line through windows and another on a line through the wall proper. A partial elevation and plan section shall be on the same sheet at the same scale. This is required for all substantial variations in wall design. The purpose of these sections is to delineate the fundamental concepts of the proposed exterior wall design.
15. Design of Special Areas: Provide preliminary design sketches, including 1:50 scale plans, interior elevations, reflected ceiling plans of lobbies, auditoriums, kitchens, laboratories, and other areas which are to be given special architectural treatment. Floor plans at 1:50 scale shall be started during this phase. They shall show casework and equipment layouts.

16. Possible future expansion shall be indicated by dotted outlines on the plans and elevations. It shall be noted with the words "future expansion."
17. Perspective CAD Sketch and Rendered Perspective: When required by the A/E contract, a line perspective sketch and a rendered perspective shall be submitted. A block model of the building may be required by the contract.
 - a. The perspective CAD sketch shall show the desired appearance of the building. The CO shall approve the sketch before the rendered perspective is begun.
 - b. The A/E shall proceed with the rendering after approval of the DD drawings and the perspective sketch. The rendering shall be done by a professional renderer who shall produce an artistic work of high quality observing the following requirements:
 - (1) Medium: Rendering shall be in color suitable for photographic reproduction. The environment of the building as it actually exists or will exist after completion of construction shall be portrayed. Emphasis shall be given to the building instead of its surroundings.
 - (2) Scale and Materials Indication: Human figures shall be placed at or near the main entrance to establish the scale of the building. The extent to which materials are indicated may be left to the A/E's judgment
 - (3) Other: The rendering shall be a minimum of 500 x 400 mm exclusive of mat. It shall be provided with mat, frame, and non-reflective glass. Color photographic reproductions of the rendering may be required by the A/E contract.
18. Coordinate design development with any value engineering proposals and energy conservation recommendations.
19. Plumbing (Provide the following information)
 - a. Location and size of existing utilities and service connections to building(s).
 - b. Location and arrangement of all major equipment.
 - c. Preliminary calculations for determining sizes and types of plumbing, process equipment, and systems.
 - d. Plumbing layout of typical toilet rooms including drainage and venting systems.
 - e. Schematic diagrams showing completed drainage, venting, and water systems. Include process services, if any.
20. Heating (Provide the following information)
 - a. Preliminary layout and description of outside distribution systems from central plant, if utilized. Include the location and size of any existing mains and building connections.

- b. Location and arrangement of all major heating equipment.
 - c. Provide design narratives including design temperature (indoor and outdoor) per ASHRAE fundamental book, total fresh-air requirements, heating load calculation for each room (including walls, roof, windows, and infiltration load), and the total heating load (including fresh-air ventilation load) for entire buildings. Provide domestic water heating load. Also, provide summer/winter process heating (such as kitchen and other equipment) load for the boiler.
 - d. Complete single-line piping diagrams of all heating systems and equipment for the entire building. Diagrams shall include air conditioning and ventilating coils, perimeter heating systems, and special heating for stairways, lobbies, entrances, garages, etc.
 - e. Provide number of control points for major equipment to be included in the DDC system such as boiler, pumps (heating system and domestic water system), booster pump, etc.
 - f. Complete equipment and piping diagram with heat balance calculations for process hot water system and steam generating system operating over 275 KPa.
21. Air Conditioning - Particular attention should be given to insure that the layouts suit the modular space arrangement for the building (Provide the following information).
- a. Location and arrangement of all major equipment.
 - b. Provide design narratives including design temperature (indoor and outdoor) per ASHRAE fundamental book, total fresh-air requirements, air-conditioning load calculation for each room (including walls, roof, windows, and infiltration load), and the total air-conditioning load (including fresh-air ventilation load) for entire building for the peak time of day.
 - c. Economic analysis to show comparative costs and recommendations for refrigeration plant.
 - d. Economic justification should be provided if a high-velocity duct distribution system is proposed.
 - e. Single-line layout of ventilating and air conditioning ductwork to indicate number of zones, type of system (i.e., high or low pressure, multi-zone, etc.) and extent of each system. Elevator machine room ventilation shall be included.
 - f. Sequence of operation and schematic temperature control diagrams.
 - g. Air outlet location for typical areas.
 - h. Location of cooling tower including a method for screening from view.
 - i. Room names and numbers.

22. Electrical (Provide the following information)
- a. Plans shall show space assignment, sizes and outline of any new, existing and planned future fixed major electrical equipment. Major fixed equipment would include service entrance, transformers, main switchgear, generators, fuel-oil or gas tank, transfer switches, branch panels, FACP, etc. in support of the basic distribution.
 - b. Provide a list of medical equipment required for the project that requires electrical connection. Show proposed voltage, phase and ampacity.
 - c. Provide a description of general interior lighting systems, indicating types of lighting intensities. Submit catalogue cuts for each major type of fixture proposed.
 - d. Where the occupancy is required by code or criteria to have fire detection and alarm system devices, provide a preliminary layout plan. Provide the location of all fire/smoke damper motor location
 - e. Provide preliminary one-line power distribution diagram with major equipment such as utility's transformer, MDP, surge protector devices, generator and all ATS and panel boards.
 - f. Identify and show location and space for of any proposed telephone and LAN/ fileserver equipment, including switch location and any racks and/or backboards.
 - g. Show general receptacle (must be 20 amp-125 volt) layout. Include any proposed special receptacles such as hospital grade, GFC, etc.
 - h. Provide calculations to establish the sizing of major electrical components and equipment. Provide a preliminary electrical load analysis for both normal and (if any) essential electrical systems. Calculations at this level shall, at least, be based on reasonable unit watt allocations for each category of component load including lighting, receptacle, HVAC, mechanical and fixed medical equipment, alarms, communication/data loads. For medical facilities, provide an essential electrical system function listing for every room and space as recommended by NFPA 99, Appendix C-3.3. Provide preliminary short circuit analysis. Address grounding approach and proposed method to achieve.
 - i. Calculate lightning strike risk index per Appendix to NFPA 780. Provide a preliminary lightning protection system design for buildings with a risk index score above 8.
 - j. Provide a general description of the electrical service including proposed voltage and phase, service feed (primary or secondary), and service type (overhead or lateral).
 - k. The following items shall be of Copper material:
 - (2) Conductor – phase, neutral and ground
 - (3) Motor winding

- (4) Transformer winding
 - (5) Panel board bus bars – phase, neutral and ground (may be silver plated on main switchboard)
 - (6) Automatic Transfer Switch – phase, neutral, and ground (may be silver plated)
- I. Provide a sample of all proposed electrical schedules, tables, calculation methods, forms, etc. Includes samples such as lighting calculation format, fixture schedule form, panel schedule form, electrical legend, final calculation format, voltage drop calculations format, transformer schedule form, motor control schedule form.

23. Refer to Appendix “F” for submission checklist.

F. Construction Document Submittal

1. General

The Construction Document (CD) drawings and related documents are submitted for review and approval in three stages:

65% CD SUBMITTAL

100% CD SUBMITTAL

FINAL CD SUBMITTAL

- a. Drawing Preparation: Each sheet of drawings must show the name, number, and location of the project.
- b. Components: The drawings will include:
 - (1) A Cover or Index Sheet.
 - (2) Site survey and soil borings data.
 - (3) Site Utilities
 - (4) Site Work.
 - (5) Architectural Floor and Roof Plans (A separate plan must be drawn for each floor, basement, mezzanine, and penthouse level.).
 - (6) Exterior Elevations.
 - (7) Longitudinal and Transverse Building Sections.
 - (8) Reflected Ceiling Plans.
 - (9) Architectural Schedules (Finish, Door, Window, etc.)
 - (10) Exterior and Interior Details.
 - (11) Structural Drawings, Schedules, and Details.
 - (12) Mechanical Drawings, Schedules, and Details.

- (13) Electrical Drawings, Schedules, and Details.
 - (14) Landscaping and Planting Drawings.
 - (15) Additional drawings (e.g., Demolition, Kitchen Equipment, etc.) as warranted by the project.
- c. Elevations and Sections:
- (1) Scale shall be the same as used for the floor plans.
 - (2) The extent of each building material used shall be indicated clearly on the elevations.
 - (3) Cutting Plane for Longitudinal and Transverse Sections: A plane shall be chosen which cuts through the most important spaces and reveals the maximum number of different construction conditions. In addition to complete sections, other complete or fragmentary sections needed for clarity shall be shown. The planes through which the longitudinal and transverse sections have been taken shall be indicated on the related floor plans.
- d. Exterior Details: Provide all details necessary to explain fully the exterior architectural work and how it connects to the structural work. Head, jamb and sill details of exterior door and window openings are required as well as exterior wall sections at openings and between openings. Other necessary architectural features shall also be detailed.
- e. Wall Sections: Complete wall sections of all unique conditions are required. They shall show each type of wall construction from the top member to the lowest floor level (including the footing).
- (1) Anchor details for stone, brick, and other masonry shall be checked for structural adequacy by structural engineers.
 - (2) Sections shall be developed to the extent necessary to show roofing and flashing details under all conditions.
- f. Details: Details shall be drawn at a scale sufficient to indicate the desired arrangement of materials.
- (1) Standard details may be used as an integral part of the drawings; however, they must be tailored to fit the specific project.
 - (2) In case of differences between small and large-scale drawings, the large-scale drawings shall govern.
 - (3) All details shall be appropriately cross-referenced as well as back-referenced to the plans. When a large scale drawing of a major element is made, it shall be referenced on the floor plans.
- g. Schedules: Since the construction contract clauses of the specifications state that schedules on drawings shall take precedence over any conflicting notations on the drawings, it is important that schedules be accurately prepared to ensure that the desired finishes and materials are obtained. The following schedules shall be provided: Interior Finish Schedule, Interior and Exterior Color Schedule, Door Schedule, Window Schedule, Equipment

Schedule, and Schedules to supplement Detail Drawings.

- h. Materials: A materials legend showing cross hatching examples and corresponding materials shall be provided.
 - (1) On areas of drawings where cross-hatching is needed to indicate materials, only enough area to show the type and extent of the material need be crosshatched.
 - (2) Where cross-hatching is used to indicate the extent or scope of new work (as opposed to existing work), the entire area of the new work shall be crosshatched.
 - i. General Notes: General notes for each category of drawings shall be placed on the first sheet of each series, preferably above the title block. These notes should be kept to a minimum. They may be referred to on other sheets in the same or other series as necessary without repetition. Notes should be clear, concise, and non-repetitive. They should complement and amplify the drawings and specifications.
 - (1) Notes shall be directed only to the General Contractor. The A/E shall not put any notation or statement on the drawings indicating or designating portions of the work to be done by a specific subcontractor or trade.
 - (2) Consistency of Nomenclature: In order to guard against conflicts over ambiguous terms and statements, the terms used on drawings and in specifications shall be identical. The A/E shall refer to the POR and design data for proper terms for rooms, spaces or portions of structures.
 - j. Coordination of Construction Documents: All construction documents shall be coordinated to ensure coverage and to eliminate contradictions. Special care shall be taken to coordinate the architectural drawings and specifications with the structural, mechanical, and electrical drawings and specifications.
 - k. Accessibility of Mechanical and Electrical Equipment: The A/E shall ensure that the design is coordinated to provide clearance around all machines and equipment for the installation and removal of parts. Door or window openings, removable panels, corridor sizes and locations, and floor or roof load capacities shall be designed so that equipment can be removed without structural changes to the building.
 - l. Update the Space Comparison Report as prescribed in Appendix "C" for all CD submittals.
 - m. Refer to Appendix "F" for submission checklist.
2. 65 Percent Construction Document Submittal:
- a. General: The 65 percent construction documents shall be in accordance with the approved Design Development Submittal, the approved POR, and the written comments made during the Design Development review. They are then reviewed by the Government to guard against scope expansion or change in design or materials that may increase costs above the authorized funds.

Drawings and specifications must define the size, configuration, materials,

and complexity of construction; the type and quantity of Group I equipment; and the scope and complexity of all systems. Provide major groups of construction details, schedules and diagrams, and a written report on building construction costs and energy budget status. Identify all systems for which performance specifications are being considered.

Drawings shall be at final working drawing scale. Each detail, section or elevation shall be identified by a title. All drawings submitted shall be identified by a drawing number, date, and identification of submittal.

Drawings not specifically required to be completed at this stage but are required to prepare a detailed cost estimate, may be submitted in a partially complete state.

- b. Landscape Plan:
 - (1) The A/E is responsible for retaining a qualified landscape architect, when required by the SOW, to develop a landscape plan for submission.
 - (2) When required by the POR, a lawn sprinkler system shall be prepared for each project and fully coordinated with the landscape plan. Lawn sprinkler systems shall meet the requirements of Executive Order 12902 (Energy Efficiency and Water Conservation). A water supply source for the system shall be shown on the plumbing drawings. The lawn sprinkler design shall be shown on the landscape plan and shall include piping, heads, valves, and controls.
- c. Floor Plans: A plan of each floor level at 1:100 scale is required. Plans shall be complete, showing materials, dimensions, room names and numbers finishes, ceiling heights, door types, materials and sizes, and any fire retardant walls, partitions and doors. Those areas which are complex and/or require fixed furniture or equipment layout shall be drawn at 1:50 scale.
- d. Roof Plans: A complete roof plan, including details of flashings and drains, is required.
 - (1) Roofs shall be sloped at not less than 21 mm per m. Patterns of slope to drains shall be shown on the roof plan.
 - (2) Elevations showing high and low points on the roof shall be included on the drawings.
 - (3) Location of all mechanical equipment such as AHUs, Exhaust Fans, Roof drains, Roof vents, and condensing unit as show in the mechanical drawings.
- e. Elevations and Sections: A complete elevation of each side of the building, at least one complete longitudinal section, and one complete transverse section through the building are required. The elevations and sections shall include notes to indicate materials that are specified.
- f. Exterior Wall Details: A typical wall section for each type of wall construction is required. Wall sections must be complete and show materials, dimensions, structural bonding and anchoring systems, windows, doors, louvers (as shown in the mechanical plan), and flashings.
 - (1) If architectural cast concrete (stone) panels are used, all reinforcing

required for a typical panel shall be indicated.

- (2) Provide 1:5 scale details of all anchors required to secure the exterior facing to the structure, and of the header, jamb, and sill conditions for all openings in exterior walls.
- g. Interior Details:
- (1) Interior elevations are required for those spaces that require fixed furniture or equipment, or where elevations are necessary to show the extent of wall material. Elevations shall be drawn at 1:50 scale and shall indicate the design, materials, and major dimensions.
 - (2) Partial floor plans at 1:50 scale shall be provided to explain interior elevations or to provide information on equipment layout, floor materials, patterning, etc.
 - (3) Reflected ceiling plans shall show the extent of materials and the coordination of architectural, mechanical, and electrical items.
 - (4) Explanatory sections at 1:20, 1:10, or 1:5 scale should be included where necessary to show the design of an element.
 - (5) The drawings shall show all necessary details for the special areas shown on the DD design. There shall be sufficient detail to allow approval by the agency.
- h. Elevators, Escalators, Dumbwaiters and Materials Handling Equipment: The following items are required:
- (1) Plans at 1:50 scale of elevators (showing floors served); typical floors in blind portions of hoistway, if any; elevator pits; secondary levels, and machine rooms having access. Plans shall include platform size, counterweight space, door space, and clearance dimensions.
 - (2) Sections at 1:50 scale through elevator hoistways, pits, secondary levels, and machine rooms (runby dimensions shall also be shown.).
 - (3) Details showing elevator hoistway vents when serving four or more floors.
 - (4) Details of trolley beams, trap doors, or other provisions for removal of components of elevator equipment from elevator machine rooms.
 - (5) Details of supports for elevator machine beams, elevator dead end hitch beams, and escalator trusses (Elevator machine and hitch beams shall rest on their support beams rather than frame into the support beams.).
 - (6) Elevations of elevator entrances at typical and nontypical floors (Signal fixtures, elevation of elevator starters, indicator and control panels shall be shown.)
 - (7) Details of special elevator cabs and special hoistway entrances where applicable.

- (8) Plans and sections showing clearances at 1:50 for escalators, dumbwaiters, adjustable loading ramps, scales, and conveyors.
 - (9) Diagrammatic layout of materials handling systems.
 - (10) Details at appropriate scale of power-operated doors (pedestrian and vehicular), control systems, and space for door operators.
- i. Schedules: It is most important that they be closely coordinated with the project specifications and that the nomenclature is identical. The following schedules are required and shall be shown on the drawing:
- (1) Interior Finish Schedule: List every material that is exposed in each space (including unfinished walls or undersides of structural slabs). The word "exposed" shall not be used. Instead, use the name of the material. For each space, this schedule shall identify the room number, room name, substrate, material and finish of floor, base, each wall (i.e., north, east, south, and west), ceiling, ceiling height, and space for remarks.
 - (2) Interior and Exterior Color Schedule (placed on the last sheet in the series of schedule sheets): This schedule shall identify the room name, number, material, color, and other pertinent information. Colors, textures, and finishes of specific manufacturers may be used in this schedule or the finish schedule. A note shall be included stating that a manufacturer's name is not intended to limit competition.
 - (3) Door Schedule: Include all doors by door number and room number, frame material and detail, door material and elevation, size of door, glazing, other openings and hardware set. The schedule shall refer to detail drawings of jamb and head conditions.
 - (4) Window Schedule: Indicate all window sizes, location of operating units, and type of glazing used in each window.
- j. Interior Perspective CAD Sketch:
- (1) General: A preliminary line perspective depicting a proposed typical interior view perspective shall be submitted, when required by the A/E contract.
 - (2) The interior perspective CAD sketch shall be submitted with the 65 percent construction documents. The interior perspective sketch will clearly define the proposed interior materials and overall quality of the major public interior spaces. An eye-level perspective of the main public lobby/waiting area, reception desk, and major pedestrian circulation routes are the preferred perspective views. The Contracting Officer shall approve the sketches before the rendered perspectives are developed.
- k. Preliminary Color Boards: Color boards will be submitted in the specified quantities, in a standard 280 x 215 mm three ring binder, when required by the A/E contract. Samples will be presented of all major building interior and exterior finishes. Foldouts may be up to 838 x 647 mm as long as they refold within the standard binder configuration. Actual material samples shall be displayed showing color, texture, pattern, finish, thickness, etc., for all appearance related items where choice exists. These samples shall be large

enough to indicate true patterns. Samples shall be organized by color schemes with a separate sample group for each scheme. The schemes shall be coordinated with elevations for the exterior and by room names and numbers shown on the architectural floor plans for the interior. Materials and colors shall be labeled by manufacturer, source, and product description for color and pattern purposes.

- I. Preliminary Specifications: Specifications shall be prepared by the A/E to substantiate form, arrangement, and procedures for development of all sections. The preliminary specifications shall include all technical sections prepared with headings that illustrate broad scope contents. Specifications shall be complete, edited for project, and in final format.
- m. Provide a cost estimate: Refer to Chapter VI.
- n. Mechanical:
 - (1) All system details, equipment piping hookup details, piping riser diagrams, controls and equipment schedules shall be shown. In addition to the drawings, calculations and specifications, the following shall be included:
 - (2) Heating
 - (a) Layouts of mechanical room including boilers, chiller, generator, pumps, tanks, AHU's, etc. and other rooms containing maintenance clearances, and main piping.
 - (b) Heating piping on floor plans, heating system flow diagrams, riser diagrams, and control diagrams for heating system and major equipment indicating the contemplated design.
 - (c) Layout of underground heat distribution system in details indicating contemplated design.
 - (d) Layout of engine generator sets in details permitting evaluation of contemplated design with regard to fuel, air, exhaust and electrical systems.
 - (3) Plumbing
 - (a) Layouts of typical toilet rooms and location of all plumbing equipment in mechanical equipment rooms.
 - (b) Layouts of special spaces such as elevator machine rooms.
 - (c) Typical riser diagrams for water, soil, waste, and vent piping.
 - (d) System and supply piping layout for all standpipe systems and sprinkler systems showing hazards and zoning.
 - (e) Layout of all fuel systems such as propane, natural gas, fuel oils, and/or solid fuels showing locations of storage tanks or other storage areas, all safety and fire precautions.
 - (f) Layouts of all medical and non-medical gas and other systems such as: oxygen, nitrous oxide, compressed air, vacuum, nitrogen, etc., and other systems including softened water, deionized water,

laboratory water, non-potable water, feed water, ethylene glycol solutions and their feed piping, tanks and other appurtenances as required.

(4) Air Conditioning

- (a) Air Flow System balance diagram including supply, return and exhaust air flow, chilled and hot water system balance diagram (provide on the drawing and not in the calculations).
- (b) Preliminary sequence of operation and automatic temperature control diagram with major control equipment (controller) for boiler, chiller, AHUs, pumps, exhaust fans and connection to monitor the building fire alarm system.
- (c) Double line ductwork layout including Mechanical Room, Boiler Room and typical Corridor area where ductwork crossing.
- (d) Equipment room layouts developed to the extent of showing clearances for access and showing trolley beams provided for maintenance.

(5) Preliminary riser diagrams and equipment schedules.

(6) Calculations, riser diagrams, and special systems.

(7) Preliminary load calculations.

(8) Fire Protection System piping includes Fire Hydrants, fire department connection location, backflow preventer, etc.

o. Electrical

- (1) Provide detailed lighting layout plans for all areas (interior, exterior and parking) with associated panel and circuit numbers (home runs) and all proposed switching located on the plans. Show all emergency/exit lighting.
- (2) Provide separate detailed lighting calculations with fixture manufacturer cut sheets (not required if isometrics are shown on drawings).
- (3) Provide detailed site Plan showing power service, site power distribution, communications and cable service (if any) and site lighting. Identify the location of an electrical Utility Company's connection point, and an electrical utility transformer location/ metering. Differentiate between utility service work and construction contractor's work.
- (4) If electrical demolition is necessary, provide demolition plans clearly identifying magnitude, scope and phasing of demolition.
- (5) Provide detailed power plans for all areas including any switchgear, transformers, generators, panels, equipment and receptacles. Show panel and circuit designations (home runs). .
- (6) Provide detailed special system plans showing layout of

communication and signal pathways and devices, fire detection and alarm devices (FACP, smoke detectors, duct detectors, horns/ strobes, manual pull stations, etc.) and other signal systems (such as nurse call, etc.).

- (7) Detailed one-line diagram shall include all connected 3-phase equipment, all panel boards, and feeder conduit and conductor sizes. The panel schedules must show a minimum of 65% completed branch circuits in each panel. The panel schedule should show all Overload Protection, voltage, phase, AIC, MCB/MLO, Neutral size, Connected Load and Demand Load for both normal and essential power.
 - (8) Provide any lightning protection design and show all system grounding and equipment grounding & bonding details. Provide the location of all grounding rods on the floor plan and detail showing how to access these rods in future for checking ground connections continuity and testing.
 - (9) Provide detailed electrical specifications.
 - (10) Provide detailed load calculations, short circuit calculations, voltage drops based on drawings. Where used, provide detailed emergency power total load calculations for sizing of generator(s) and transfer switch (es). Provide a revised list of all the medical equipment, if any is required, (1-phase or 3-phase) for the project that require electrical connection.
 - (11) Provide typical details to show space coordination in ceiling areas (particularly in the corridor area) for maintenance and access of equipment, components, piping, ducts etc. including, but not limited to:
 - (a) Electrical conduit for lights and power supply
 - (b) Fire Alarm conduit/wiring
 - (c) Special system – Voice/data cable tray, Nurse Call system cable
 - (d) Light Fixtures
 - (e) HVAC system piping – Chilled water/Hot water supply and return piping
 - (f) HVAC system control valves and accessibility to the valves
 - (g) Piping – Medical Air, Oxygen, Nitrous Oxide, Dental Air, Vacuum, domestic hot/cold water, sprinkler system, etc.
 - (h) Supply and return duct work
 - (i) Damper and accessibility to the damper
3. 100 Percent Construction Document Submittal:
- a. General: When the contract documents are 100 percent complete, they are submitted to the agency for review. This includes all architectural and engineering drawings and specifications necessary for bidding and required calculations. All components shall be accurate and coordinated among disciplines.
 - b. Cover Sheet and Index: A cover sheet and an index sheet of the same size as the

drawings must be provided. The A/E shall provide covers with an ES approved design for the drawings and specifications. All drawings in the 100 percent documents shall be listed by number, title, and in numerical sequence. Titles and numbers listed in the index must be identical to those shown in each title block.

- c. Topographic Survey: This survey, when required, shall be inserted as the first drawing following the index sheet.
- d. Site and Grading Plans: These plans must show the entire site, and must establish the grading and project limits. They also must show as much of the adjoining area as required for the plat approval. The plans must show approach roads, relationship to other buildings on the site, etc. Where practical, the building on the site plan should be oriented the same as the floor plans so that the entrance faces the same side of the sheet on all plans.
 - (1) Recommended scales for this submittal are 1:200 to 1:500 provided that uniform sheet size can be maintained. Areas of complex design shall be shown in detail, 1:200. The scale of the topographic or boundary survey shall be used if it permits an adequate explanation of the work.
 - (2) Multiple Buildings: For projects comprising several buildings and a road system, the site plan and grading plan are placed on separate sheets. For very large projects, both the site plan and grading plan may be divided into sectional sheets to keep within the established sheet size.
 - (3) Road Curve Data: Road curve data, vertical curve data, and other related elements concerning the location and layout of the work shall be shown on the site plan.
 - (4) Contours and Grading: The contours of existing topography, new grading, and other data concerning the grading shall be shown on the grading plan. Existing contours are to be indicated by dotted lines; finish contours are to be shown as solid lines. Spot elevations shall be shown whenever necessary to explain details of grading or changes in grade.
 - (5) Demolition and Site Clearing: If this cannot be shown on the site plan, a separate plan shall be furnished. The extent of the work shall be indicated and noted, including removal of existing buildings, filling of old foundations, removal of trees, erosion control, etc.
 - (6) Details shall be incorporated on the drawings.
- e. Additional Specific Requirements for All Drawings:
 - (1) Plans: If floor plans are drawn at 1:100 scale, detailed 1:50 scale plans are required to show spaces that need special architectural treatment.
 - (2) Interior Elevations: These are generally submitted at 1:50 scale.
 - (3) Details: Portions of interior plans and elevations may need to be enlarged to 1:20, 1:10, or 1:5 scale to indicate the contract requirements adequately. Window and doorframe details shall be drawn at 1:10 or 1:5 scale.
 - (4) Toilets: If floor plans are at 1:100 scale or smaller, additional toilet plans shall be furnished at 1:50 scale to indicate fixture enclosure location and provide other necessary information. Toilet room elevations are required only when all necessary information cannot be shown on the plans.

- (5) Stairs: Stairs shall be laid out fully at 1:50 scale. All dimensions and necessary enlarged details shall be provided.
 - (6) Hazardous Materials: The location of any hazardous material (e.g. asbestos) identified by preliminary inspection shall be noted, with appropriate instructions, on drawings related to any portion of the construction that might disturb the material, unless the material will be removed prior to that phase of construction.
- f. Building Sign: If a permanent building sign is required, a spacing diagram and details for the title letters in the sign shall be included.
 - g. Construction Sign: The layout and sign information (provided by ES) shall be approved by ES. The construction sign location shall be shown on the site plan. The layout and lettering details of this sign shall be on the plans. The A/E may include the names of the principal consultants.
 - h. Specifications: Complete specifications shall be prepared for submittal to the Contracting Officer. Specifications shall be complete, edited for the project, and in final format.
 - i. Provide a cost estimate: Refer to Chapter VI.
 - j. Final Exterior and Interior Perspective Renderings: When required by the A/E contract and upon approval of the preliminary exterior and interior perspective sketches, the A/E shall proceed with the final renderings. The renderings shall be done by a professional who shall produce a graphic work of high quality observing the following requirements:
 - (1) Renderings shall be in color and in any medium suitable for photographic reproduction.
 - (2) The original color renderings and a specified number of color copies will be required.
 - (3) The exterior perspective rendering shall have a matted overall dimension of 762 x 508 mm. The framed dimensions will be 787 x 533 mm. The interior perspective rendering may be a smaller scale with a maximum overall scale of 787 x 533 mm. Both renderings will be mounted under glare reducing glass surrounded by a good quality 25 mm minimum flat top black metal frame.
 - (4) Two 51 x 51 mm color slides of the final renderings shall also be submitted with the final framed renderings.
 - k. Final Color Boards: All changes resulting from the review of the preliminary color boards shall be incorporated in the 100 percent submission. This submission shall be complete with all originally approved and new materials presented in a single revised package.
 - l. Mechanical:
 - (1) Drawings complete.
 - (2) Final calculations including all HVAC, plumbing, fire protection, and special purpose calculations. HVAC calculations shall include:
 - (3) Final block loads for heating, cooling, and ventilating.

- (4) Individual room loads.
- (5) Proposed equipment selection with model number, pump curves, and fan curves with selections indicated.

Electrical:

- (1) Complete drawings (light and power distribution), equipment schedules, and panel schedules. Complete lightning protection drawing including equipment grounding and bonding details.
- (2) Specifications complete.
- (3) Complete building total connected load and demand load calculation, including future demand. Complete emergency power load calculation for sizing the generator
- (4) Complete one-line diagram with minimum cross wiring. Differentiate between single-phase, dual-phase and three-phase equipment, including OCPD size for panel board, transformer, motors (such as exhaust fans, AHU's and condensing units) –no block diagram will be accepted.
- (5) Complete Fire protection drawing including location of all fire alarm devices
- (6) Complete Special Systems Drawing.
- (7) Provide detailed construction cost estimate with material and labor cost for each item. Lump sum cost estimate will not be accepted for any item for which the cost is more than \$5K.

4. Final Construction Document Submittal:

Provide the following for review and approval:

- a. Complete construction documents.
 - (1) Technical specifications - computer disks in WordPerfect format.
 - (2) Drawings - Full-size transparencies and computer disks or CD's in AutoCAD format.
- b. Provide a cost estimate: Refer to Chapter VI.
- c. Copies of all engineering calculations including final energy budget status.
- d. Formally concluded project review comment file.
- e. Copies of all other reports and studies required by this contract.
- f. Update the Space Comparison Report as prescribed in Appendix "C."

All written government review comments shall be resolved and incorporated. The updated drawings and specifications will become the final construction documents. These documents shall be signed, sealed, and dated by the professional architect or engineer with respect to the specific field of registration. The original tracings or film base reproducible mylars shall be submitted to ES for use in bidding and contracting. If reproducibles are to be used, a sample must be submitted for approval. Tracings or reproducibles not capable of producing clear prints will be rejected.

G. Government Review Comments

1. At the completion of each phase, the A/E shall submit the required materials and documents for review. Reviews shall be for overall design concept and adherence to the POR and previously approved submissions. After receiving a complete submittal, including the "Certified Submission Checklist" (refer to Appendix "F") for the respective submittal phase, and verification by the ES PM that the submission is complete, the review period will start. Written comments will be returned to the A/E as stipulated in the A/E contract.
2. The Government review is not intended to provide a complete or detailed check of all drawings. It does not in any way relieve the A/E of the responsibility for checking all work; verifying compliance with codes, standards, and POR; and producing a complete, coordinated set of documents.
3. After review of any submittal, CO may require changes to the drawings. The A/E shall make these changes before completion of the next submittal and is responsible for the follow-through on each drawing of all comments made on a submittal.
4. The A/E shall submit a written response to the Government review comments after each submittal or other documents. The response shall address each comment. Comments requiring additional details, sections, notes, or cross-references to make the drawings more understandable shall be incorporated. If for any reason the A/E believes that a comment cannot be complied with, the A/E shall explain this in a written response.
5. The A/E shall not proceed to the next phase until written approval or approval contingent upon the noted changes is received from CO.

VIII. BIDDING

A. Printing and Distribution

Print and distribute the Bidding Documents (or amendments, when applicable) to the Plan Rooms in the area and to prospective bidders as directed by the CO. The bidding documents should be numbered and a log maintained to show which bidder or plan room received what numbered bid document. The direction will be by telephone (or FAX) from the CO with a follow-up letter. The A/E is not to accept deposits. All prospective bidders who visit or call the A/E shall be advised to write or to call the CO to request the bidding documents. The CO will advise the prospective bidder about deposits and advise the A/E to distribute documents.

1. The number of sets to be printed and distributed will be determined during negotiations. The A/E shall provide printing costs per sets during negotiations. If additional sets are required to be printed during the bidding phase, the negotiated printing costs shall be the same to avoid bidding delay.
2. In the event prospective bidders call the A/E for interpretation of the plans and specifications (technical question) or contractual questions, the A/E shall refer the bidder to the ES PM or CO. If the interpretation is considered pertinent to the project, the necessary amendment shall be prepared by the A/E and issued by the CO. If the interpretation requires drawings and/or specifications changes, the A/E shall complete and furnish them to the CO (If the work involved by the A/E was due to A/E error, this task shall be accomplished by the A/E at no cost, including mailing of amendment).
3. Notify the CO in writing that the solicitation documents have been mailed to prospective bidders. This written notification shall be furnished within seven (7) calendar days of the mailing. The notification shall include the name and address of contractors and the date that the solicitations were mailed. The mailing date shall be the date directed by the CO.

B. Pre-Bid Conference

If a pre-bid conference is held, the A/E shall attend. He shall assist the CO in taking notes and furnish a written report of items discussed. This written report shall be furnished to the CO within four (4) calendar days after the pre-bid conference.

C. Perform Post-Bid Analysis

Final cost estimates that are over or under the apparent low responsive bid by more than 15% may require a post-bid analysis by the A/E to determine the reasons for the variance. The A/E shall submit a written response to the CO within seven (7) days after date of request. The response shall identify specific areas of variance and the reasons for the variance. The response shall include a recommendation to either award or reject the bid with full rationale to support the recommendation.

IX. CONSTRUCTION ADMINISTRATION

These are the services provided by the A/E disciplines to oversee the performance of the construction contractor during the primary stages of the construction process. If required, the A/E shall perform the following Construction Contract Administration Services duties and responsibilities during the construction phase:

A. Progress Reporting Service

1. Monthly progress reports shall be submitted within seven (7) calendar days after the end of month. The report shall include, at a minimum, a summary of the following:
 - a. Current status and evaluation of overall project percentage completion.
 - b. Number and amount of change orders.
 - c. Problems.
 - d. Accomplishments.
 - e. Recommendations.
 - f. Other pertinent information concerning the work.
 - g. Progress payment recommendations, based on a review of the construction contractor(s) pay request and progress chart.
 - h. Progress photos of the work. Provide twelve (12) photos per month. The photos shall be labeled, dated, and contained in sleeved plastic sheets for use in 3-ring notebook.
 - i. Verify contractor's redline markup on the construction documents (for as-builts)
2. Typed notes of all specific meetings, which are required by the contract or specifically directed by the CO, shall be provided within four (4) working days of said meeting.

B. Office Construction Administration Services

1. Within seven (7) days the A/E shall provide the CO with a complete list of the required construction phase submittals.
2. Expediting and processing submittals, including the receipt and review of, and the recommended action on, Schedules, Shop Drawings, Product Data, Samples, and other submittals required by the approved CONSTRUCTION DOCUMENTS. The A/E shall recommend approval or rejection of submittals to the CO.
3. Documenting receipt and dispersal of all submittals.

4. Distribution of submittals.
5. Maintenance of submittals file.
6. Related communications.

C. Construction Field Observation Services

These services include full-time on-site qualified representative, and field visits by A/E disciplines to the site to evaluate the progress and quality of the work. The Contractor shall perform the following Construction Field Observation Services duties and responsibilities during construction phase:

1. These services include A/E disciplines visiting the site at intervals appropriate to the stage of construction, in order to become familiar with the progress and quality of the work, and determining if the work is proceeding in accordance with the approved CONSTRUCTION DOCUMENTS, and preparing related reports and communications.
 - a. Establish schedule for inspection and approval of specific phases of construction, on-site, for each of the disciplines on the design team.
 - b. Provide certification of satisfactory completion of each of the following phases and/or systems:
 - (1) Foundations
 - (2) Concrete Forms (Location)
 - (3) Reinforcing Steel
 - (4) Framing
 - (5) Roof and Roofing
 - (6) Building Envelope
 - (7) Wiring and Electrical Equipment, Fire Protection Equipment
 - (8) Piping
 - (9) Utilities Connections
 - (10) Group I Equipment Ducting, Controls, Special Systems, etc., Finishes and Group II Equipment.
 - c. During the construction phase, the A/E shall provide written reports of each visit to the construction project, indicating progress, current activities, problems and recommendations. Evaluate construction progress according to the construction contract schedule on a monthly basis and report in writing to the contracting officer.

D. Project Representative Services

The selection, employment and direction of a full-time project representative who shall be the Project Design Architect/Engineer or a qualified inspector.

1. The representative shall be full-time and on-site for at least 40 hours/week for the construction period and construction project closeout period.
2. An adjustment to the subcontract may be made if the time period required for the project representative increases or decreases or if the project schedule is altered.
3. The project representative shall perform all duties and responsibilities, and have the limitation of authority, as described in AIA Document B352, except the following changes in terminology shall be used: Change "Architect" to "Construction Project Manager"; change "Contractor" to "Construction Subcontractor".

E. Construction Inspection Coordination Services, relating to independent inspection and testing agencies, shall consist of:

1. Monitoring field-testing required by the approved CONSTRUCTION DOCUMENTS.
2. Recommending scope, standards, procedures, and frequency of testing and inspections.
3. Arranging for testing and inspection of specific samples, materials, and assemblies on Contractor's behalf. Include soils, foundation reviews, ground temperature monitoring weld inspections, sound transmission, air volume balance, water balance, water supply and piping, et al.
4. Monitoring status of work requiring testing and inspection.
5. Evaluating compliance by testing and inspection agencies with required scope, standards, procedures, and frequency.
6. Reviewing reports on inspections and tests and notifying the Contracting Officer and construction subcontractor(s) of observed deficiencies in the work.

F. Pre-Construction Conference Services

If a pre-construction conference is held, the A/E shall attend. He shall assist the CO taking notes and furnish a written report of items discussed. The written report shall be furnished to the CO within four (4) calendar days after the pre-construction conference. Provide conference notes to all attendees on at least the following topics: inquiries from attendees; proposed modification items resultant from the conference; procedures; progress reporting; problems; scheduling; and equal employment and Indian preference in training, employment and subcontracting opportunity provisions.

G. Post Construction and Warranty Services

These are the services provided by the A/E disciplines to oversee the performance of the construction contractor during the final stages of the construction process and prior to the completion of the warranty period. The Contractor shall perform the following post-construction services, duties, and responsibilities:

1. Record Drawings services shall consist of:
 - a. Making arrangements for obtaining from the construction prime contractor and other parties certified information on all construction changes differing from the originally approved CONSTRUCTION DOCUMENTS, and information on the location of concealed systems as installed during construction.
 - b. Review of general accuracy of information submitted and certified to by the construction contractor.
 - c. Preparation of record drawings, based on information furnished by the construction contractor, including significant changes in the work made during construction.
 - d. Transmittal of record drawings and general data, appropriately identified, to the CO.

H. Maintenance and Operation Programming Services shall consist of:

1. Providing construction contractor with a document format and a list of all items to be included in the O & M manual.
2. Arranging for and coordinating instruction to Government employees on the operation and maintenance of equipment with the construction contractor's and the manufacturers' representatives. Establishing time, place, date(s), and agenda, and providing written notification to CRIT, ES, and the SUD.
3. Reviewing and approving, if acceptable, the preparation and submittal of three (3) complete sets of operation and maintenance manual(s) for the Government's use by the construction contractor.
4. Provide assistance to Project Manager in completing Real Property Report.

I. Project Closeout Services

Shall be initiated upon notice from the CO that the work, or a designated portion of the work acceptable to the Contracting Official, is sufficiently complete, in accordance with the approved CONSTRUCTION DOCUMENTS, to permit occupancy or to permit the intended use of the space or system. These services shall consist of:

1. A detailed inspection with the PM to insure conformity of the work with the approved CONSTRUCTION DOCUMENTS, and to verify, with the CO, the list of items to be completed or corrected.
2. A final inspection with the PM to verify the final completion of the work.

J. Warranty Phase Services

Establish a cost per man/trip for possible warranty phase services.

APPENDIX "A"

PUBLIC LAW 100--678--NOV. 17,1988

102 STAT. 4051

SEC. 6. COMPLIANCE WITH NATIONALLY RECOGNIZED CODES.

(a) IN GENERAL.--The Public Buildings Act of 1959 (40 U.S.C. 601616) is further amended by adding at the end the following new section:

"SEC. 21. COMPLIANCE WITH NATIONALLY RECOGNIZED CODES.

"(a) BUILDING CODES.--Each building constructed or altered by the General Services Administration or any other Federal agency shall be constructed or altered, to the maximum extent feasible as determined by the Administrator or the head of such Federal agency, in compliance with one of the nationally recognized model building codes and with other applicable nationally recognized codes. Such other codes shall include, but not be limited to, electrical codes, fire and life safety codes, and plumbing codes, as determined appropriate by the Administrator. In carrying out this subsection, the Administrator or the head of the Federal agency authorized to construct or alter the building shall use the latest edition of the nationally recognized codes referred to in this subsection.

Safety.
40 USC 619.

"(b) ZONING LAWS.--Each building constructed or altered by the General Services Administration or any other Federal agency shall be constructed or altered only after consideration of all requirements (other than procedural requirements) of--

State and local
governments.

"(1) zoning laws, and

"(2) laws relating to landscaping, open space, minimum distance of a building from the property line, maximum height of a building, historic preservation, and esthetic qualities of a building, and other similar laws, of a State or a political subdivision of a State which would apply to the building if it were not a building constructed or altered by a Federal agency.

"(c) SPECIAL RULES.--

"(1) STATE AND LOCAL GOVERNMENT CONSULTATION, REVIEW, AND INSPECTIONS.--For purposes of meeting the requirements of subsections (a) and (b) with respect to a building, the Administrator or the head of the Federal agency authorized to construct or alter the building shall--

"(A) in preparing plans for the building, consult with appropriate officials of the State or political subdivision, or both, in which the building will be located;

"(B) upon request, submit such plans in a timely manner to such officials for review by such officials for a reasonable period of time not exceeding 30 days; and

"(C) permit inspection by such officials during construction or alteration of the building, in accordance with the customary schedule of inspections for construction or alteration of buildings in the locality, if such officials provide to the Administrator or the head of the Federal agency, as the case may be

"(i) a copy of such schedule before construction of the building is begun; and

"(ii) reasonable notice of their intention to conduct any inspection before conducting such inspection.

"(2) LIMITATION ON STATE RESPONSIBILITIES.--Nothing in this section shall impose an obligation on any State or political subdivision to take any action under paragraph (1).

"(d) STATE AND LOCAL GOVERNMENT RECOMMENDATIONS.--Appropriate officials of a State or a political subdivision of a State may make recommendations to the Administrator or the head of the Federal agency authorized to construct or alter a building concerning measures necessary to meet the requirements of subsections (a) and (b). Such officials may also make recommendations to the Administrator or the head of the Federal agency concerning measures which should be taken in the construction or alteration of the building to take into account local conditions. The Administrator or the head of the Federal agency shall give due consideration to any such recommendations.

"(e) EFFECT OF NONCOMPLIANCE.--No action may be brought against the United States and no fine or penalty may be imposed against the United States for failure to meet the requirements of subsection (a), (b), or (c) of this section or for failure to carry out any recommendation under subsection (d)

"(f) LIMITATION ON LIABILITY.--The United States and its contractors shall not be required to pay any amount for any action taken by a State or a political subdivision of a State to carry out this section (including reviewing plans, carrying out on-site inspections, issuing building permits, and making recommendations).

"(g) APPLICABILITY TO CERTAIN BUILDINGS.--This section applies to any project for construction or alteration of a building for which funds are first appropriated for a fiscal year beginning after September 30, 1989.

"(h) NATIONAL SECURITY WAIVER.--This section shall not apply with respect to any building if the Administrator or the head of the Federal agency authorized to construct or alter the building determines that the application of this section to the building would adversely affect national security. A determination under this subsection shall not be subject to administrative or judicial review."

40 USC 619 note

(b) NOTIFICATION OF FEDERAL AGENCIES.--Not later than 180 days after the date of the enactment of this section, the Administrator of General Services shall notify the heads of all Federal agencies of the requirements of section 21 of the Public Buildings Act of 1959.

APPENDIX "B"

This Information is Supplemental to the GSA Metric Design Guide.

METRIC IN DESIGN AND CONSTRUCTION

*This information was taken from Metric in Construction, Volume 3, Issue 3, May-June 1994
which is the newsletter of the Construction Metrication Council of the
National Institute of Building Sciences, Washington, D.C.*

METRIC MODULE AND GRID

What will change:

- The basic building module--from 4 inches to **100 mm**.
- The planning grid--from 2' x 2' to **600 x 600 mm**.

What will stay the same:

- A module and grid based on rounded, easy-to-use dimensions. The 600 x 600 mm grid is the global standard.

DRAWINGS

What will change:

- Units--from feet and inches to **millimeters** for all building dimensions and to **meters** for large site plans and civil engineering drawings. Unit notations are **not** unnecessary: if there's no decimal point, its millimeters; if there's a decimal point carried to one, two, or three places, its meters. **Centimeters are not used in construction.**
- Drawing scales--from inch-fractions-to-feet to true ratios. Preferred metric scales are:

1:1 (full size)
1:5 (close to 3" = 1'-0")
1:10 (between 1" = 1'-0" and 1-1/2" = 1'-0")
1:20 (between 1/2" = 1'-0" and 3/4" = 1'-0")
1:50 (close to 1/4" = 1'-0")
1:100 (close to 1/8" = 1'-0")
1:200 (close to 1/16" = 1'-0")
1:500 (close to 1" = 40'-0")
1:1000 (close to 1" = 80'-0")

- Drawing sizes--to the ISO "A" series:
AO (1189 x 841 mm, 46.8 x 33.1 inches)
A1 (841 x 594 mm, 33.1 x 23.4 inches)
A2 (594 x 420 mm, 23.4 x 16.5 inches)
A3 (420 x 297 mm, 16.5 x 11.7 inches)
A4 (297 x 210 mm, 11.7 x 8.3 inches)

Of course, metric drawings can be made on any size paper.

What will stay the same:

- Drawing contents. **Never** use dual units (both inch-pound and metric) on drawings. It increases dimensioning time, doubles the chance for errors, makes drawings more confusing, and delays the learning process.

SPECIFICATIONS

What will change:

- Units of measure--from feet and inches to **millimeters** for linear dimensions, from square feet to **square meters** for area, from cubic yards to **cubic meters** for volume (except use **liters** for fluid volumes), and from other inch-pound units to metric units as appropriate.

What will stay the same:

- Everything else in the specification.

Do not use dual units in specifications except when the use of an inch-pound measure serves to clarify an otherwise unfamiliar metric measure; then place the inch-pound unit in parentheses after the metric. For example, "7460 W (10 horse power) motor." All unit conversions should be **checked by a professional** to ensure that rounding does not exceed allowable tolerances.

FLOOR LOADS

What will change:

- Floor load designations--from "psf" to kilograms per square meter (**kg/m²**) for everyday use and kilonewtons per square meter (**kN/m²**) for structural calculations.

What will stay the same:

- Floor load requirements.

Kilograms per square meter often are used to designate floor loads because many live and dead loads (furniture, filing cabinets, construction materials, etc.) are measured in kilograms. However, kilonewtons per square meter or their equivalent, megapascals, are the proper measure and should be used in structural calculations.

CONSTRUCTION PRODUCTS

What will change:

- Modular products--brick, block, drywall, plywood, suspended ceiling components, and raised floors. They will undergo "hard" conversion; that is, their dimensions will change to new rounded "hard" metric numbers to fit the universal **600 x 600 mm** metric planning grid.
- A number of other products such as concrete reinforcing bars and various kinds of fasteners. They are being converted to hard metric sizes as the result of industry initiatives.
- Poured-in-place concrete and products that are custom-fabricated for each job (for example, cabinets, stairs, handrails, ductwork, commercial doors and windows, structural steel and precast concrete). Such products usually can be made in any size, inch-pound or metric, with equal ease; therefore, for metric jobs, they simply will be fabricated or formed in metric.

What will stay the same:

- The balance of products since they are cut-to-fit at the jobsite (for example, framing lumber,

woodwork, wiring, piping, and roofing) or are not dimensionally sensitive (for example, fasteners, hardware, electrical components, plumbing fixtures, HVAC equipment, and gravel). Such products will just be "soft" converted--that is, relabeled in metric. A 2-3/4" x 4-1/2" wall switch face plate will be relabeled 70 x 115 mm and a 30 gallon tank, 114 L. Manufacturers may convert many of these products to new rounded "hard" metric sizes eventually but only when it becomes convenient for them to do so.

"2-BY-4" STUDS AND OTHER "2-BY" FRAMING (BOTH WOOD AND METAL)

What will change:

- Spacing--from 16" to **400 mm**, and 24" to **600 mm**.

What will stay the same:

- Cross-sections.
"2-bys" now are produced in "soft" fractional inch dimensions so there is no need to convert them to new rounded "hard" metric dimensions. 2-by-4s may keep their traditional name or perhaps they'll be relabeled a nominal 50 x 100 mm or a more exact size, such as 38 x 89 mm.

DRYWALL, PLYWOOD, AND OTHER SHEET GOODS

What will change:

- Widths--from 4'-0" to **1200 mm**.
- Heights--from 8'-0" to **2400 mm**, 10'-0" to **3000 mm**.

What will stay the same:

- Thicknesses, so fire, acoustic, and thermal ratings won't have to be recalculated. Metric drywall and plywood are readily available but with a possible cost penalty for small orders. Metric rigid insulation may not be available at this time.

BATT INSULATION

What will change:

- Nominal width labels--from 16" to **16"/400 mm** and 25" to **24"/600 mm**.

What will stay the same:

- Everything else. Batts will not change in width; they'll just have a tighter "friction fit" when installed between metric spaced framing members.

DOORS

What will change:

- Height--from 6'-8" to **2050 mm or 2100 mm** and from 7'-0" to **2100 mm**.
- Width--from 2'-6" to **750 mm**, from 2'-8" to **800 mm** from 2'-10' to **850 mm**, from 3'-0" to **900 mm or 950 mm**, and from 3'-4" to **1000 mm**.

What will stay the same:

- Door thicknesses.
- Door materials and hardware.

For commercial work, doors can be ordered in any size since they normally are custom-fabricated.

CEILING SYSTEMS

What will change:

- Grids and lay-in ceiling tile, air diffusers, and lighting fixtures--from 2' x 2' to 600 x 600 mm and from 2' x 4' to **600 x 1200 mm**.

What will stay the same:

- Grid profiles, tile thicknesses, air diffuser capacities, florescent tubes, and means of suspension.

RAISED FLOOR SYSTEMS

What will change:

- Grids and lay-in floor tile--from 2' x 2' to **600 x 600 mm**.

What will stay the same:

- Grid profiles, tile thicknesses, and means of support.

HVAC CONTROLS

What will change:

- Temperature units--from Fahrenheit to Celsius.

What will stay the same:

- All other parts of the controls.

Controls are now digital so temperature conversions can be made with no difficulty.

BRICK

What will change:

- Standard brick--to **90 x 57 x 190 mm**.
- Mortar joints--from 3/8" and 1/2" to **10 mm**.
- Brick module--from 2' x 2' to **600 x 600 mm**.

What will stay the same:

- Brick and mortar composition.
Of the 100 or so brick sizes currently made, 5 to 10 are within a millimeter of a metric brick so the brick industry will have no trouble supplying metric brick.

CONCRETE BLOCK

What will change:

- Block sizes--to **190 x 190 x 390 mm**.
- Mortar joints--from 1/2" to **10 mm**.
- Block module--from 2' x 2' to **600 x 600 mm**.

What will stay the same:

- Block and mortar composition.

"The Cox bill (P.L. 104-289) prohibits federal contract documents from solely specifying modular concrete block in metric sizes. Inch-Pound substitutions shall be permitted, and provided for in the contract."

SHEET METAL

What will change:

- Designation--from "gage" to millimeters.

What will stay the same:

- Thickness, which will be soft, converted to tenths of a millimeter. In specifications, use millimeters only or millimeters with the gage in parentheses.

CONCRETE

What will change:

- Strength designations--from "psi" to megapascals, rounded to the nearest 5 megapascals per ACI 318M as follows:

| | | |
|----------|---|--------|
| 2500 psi | = | 20 MPa |
| 3000 psi | = | 25 MPa |
| 3500 psi | = | 25 MPa |
| 4000 psi | = | 30 MPa |
| 4500 psi | = | 35 MPa |
| 5000 psi | = | 35 MPa |

Yes, both 3000 and 3500 psi is converted to 25 MPa and 4500 and 5000 psi is converted to 35 MPa, which indicates the fairly broad allowable tolerances used in concrete strength designations.

What will stay the same:

- Everything else.

REBAR

What will change:

- Rebar will change in size per ASTM A615M-96a and A706M-96a. New metric bar sizes change from current bar sizes as follows:

No. 3 to 10
No. 4 to 13
No. 5 to 16
No. 6 to 19
No. 7 to 22
No. 8 to 25
No. 9 to 29
No. 10 to 32
No. 11 to 36
No. 14 to 43
No. 18 to 57

What will stay the same:

- Installation methods.

GLASS

What will change:

- Cut sheet dimensions--from feet and inches to millimeters.

What will stay the same:

- Sheet thickness; sheet can be rolled to any dimension and often is rolled in millimeters now. See ASTM C1036.

PIPE AND FITTINGS

What will change:

- Nominal pipe and fitting designations--from inches to millimeters.

What will stay the same:

- Pipe and fitting cross-sections and threads.
Pipes and fittings are produced in "soft" decimal inch dimensions but are identified in nominal inch sizes as a matter of convenience. A 2-inch pipe has neither an inside nor an outside diameter of 2 inches, an 1-inch fitting has no exact 1-inch dimension, and a 1/2-inch sprinkler head contains no 1/2-inch dimension anywhere; consequently, there is no need to "hard" convert pipes and fittings to rounded metric dimensions. Instead, they will not change size but simply be relabeled in metric as follows:

| | | | | | |
|-------|---|-------------|--------|---|--------------|
| 1/8" | = | 6 mm | 1-1/2" | = | 40 mm |
| 3/16" | = | 7 mm | 2" | = | 50 mm |
| 1/4" | = | 8 mm | 2-1/2" | = | 65 mm |

| | | | | | |
|--------|---|--------------|--------|---|-----------------------------------|
| 3/8" | = | 10 mm | 3" | = | 75 mm |
| 1/2" | = | 15 mm | 3-1/2" | = | 90 mm |
| 5/8" | = | 18 mm | 4" | = | 100 mm |
| 3/4" | = | 20 mm | 4-1/2" | = | 115 mm |
| 1" | = | 25 mm | 1" | = | 25 mm for all larger sizes |
| 1-1/4" | = | 32 mm | | | |

See the July-August 1993 *Metric in Construction* newsletter for more information.

ELECTRICAL CONDUIT

What will change:

- Nominal conduit designations--from inches to millimeters.

What will stay the same:

APPENDIX "C" Space Comparison

- Conduit cross-sections.
Electrical conduit is similar to piping: it is produced in "soft" decimal inch dimensions but is identified in nominal inch sizes. Nonmetallic conduit will not change size but will be relabeled in metric as follows:

| | | | | | |
|--------|---|----------------|--------|---|-------------------------------------|
| 1/2" | = | 12 (mm) | 2-1/2" | = | 65 (mm) |
| 3/4" | = | 20 (mm) | 3" | = | 75 (mm) |
| 1" | = | 25 (mm) | 3-1/2" | = | 90 (mm) |
| 1-1/4" | = | 32 (mm) | 4" | = | 100 (mm) |
| 1-1/2" | = | 40 (mm) | 4-1/2" | = | 115 (mm) |
| 2" | = | 50 (mm) | 1" | = | 25 (mm) for all larger sizes |

Metallic conduit will not change size but will be relabeled in metric as follows:

| | | | | | |
|--------|---|----------------|--------|---|-----------------|
| 1/2" | = | 16 (mm) | 2-1/2" | = | 63 (mm) |
| 3/4" | = | 21 (mm) | 3" | = | 78 (mm) |
| 1" | = | 27 (mm) | 3-1/2" | = | 91 (mm) |
| 1-1/4" | = | 35 (mm) | 4" | = | 103 (mm) |
| 1-1/2" | = | 41 (mm) | 5" | = | 129 (mm) |
| 2" | = | 53 (mm) | 6" | = | 155 (mm) |

The new metric names were assigned by the National Electrical Manufacturers Association.

ELECTRICAL WIRE

What will change:

- Nothing at this time.

What will stay the same:

- Existing American Wire Gage (AWG) sizes.

STRUCTURAL STEEL

What will change:

- Section designations--from inches to **millimeters** and from pounds per foot to **kilograms per meter**, in accordance with ASTM A6M.
- Bolts--to metric diameters and threads per ASTM A325M and A490M.

What will stay the same:

- Cross-sections.
Like pipe and conduit, steel sections are produced in "soft" decimal inch dimensions (with actual depths varying by weight) but are named in rounded inch dimensions so there is no need to "hard" convert them to metric. Rather, their names will be changed to metric and rounded to the nearest 10 mm. Thus, a 10-inch section is relabeled as a 250-mm section

and a 24-inch section is relabeled as a 610-mm section.

COMPARISON OF POR SPACE ALLOCATION WITH ACTUAL SPACE NEW HEALTH CARE FACILITY CONSTRUCTION PROJECTS

INDIAN HEALTH SERVICE

Through the various phases of a new health care project, the space allocation provided in the approved Indian Health Service (IHS) Program of Requirements (POR) is to be compared with the actual space designed and or constructed. The comparison process begins in the Schematic Phase of design, with the submission of a Space Comparison Report. After this report is approved it is to be updated and resubmitted when there is a change in area. The last submission of a Space Comparison Report is with the submission of the 100 percent construction documents. Also, as part of the "Record Drawings" an update and verification will be required.

Report Content: The report is to be provided in two parts. It is desired that this report be computer generated. The first part is to contain tables that provide a summary and a detailed backup. The second part is to contain floor plans that delineate the various components used in the actual space computations. If Computer-Aided Design (CAD) is used, polylines ("P" lines) should be shown so the net and gross areas are calculated by the computer software program used.

- a. **Part I, Section A**, is a summary that shows subtotals for each of the five services components included in IHS health care facilities; i.e., Inpatient, Diagnostic, Ambulatory, Administrative, and Support, as applicable to the respective project. Each department within a service component shall be subtotaled. For each service component and departmental subtotal, the POR net area, applicable net-to-gross factor, and gross area are to be shown. The actual spaces (designed or constructed) are to be compared with the POR spaces, with the percent of variance for both net and gross areas being shown. See Example "A" for format.
- b. **Part I, Section B**, is a backup that gives a detailed breakdown for each department. This breakdown is to track each individual space in the POR by Criterion Number. The POR portion of the table is to provide the respective Criterion No., the space name, quantity (number of units), unit net area, and net area. The POR net areas for each department are to be totaled, and the departmental net-to-gross factor applied in order to provide the POR department gross area. For each POR Criterion Number, the actual space identification numbers (used by designer for space identification in early phases of the design prior to room number assignments), room numbers, unit net area, and net area are to be shown (See A/E Guide section IV.B and C). For each POR Criterion Number, the actual net areas are to be compared with POR net areas, with the variance amount being shown, as well as the percent of variance and any appropriate comments. See Example "B" for format.
- c. **Part II**, is appropriate floor plans that delineate how the actual area is assigned to each department and the components that make up the building gross area.

Basis of Computations

a. Space Net Area

- (1) For space net area, each actual individual space is measured from the inside face of permanent walls or common lines between spaces. No deductions are to be made for space occupied by interior partitions when it is a wall within a space used to separate functions; or baseboard heating, ventilation and air-conditioning (HVAC) units. However, deductions are to be made for all mechanical shafts passing through the space, structural columns, and HVAC units other than baseboard type.
- (2) When two or more spaces are combined into a single area, the actual space is to be compared with the combined respective POR spaces.
- (3) When a single space is divided into two or more spaces, the actual space is to be compared with the split respective POR space.

b. Department Gross Area

- (1) For department gross area, each actual department shall be measured from the inside face of any exterior wall, the inside face of permanent corridor (building circulation) walls, or to the inside face of walls common with an adjacent department. (Note, the entire thickness of all walls for permanent corridors is included with the measurements for the permanent corridors.) There are to be no deductions for structural elements, departmental corridors, or partitions that occur within the department. Spaces for structural columns, which have been deducted from the space net area, are to be included in the department gross area. Spaces that have been identified to be included in the calculations for floor and building gross areas are to be deducted from the department gross area measurements and calculations.
- (2) When a space has been approved for location in a department (recipient) other than the department (donor) for which it was programmed in the POR, the gross area for the relocated space is to be deducted from the gross area of the recipient department and reflected in the donor department for comparison with the POR space. (Noting that gross area is what is moved, then a new net area will have to be calculated based on the conversion factor for the recipient department, if these factors are different. By moving gross areas, the building gross area is not affected.)
- (3) When "P lines" are used with CAD to determine the gross areas, layers separate from those used to develop the space net areas are to be used.

c. Floor Gross Area

The actual floor gross area is the sum of the items listed below:

- (1) Department gross areas.
- (2) Permanent corridors, lobbies, vestibules (other than arctic enclosures), malls, and their walls.
- (3) Stairwells and their walls (first level only). The stairwell walls are included on all levels except the first.
- (4) Elevator shafts and their walls (first level only). The elevator walls are included on all levels except the first.
- (5) Interior walls common to more than one department.
- (6) Exterior walls (walls that follow the building “footprint”, not including roof overhangs, cornices, pilasters, buttresses, etc., which extend beyond the exterior wall face).

d. Building Gross Area

The actual building gross area is the sum of the items listed below:

- (1) Total floor gross area.
- (2) Mechanical space. Refer to section “e” below.
- (3) Space associated with energy efficiency, extreme climate response such as arctic enclosures, seismic concerns, and/or innovative construction techniques. (Examples are extra wall thickness for arctic conditions, seismic bracing, and double walls that are a result of placing two modular units together.)

e. Mechanical Space. The POR allocates 12 percent of the total floor gross area for mechanical space. This space can be used only as mechanical space and can not be added to other areas of the facility. If the area is not required as mechanical space, it is to be deducted from the total building gross area. The actual mechanical space is included in the total building gross area. The various components of mechanical space are to be listed in a summary backup table and compared with the programmed 12 percent area given in the POR. Mechanical space includes the following:

- (1) Enclosed and covered space used for major equipment such as boilers, chillers, large pumps and valves, emergency generators, storage tanks, and large fans.

- (2) Rooms used for electrical switching gear, main electrical panels, main communication terminals, mechanical controls, metering of utility services, and shafts for utilities on first level only.
 - (3) Crawl spaces and mechanical penthouses at the percentage of area indicated in paragraph "f" below.
 - (4) The gross area of stand-alone mechanical spaces and mechanical penthouses are counted as part of the "gross area for mechanical space." The net area of mechanical spaces located in a building that more than one department is located in is counted as part of the "gross area for mechanical space."
- f. **Crawl Spaces and Mechanical Penthouses.** These components do not affect the building "footprint" but are included as components of the mechanical space at the percentage of area indicated below:
- (1) All spaces having a clear height of 2 000 mm or higher are counted as 100 percent in gross area computations.
 - (2) All spaces having a clear height between 1 200 mm and 2 000 mm are to be counted as 50 percent in gross area computations.
 - (3) All spaces, having a clear height of less than 1 200 mm are excluded from gross area computations.
 - (4) Clear height is defined as the distance between the surface of the earth or finished floor and the bottom of the predominate framing members (normally the joists or trusses). It is expected that girders, pipes or ducts may protrude into this height.
- g. **Components Excluded from Building Gross Area Computations, but Included in the Report.**
- (1) The following components are excluded from the building gross area. They are to be included in this report as separate line items and the actual spaces are to be reported and compared with the POR space requirements when applicable. Each of these components is to be authorized specifically for use in the project in the basic POR or a POR amendment.
 - (a) Equipment access walkways.
 - (b) Catwalks and mezzanines which utilize open metal floor grating.
 - (c) Interstitial space (if use of such is approved in accordance with IHS requirements).
 - (d) Loading Dock(s).

- (e) Covered entrances.
- (f) Exterior covered walkways; canopied areas, trellis-type covers and other covered but not enclosed areas.
- (g) Building overhangs exceeding 1 meter in width.
- (h) Parking.
- (i) Uncovered outside storage areas.
- (j) Helicopter ports or helicopter pads.
- (k) Unroofed equipment pads.
- (l) Locally specified separate traditional healing structures.
- (2) The following components are excluded from the building gross area and do not require authorization before they are used in a design. They are to be included in this report as separate line items and the actual spaces are to be reported.
 - (a) Crawl space having a clear height less than 1200 mm.
 - (b) Building overhangs not exceeding 1 meter in width.

h. Components Excluded from Report. The following components are excluded from the building gross area and from this report:

- (1) Bay windows.
- (2) Unfinished and unoccupied attics that do not have floor surfaces. Note, attics that have floor surfaces are treated as a floor and will be counted as such.

APPENDIX "C"
Space Comparison – EXAMPLE B

| PROJECT PHASE: | | FACILITY NAME: | | | | | | DATE: | | | |
|--|--------------------------------------|----------------------------|---------------------|------------------------------|----------------------------|---------------------|------------------------------|------------------------------|-----------|------------------------------|--------------|
| Comparison of POR Space Allocation with Actual Space | | | | | | | | | | | |
| Part I, Section A - Services Summary | | | | | | | | | | | |
| Dept. No. | Department Name | POR | | | Actual | | | Variance | | | |
| | | Net Area (m ²) | Net-to-Gross Factor | Gross Area (m ²) | Net Area (m ²) | Net-to-Gross Factor | Gross Area (m ²) | Net Area | | Gross Area | |
| | | | | | | | | Difference (m ²) | % | Difference (m ²) | % |
| INPATIENT SERVICES | | | | | | | | | | | |
| | | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | | 0 | |
| | Sub-total Inpatient Services | 0 | | 0 | 0 | | 0 | 0 | | 0 | |
| DIAGNOSTIC SERVICES | | | | | | | | | | | |
| 21.0 | Laboratory | 72 | 1.30 | 94 | 72 | 1.30 | 94 | 0 | 0% | 0 | 0.0% |
| 22.0 | Radiology - Diagnostic Imaging | 135 | 1.45 | 196 | 140 | 1.45 | 203 | 5 | 4% | 7 | 3.7% |
| | Sub-total Diagnostic Services | 207 | | 289 | 212 | | 297 | 5 | 2% | 7 | 2.5% |
| AMBULATORY SERVICES | | | | | | | | | | | |
| 31.0 | Emergency & Urgent Care | 133 | 1.35 | 180 | 133 | 1.35 | 180 | 0 | 0% | 0 | 0.0% |
| 32.0 | Ambulatory Care - Medical | 291 | 1.35 | 393 | 291 | 1.30 | 378 | 0 | 0% | (15) | -3.7% |
| 32.0 | Ambulatory Care - Eye | 76 | 1.35 | 103 | 76 | 1.35 | 103 | 0 | 0% | 0 | 0.0% |
| 33.0 | Community Health Services | 421 | 1.20 | 505 | 421 | 1.20 | 505 | 0 | 0% | 0 | 0.0% |
| 34.0 | Dental Clinic | 241 | 1.30 | 313 | 241 | 1.30 | 313 | 0 | 0% | 0 | 0.0% |
| 35.0 | Pharmacy | 143 | 1.25 | 179 | 143 | 1.25 | 179 | 0 | 0% | 0 | 0.0% |
| 36.0 | Physical Therapy | 109 | 1.30 | 142 | 109 | 1.30 | 142 | 0 | 0% | 0 | 0.0% |
| 39.0 | Dialysis Treatment | 265 | 1.25 | 331 | 265 | 1.25 | 331 | 0 | 0% | 0 | 0.0% |
| | Sub-total Ambulatory Services | 1,679 | | 2,145 | 1,679 | | 2,131 | 0 | 0% | (15) | -0.7% |
| ADMINISTRATIVE SERVICES | | | | | | | | | | | |
| 41.0 | Administration | 268 | 1.25 | 335 | 268 | 1.25 | 335 | 0 | 0% | 0 | 0.0% |
| 42.0 | Medical Records | 170 | 1.20 | 204 | 170 | 1.20 | 204 | 0 | 0% | 0 | 0.0% |
| 43.0 | Employee Facilities | 145 | 1.15 | 167 | 145 | 1.15 | 167 | 0 | 0% | 0 | 0.0% |
| 44.0 | Education and Consultation | 126 | 1.15 | 145 | 126 | 1.15 | 145 | 0 | 0% | 0 | 0.0% |
| 45.0 | Public Facilities | 292 | 1.15 | 336 | 292 | 1.15 | 336 | 0 | 0% | 0 | 0.0% |
| 46.0 | Business Office | 81 | 1.20 | 97 | 81 | 1.20 | 97 | 0 | 0% | 0 | 0.0% |
| | Sub-total Administrative | 1,082 | | 1,284 | 1,082 | | 1,284 | 0 | 0% | 0 | 0.0% |
| SUPPORT SERVICES | | | | | | | | | | | |
| 51.0 | Medical Supply Services | 50 | 1.15 | 58 | 50 | 1.15 | 58 | 0 | 0% | 0 | 0.0% |
| 52.0 | Property and Supply | 403 | 1.10 | 443 | 403 | 1.10 | 443 | 0 | 0% | 0 | 0.0% |
| 54.0 | Housekeeping and Linen | 120 | 1.05 | 126 | 120 | 1.05 | 126 | 0 | 0% | 0 | 0.0% |
| 55.0 | Facilities Management | 170 | 1.15 | 196 | 170 | 1.15 | 196 | 0 | 0% | 0 | 0.0% |
| 56.0 | Building Services | 33 | 1.10 | 36 | 33 | 1.10 | 36 | 0 | 0% | 0 | 0.0% |
| 57.0 | Clinical Engineering | 19 | 1.15 | 22 | 19 | 1.15 | 22 | 0 | 0% | 0 | 0.0% |
| | Sub-total Support Services | 795 | | 880 | 795 | | 880 | 0 | 0% | 0 | 0.0% |
| Subtotal - Total Dept. Gross Area | | | | 4,599 | | | 4,591 | | | (7) | -0.2% |
| Dept. to Floor Factor | | | 20% | 920 | | 20.0% | 918 | | | (1) | -0.2% |
| Subtotal - Total Floor Gross Area | | | | 5,518 | | | 5,510 | | | (9) | -0.2% |
| Mechanical Space @ 12% Max. | | | | 662 | | | 661 | | | (1) | -0.2% |
| Total Building Gross Area | | | | 6,181 | | | 6,171 | | | (10) | -0.2% |

APPENDIX “C”
Space Comparison – EXAMPLE A

APPENDIX "C" Submission Checklist

| PROJECT PHASE: | | FACILITY NAME: | | | | | DATE: | | | | | |
|--|-------------------------------|----------------|----------|--------------------|---------------|----------------|--------------------|---------------|----------------|-------------|-----|--------------------------|
| Comparison of POR Space Allocation with Actual Space | | | | | | | | | | | | |
| Part I, Section B - Departmental Review | | | | | | | | | | | | |
| Crit. No. | Space Name | Space ID No. | Room No. | POR | | | Actual | | | Variance | | Comments |
| | | | | Quantity of Spaces | Unit Net Area | Total Net Area | Quantity of Spaces | Unit Net Area | Total Net Area | Difference | % | |
| DIAGNOSTIC SERVICES | | | | | | | | | | | | |
| 21.0 - Laboratory | | | | | | | | | | | | |
| 21.15 | Combined Procedure Area | | | 1 | 19 | 19 | 1 | 19 | 19 | 0 | 0% | |
| 41.11 | Computer Work Station | | | 1 | 2 | 2 | 1 | 2 | 2 | 0 | 0% | |
| 21.04 | Control & Specimen Processing | | | 1 | 9 | 9 | 1 | 9 | 9 | 0 | 0% | |
| 21.01 | Blood Drawing | | | 1 | 6 | 6 | 1 | 6 | 6 | 0 | 0% | |
| 21.02 | Specimen Toilet | | | 1 | 5 | 5 | 1 | 5 | 5 | 0 | 0% | |
| 21.03 | Specimen Storage | | | 1 | 3 | 3 | 1 | 3 | 3 | 0 | 0% | |
| 21.31 | Storage / Records | | | 1 | 5 | 5 | 1 | 5 | 5 | 0 | 0% | |
| 52.01 | Storage / Supply | | | 1 | 5 | 5 | 1 | 5 | 5 | 0 | 0% | |
| 21.25 | Body Holding | | | 1 | 7 | 7 | 1 | 7 | 7 | 0 | 0% | |
| 41.02 | Office - Supervisory | | | 1 | 11 | 11 | 1 | 11 | 11 | 0 | 0% | |
| Total Department Net Square Meters | | | | 72 | | | 72 | | | 0 0% | | |
| 22.0 - Radiology - Diagnostic Imaging | | | | | | | | | | | | |
| 22.06 | Procedure Room, Diagnostic | | | 1 | 30 | 30 | 1 | 30 | 30 | 0 | 0% | |
| 22.25 | Procedure Room, Ultrasound | | | 1 | 14 | 14 | 1 | 14 | 14 | 0 | 0% | |
| 22.03 | Dressing Booth | | | 3 | 2 | 6 | 1 | 2 | 2 | | | 3-sizes of dressing Rm's |
| | Dressing Booth | | | | | | 1 | 1 | 1 | | | |
| | Dressing Booth | | | | | | 1 | 3 | 3 | 0 | 0% | |
| 22.03 | Dressing Booth, Handicapped | | | 1 | 4 | 4 | 1 | 5 | 5 | 1 | 25% | |
| 22.08 | Patient Holding Alcove | | | 1 | 7 | 7 | 1 | 7 | 7 | 0 | 0% | |
| 11.12 | Patient Toilet, Handicapped | | | 1 | 5 | 5 | 1 | 5 | 5 | 0 | 0% | |
| 22.12 | Darkroom | | | 1 | 8 | 8 | 1 | 8 | 8 | 0 | 0% | |
| 22.16 | Portable X-ray Alcove | | | 1 | 3 | 3 | 1 | 3 | 3 | 0 | 0% | |
| 22.17 | Barium Prep Area | | | 1 | 2 | 2 | 1 | 2 | 2 | 0 | 0% | |
| 52.01 | Unit Supply Storage | | | 1 | 6 | 6 | 1 | 6 | 6 | 0 | 0% | |
| 22.15 | Film File Room | | | 1 | 15 | 15 | 1 | 19 | 19 | 4 | 27% | |
| 22.22 | Film File Sorting Area | | | 1 | 6 | 6 | 1 | 6 | 6 | 0 | 0% | |
| 22.13 | Viewing Area | | | 1 | 7 | 7 | 1 | 7 | 7 | 0 | 0% | |
| 45.01 | Janitor's Closet | | | 1 | 4 | 4 | 1 | 4 | 4 | 0 | 0% | |
| 22.14 | Office Film Reading Room | | | 1 | 7 | 7 | 1 | 7 | 7 | 0 | 0% | |
| 41.02 | Office, Supervisory | | | 1 | 11 | 11 | 1 | 11 | 11 | 0 | 0% | |
| Total Department Net Square Meters | | | | 135 | | | 140 | | | 0 0% | | |

APPENDIX “C”
Space Comparison – EXAMPLE A

**APPENDIX “D”
IHS/HSP Template Rule Book**

HSP

Health Systems Planning

October 2002

Template Rule Book

SYNOPSIS

Template design solutions streamline the process of developing new IHS Healthcare Facilities, assuring quality and consistency of physical environment, accurate and early projection of project cost, and accelerated development time frames. The Templates provide schematic design level descriptions of functional and efficient departments configured to be combined into site and community specific facilities.

The Templates are limited to departments and functions that should remain constant between varied local customs and practices. As the Templates are applied to differing facilities, local input will determine the site plan, interior and exterior aesthetic character, interdepartmental relationships, and locally implemented program space.

This document includes the information necessary to gain full benefit of the Templates by understanding their organization, design parameters, and flexibility of application. Also included are guidelines for developing the Out-of-Template departments. By working within the defined parameters, project teams will greatly expedite development of their project while contributing to continual improvement of the Templates for future use.

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INTRODUCTION

Templates are provided for a broad range of departmental functions and operational capacities. The Templates selected by the HSP are appropriate to meet the workload needs of the project's user population, and the programmatic needs for the departments that have not been developed as Templates (Out-of-Template). Architects/Engineers (A/E) will begin projects with the process of organizing the various departmental Templates and "Out-of-Template" areas into a cohesive design solution.

Templates are based on a set of required needs and adjacencies for a department or a grouping of related departments with common functional elements. They are designed with perimeter configurations that accommodate connection to public circulation, interconnection with other related Templates, provision for anticipated growth, and possible exterior window locations. All Templates incorporate a standardized square structural grid to facilitate efficient organization around public spaces and circulation systems, and to allow vertical stacking in multistory configurations.

Out-of-Template components include areas heavily influenced by local customs and conditions (such as tribal programs) and support spaces (such as public amenity and building support) that can be configured in a variety of ways without impacting the effectiveness and efficiency of the Template departments. Those Out-of-Template areas requiring immediate adjacency to a specific department(s) are identified on the documents for that Template. By designing Out-of-Template areas to the dimensional and planning standards applied to the Templates the A/E for the project will achieve maximum flexibility in the specific facility's layout and long-term flexibility.

The internal design of the Templates will satisfy functional needs, but the building as a whole must respond to the specific site and its context. By designing a total system, both the Templates and Out-of-Template pieces will fit together as a unit, allowing for a multitude of layouts, rather than dictating a prototypical design.

CRITERIA

A. Predefined Requirements for All IHS Health Facilities

1. Building Codes and Standards — ***most recent edition***. Each facility developed for the IHS must conform to the Codes and Standards in effect at the time of project implementation. The specific editions of codes and standards used in development of the Templates are indicated in Design Notes for each Template. As the A/E begin the process of developing Template-based facilities, early emphasis must go to identification of codes and standards in effect and assuring facility compliance at completion of the Design Development phase. (Refer to the A/E Guide, Section III.C)

- a. National Fire Protection Associations documents (NFPA)
- b. Americans with Disabilities Act (ADA)
- c. Occupational Safety Health Administration (OSHA)
- d. National Council on Radiation Protection and Measurements (NCRP) (all radiographic equipment locations, including: Radiology, Dental, etc.)

2. Design Standards

AIA Guidelines for Construction and Equipment of Hospital and Medical Facilities (AIA Guidelines).

3. The template planning solutions were developed under the standards and requirements of:

- a. National Fire Protection Associations documents (NFPA) - 1995, 1993 NFPA 99, 1994 NFPA 101
- b. Americans with Disabilities Act (ADA) - August 1994
- c. Occupational Safety Health Administration (OSHA)
- d. AIA Guidelines for Construction and Equipment of Hospital and Medical Facilities (AIA Guidelines) - 1992-93

Deviations from the referenced standards in response to IHS service-specific conditions have been made and are noted in the Design Notes for each affected discipline. It is not the intention of the HSP documents to supersede IHS contractual building codes but to supplement them with decisions as possible and appropriate.

It remains the Architect/Engineer responsibility to meet the contracted design criteria.

DATA OVERVIEW

Each Template represents a functionally efficient space plan for a department or group of related/mutually supportive departments. The HSP is designed to provide the documents necessary to plan and acquire approval for a medical program and collate and communicate the necessary information to an A/E for the design of a health facility.

The HSP tabulates and documents the necessary information for communication to the design team. The following documents are available for the A/E:

- A. Program of Requirements - Hard copy
 - a. Design Notes,
 - b. Projected Annual Workload Capacity,
 - c. Fundamental Design Parameters,
 - d. Imperative Issues,
 - e. Operational Concepts,
 - f. Adjacency Parameters,
 - g. Expansion and Flexibility, and
 - h. Room/Template Specific Issues
- B. Space Program - Hard copy and data files
- C. Template Drawings - Hard copy and AutoCAD files.
- D. Equipment List - A department-by-department, room-by-room equipment and furniture list - Hard copy and data files.
- E. Room Function Plan - Hard copy and AutoCAD files.
- F. Room Data Sheet - Hard copy and data files.
- G. Engineering Criteria
- H. Cabinet Elevations – AutoCAD files.
- I. Door Hardware Requirements – AutoCAD file.

PARAMETERS/FLEXIBILITY'

A. Parameters — Fundamental conditions and requirements apply to every Template. These standards were developed to provide conservative schematic design solutions that are adaptable to a broad spectrum of locally influenced and selected materials and details of construction. While it is not necessary to maintain the exact dimensions of individual components/systems (such as wall thickness or column enclosure) it is nonetheless important to respect and maintain other dimensional criteria such as minimum room clearances and corridor locations as indicated on each Template.

1. Structural Bay/Assumptions

All Templates are planned in a 9 m x 9 m structural bay, with assumed column locations at every grid line intersection point

2. Standard Dimensions

a. Doors

- 1) Gurney and/or equipment access — 1200 mm (each leaf)
- 2) Staff and ambulatory public access — 900 mm (each leaf)

b. Corridors

- 1) Gurney/nonambulatory patient access — 2500 mm clear
- 2) Ambulatory patient access — 1800 mm clear
- 3) Staff and minor equipment access — 1800 mm clear
- 4) Staff pedestrian access (no equipment) — 1500 mm clear
- 5) Staff pedestrian access, open office areas — 1200 mm clear

c. Columns

- 1) All columns are assumed to be 750 mm x 750 mm finished dimension. This accommodates structural members as well as limited plumbing and electrical chase locations.

PARAMETERS/FLEXIBILITY (cont)

d. Wall Thickness

- 1) Interior partitions are planned as 150 mm finished thickness.
- 2) Single loaded plumbing walls for wall-mounted fixtures are planned as 500 mm finished thickness.
- 3) Double-loaded plumbing walls for wall-mounted fixtures are planned as 750 mm finished thickness.
- 4) Exterior walls are planned as providing a finished interior face coinciding with the location that would result from use of a standard (150 mm) partition centered on the column grid line. The exterior face is shown, for graphic representational purposes only, to align with the exterior face of the standard column (750 mm x 750 mm). The actual exterior wall thickness and profile are at the discretion of local project implementation teams, contingent on maintenance of the intended interior face of wall location.

3. Area Calculation

- a. Room areas (net) are calculated to the finished face of wall.
- b. Template and/or department areas (gross) are calculated to the centerline of perimeter walls/partitions, except at exterior exposures where the area is calculated to a point 75 mm past the finished interior face of the wall (hypothetical centerline of standard partition in same location).

4. Circulation

- a. Interdepartmental circulation occurs through public corridors located “Out-of-Template” or through corridors where provided to allow direct flow from one Template into the next. Where overall Template proportions permit, multiple connections are provided to allow separation of staff and patient traffic.
- b. Intradepartmental circulation occurs to the greatest extent possible through corridors located along centerlines of structural bays. Where corridors are located off-center, it is in response to requirements of specific departmental/clinical function.

PARAMETERS/FLEXIBILITY (cont)

- c. Public circulation occurs through public corridors located “Out-of-Template.” Circulation areas labeled “Inpatient Public Corridor” on Templates indicate the presence of gurney bound and/or ambulatory inpatient traffic. This information is provided to assist local implementation teams where project parameters permit separation of outpatient and inpatient traffic. This designation does not preclude use of the corridor by others.
5. Template depths/proportions are planned to permit connection to adjacent Templates of similar function or related/supporting activity.
6. Growth and flexibility are accommodated in selected Templates through interdepartmental connections, and/or by extension of clear corridor widths to exterior wall conditions. In some cases perimeter corridor extension areas are occupied with a room or space whose function could be relocated into the future growth area to permit such connection. Provisions for and anticipation of future growth are noted on applicable Template Design Notes.
7. Template Combinations/Assembly
 - a. As local teams organize Template and Out-of-Template areas into total concept design solutions, full consideration should go to accommodating long-range interconnection of adjacent departments of similar function and/or occupancy. Changes through time in service demand may require re-assignment of departmental spaces to accommodate growth in one department through expansion into adjacent one(s).
 - b. Multiple Department Templates — Where individual Templates include multiple departments, they are selected by nature of similar patient profiles and/or interrelated workload capacities.
 - c. Multiple Template Departments — Where multiple Templates are used for a single department or departmental group it is in response to a large area requirement that would produce a Template of such scale as to be difficult to integrate into a total design solution, or where patient perceptions of scale and relation to exterior light would be adversely affected. Such single-department multiple Templates should be in close if not immediate functional adjacency arranged to best serve the local population’s requirements and preferences.

PARAMETERS/FLEXIBILITY (cont)

B. Flexibility

1. Each facility designed using the template system will have issues that are directly associated with the specific context and setting. These items need to be adjusted to meet the projects specific requirements. The fundamental parameters of the Template designs include conservative assumptions of construction and regulatory criteria to assure adaptability to each facility's particular character and circumstances. The following items represent the most frequently occurring areas of application flexibility:
 - a. Column enclosure size will vary depending on the structural system used, and the requirements for vertical chases. Adjacent room and equipment minimum clearances should be maintained.
 - b. Exterior wall thickness will depend on materials and details of construction. Interior wall face location/clearances should be maintained as indicated on Templates.
 - c. Template perimeter wall conditions will depend on adjacent use/occupancy. Adjacent room and equipment minimum clearances should be maintained.
 - d. Selection of equipment identified on the HSP generic list, relative to approved suppliers and specific models.
 - e. Changes due to revisions in design criteria and standards.
2. Modifications and changes in templates are classified as either Minor or Major.
 - a. Minor modifications and changes in departmental templates are allowed. They are the result of reviews and discussion that take place during the design process. Minor changes in a template do not affect the Template size, basic layout, or function. The 10 percent allowable deviation rule does not apply to templates. Examples are:
 - 1.) Removing, relocating, or installing a door.
 - 2.) Removing or installing a wall.
 - 3.) Switching room locations without diminishing the departmental patient/staff flow or changing the room functions.
 - 4.) A change in a room function (Requires an approved justification).
 - b. Major modifications and changes in departmental templates are allowed when they are justified and approved. A major change is when the department size is changed and a POR modification is required. Examples are:
 - 1.) The planned equipment has physically changed which necessitates a room dimensional change.
 - 2.) A program function has changed which changes the space requirements.

- 3.) An omission or error in the templates is noted.

WORKING OUT-OF-TEMPLATE

- A. The areas designed into Templates are limited to those appropriate and necessary for efficient and effective performance of specific departmental functions and activities throughout the IHS system. The remaining areas essential to the development and operation of the total facility, such as common public areas, building service spaces, and tribal programs are referred to as “Out-of-Template.” As local teams implement Template-based facilities, they will be arranging the Out-of-Template spaces in conjunction with selected Templates.

As Out-of-Template areas and locally based departments are developed and arranged, they must adhere to the fundamental dimensional and organizational parameters of the Templates themselves. In this way Templates and Out-of-Template areas may be combined into cohesive and effective design solutions.

- B. Out-of-Template items include:
 1. Public toilets will be provided according to each facility’s POR in public “Out-of-Template” areas accessed through public circulation and/or waiting spaces. Public toilets are provided within Templates only when essential to efficient operation of the specific department.
 2. Mechanical equipment rooms.
 3. Electrical equipment rooms, except where Template proportions produce excessive distances between use points and the nearest possible Out-of-Template locations.
 4. Communication equipment rooms, except where Template proportions produce excessive distances between use points and the nearest possible Out-of-Template locations.
 5. Mechanical and plumbing shafts for multistory facilities.
 6. Public service/amenity areas, as identified in each facility’s POR,
 - a. Information and reception.
 - b. Health Information centers.
 - c. Public Waiting areas.
 7. Demographic/community based functions and departments, such as for Tribal Programs, as defined in each facility’s POR.

WORKING OUT-OF-TEMPLATE (cont)

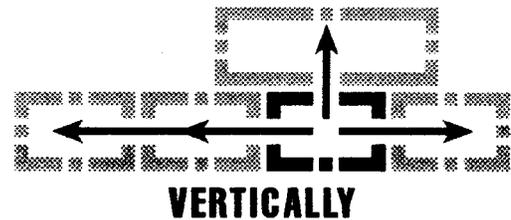
8. Vertical circulation, stairs, and elevators
9. Central Plant.
10. Ambulance Garage as defined in each facility's POR.

TOTAL SYSTEM APPLICATION

- A. Conceptual Framework** — Fundamental principles and guidelines for development of Template-based facilities. The following paragraphs and accompanying diagrams provide the *organizational premise* and developmental guidelines necessary to successfully integrate Template departments and Out-of-Template areas/components.

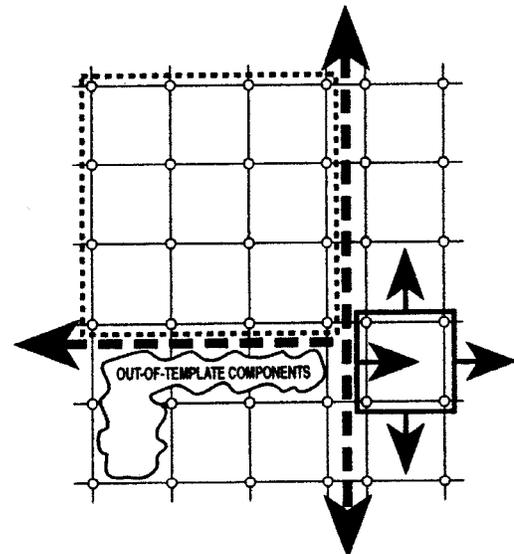
Organizational flexibility

The Total System Application of Template-based development promotes the individuality of health care facility design solutions. With departmental size and function pre-approved through use of Templates, the local design team can focus upon community and site specific issues while arranging Template and Out-of-Template areas into the total facility configuration. Design potential and *planning* alternatives are not limited.



System Components

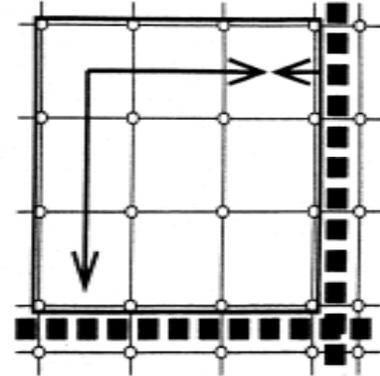
The Template Design System is composed of various parts; some are predetermined in size and configuration (Templates), some are malleable (circulation systems and public areas), and some will be developed uniquely for each site (out-of-system pieces). All these components will be assembled about the Template structural grid system to achieve facilities of various sizes and configurations.



TOTAL SYSTEM APPLICATION (cont)

Template Access

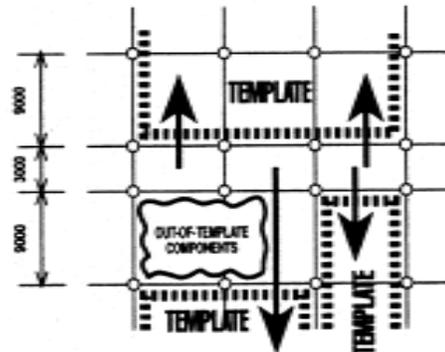
Every departmental Template must touch general building circulation at the entry/exit point(s) indicated. Some Templates containing multiple departments or incompatible types of traffic require multiple access points along the same corridor or into separate corridors.



Where functionally acceptable, entry points are located near Template corners to permit optional relocation to the adjacent side for greater flexibility in total system application.



The requirements of Inter-Template circulation are noted on Template plans and/or Design Notes. This building circulation (whether public, patient, staff, or service) attaches to, but occurs outside of, Template layouts and is counted as part of the building gross area.

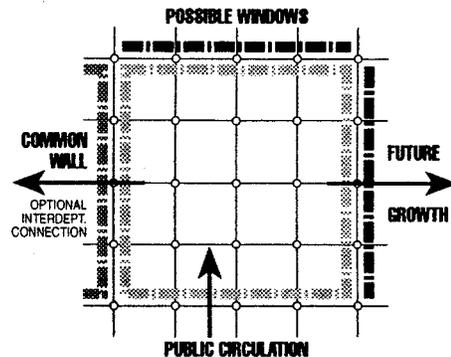


TOTAL SYSTEM APPLICATION (cont)

Template Edges

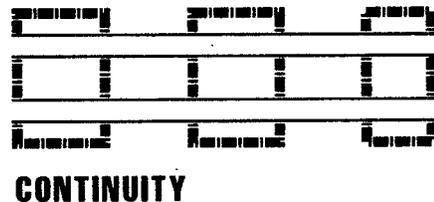
The individual Templates and corresponding Design Notes identify and define perimeter edge conditions, including:

- Adjacency requirements
- Points of connection to building circulation systems
- Optional points of direct connection to other adjacent Templates
- Exterior exposure/window opportunities and requirements
- Specific opportunities for future extension/growth

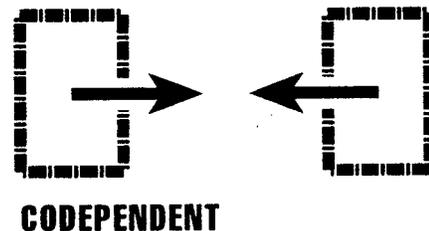


Template Proximity Relationships

Continuity — Where different Templates share functional/ operational characteristics, points of potential direct interconnection are provided, and adjacencies are identified in their Design Notes.



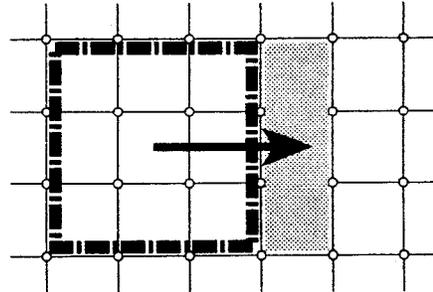
Codependency — Where different Templates require separation with close functional adjacency, points of entry to each Template are located to facilitate flexibility in achieving the adjacency. Relative priorities for adjacency are identified in the Templates' Design Notes.



TOTAL SYSTEM APPLICATION (cont)

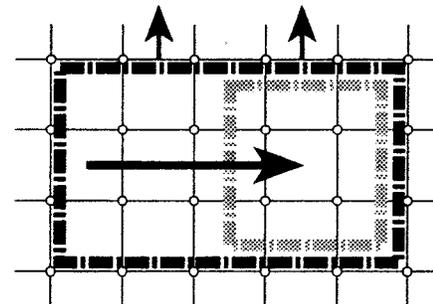
Template Growth

Perimeter Extension — Where departmental growth is most effectively anticipated at an exterior wall, that condition and any special considerations are noted on the Template plans.



**PLAN TEMPLATE TO
ALLOW GROWTH TO OCCUR**

Soft/Adjacent Space — The term “soft space” describes areas within a Template department, which serve ancillary, or support functions that can be relocated without adversely affecting the department’s function. Growth in service capacity for a Template department can be accommodated by reassigning/remodeling internal soft space, or extending into an adjacent vacated department.

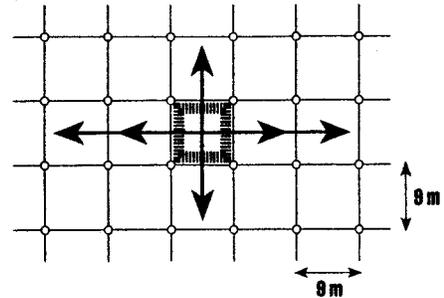


**PLAN SOFT SPACES
WITHIN TEMPLATE**

TOTAL SYSTEM APPLICATION (cont)

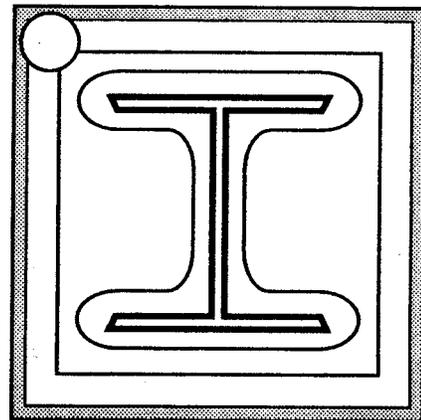
Structural Predeterminants

Each Template is planned within a 9 meter by 9-meter square structural grid. Columns are assumed at every grid intersection point within the Template and around its perimeter. This consistent planning module assures maximum flexibility for location shifts of Template departments as well as vertical stacking. Out-of-Template area development must maintain/respect the 9-meter square grid of Template departments.



STRUCTURAL PRE-DETERMINATES

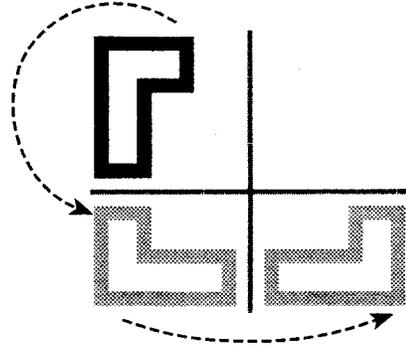
Columns are shown as 750 mm squares on the Template plans. This size is selected as a conservative assumption for the enclosure of a column and incidental plumbing/electrical chase elements. Column enclosures of smaller dimension are allowed, larger dimensions must be coordinated with the furniture/equipment/ functional layout of adjacent spaces.



TOTAL SYSTEM APPLICATION (cont)

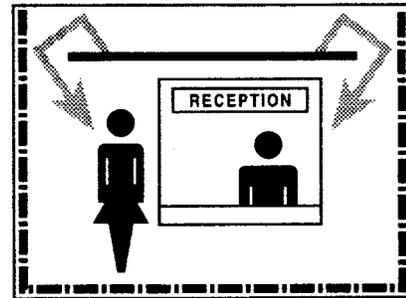
Reversing/Rotating

Where practical, Templates are designed to be reversible and rotatable along/around any axis. Restrictions and limitations are noted on the specific Templates' Design Notes. Templates manipulations are contingent on maintenance of access points, interconnection to other Templates, window locations, and anticipated growth considerations. Each space in a Template that is mirrored/reversed must be evaluated relative to the right- or left-handed nature of work areas or overall functional layouts, particularly in the arrangement of furniture and equipment.



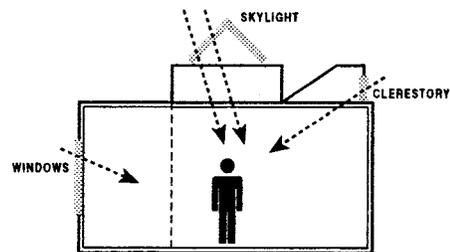
Template Public Zones

Many Templates include public waiting and/or interaction areas. These zones of transition between common public and controlled access areas are intended to allow for expression of definitively local architecture and interior design- To that end, design development of these areas is limited to permit manipulation of lighting, wall and floor materials, and reception/nurse control countertops and public exposure surfaces.



Natural Light

The use of natural light is an important consideration in the development of health care facilities for Native American populations. Local design teams are encouraged to take full advantage of local climate and environmental amenities in public and common areas, as well as in appropriate clinical function areas.



TOTAL SYSTEM APPLICATION (cont)

Out-of-Template System Components

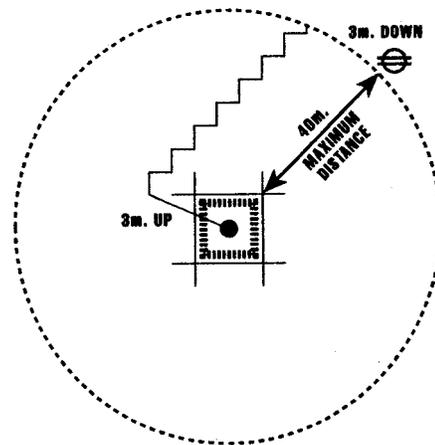
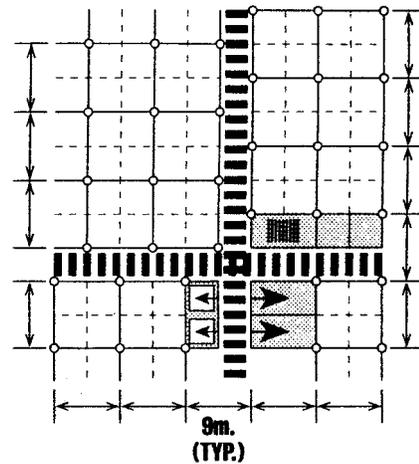
The Templates are comprised of areas that need to be in immediate proximity to achieve the desired departmental function. As a result, areas not specifically important to any single

Department, areas that can be remotely located without impairing functional efficiency, locally determined/administered program spaces (tribal programs), and all common and/or public spaces are classified as "Out-of-Template." Planning and design of Out-of-Template components are the responsibility of the local

Design professional, and must be coordinated/designed with the Templates' 9-meter planning module. As "soft spaces" however, Out-of-Template areas present the opportunity for variations in alignment of the design module as long as requirements for growth, vertical stacking, and inter-departmental connection are not compromised. Overall Out-of-Template needs and restrictions are identified in each facility's P. O. R.

Electrical/Communication Closets

To effectively meet power and communications needs, numerous substations or closets must be provided throughout the facility. These Out-of-Template areas should be dispersed and located such that no occupied area is more than 40 meters from the nearest electrical closet and the nearest communications closet. Where Template proportions make this impractical, electrical and communication rooms are planned within the Template.



TOTAL SYSTEM APPLICATION (cont)

B. Predesign - Learning to work with the IHS Template System, and organizing the project for successful *Total System Application*. Before Schematic Design can commence, the design team must fully understand the detailed requirements of the project and the ways in which the Templates will speed project development while assuring consistent quality.

As with any architectural project, predesign work includes verification of the POR, functional diagramming for each department and the overall project, and site use determination. The use of preapproved Templates eliminates the process of reviewing the POR for the departments included and clearly establishes proportional/design bay strategies and functional access points for the overall project.

The local design team must begin project development by thoroughly familiarizing themselves with the IHS Template System, and its application to their project. To accomplish this the Design A/E must:

- Study and understand the Template concept.
- Study and understand the decisions already made.
- Study and understand the flexibility inherent in each Template.
- Review and edit with the facility staff the Design Note's stated Adjacency Parameters.
- Review and edit with the facility staff the Design Note's stated Expansion/Flexibility.
- Review and edit with the facility staff the Design Note's stated Hours of Operation.
- Review recommended changes to the Design Notes with the IHS-Rockville staff.
- Review with the facility and IHS staffs the Out-of-Template pieces identified in the POR, appropriate functional groupings, adjacencies, sizes, proportions, and access points.
- Perform Site Analysis as is typical.
- Perform preliminary building system analysis as is typical.

C. Schematic Design: Following a thorough Predesign phase, schematic design will be fairly rapid. The majority of room-by-room relationships are established by nature of the Template departments. The greatest emphasis during schematic development will include:

- Next level building systems and site development.
- Room-by-room layouts for Out-of-Template areas and their connection to Templates.
- Refinement of the overall project circulation and organizational systems.
- Review and edit of Template plans to reflect code updates, user interface (quantity to be determined by contracting officer) and IHS lessons Learned.
- Review, edit, and completion of the room-by-room equipment list of all Template and Out-of-Template rooms with the facility users and Rockville staff.

TOTAL SYSTEM APPLICATION (cont)

D. Design Development: Upon the completion of Schematic Design, Design Development efforts will be expedited by the equipment and furniture plans included with the Templates. While the equipment and furniture plans are not based on specific manufacturers (per governmental procurement strategy) they do provide appropriate relationships and area requirements to accommodate state-of-the-art pieces of equipment. While working closely with the facility user and II-IS-Rockville, completion of Design Development with respect to Template equipment/furniture, includes:

- Identifying the state-of-the-art equipment and providing cut sheets for all equipment that affects the contractor.
- Developing the equipment budgets for the building and the Owner.
- Editing the plans to reflect these pieces.
- Design efforts to make Control Charting Spaces, Receptions, and Waiting Areas within the Templates compatible with the developing building aesthetics.

Beyond these defined Template modifications, the remainder of Design Development proceeds (as is typical) to complete similar levels of detail for all Out-of-Template areas in addition to continued building/engineered system development

ELECTRONIC MEDIA GUIDELINES

A. Drawings

1. Each Template is a separate electronically produced CADD drawing created in AutoCADD release 12.

The information within each drawing (graphic and written) is organized by layer to facilitate efficient management of that information.

2. A block library for each unique item of furniture and equipment is included with the Templates.
 - a. Each block consists of a drawing of the furniture or equipment item and an attached attribute tag that identifies the item by JSN.
 - b. All equipment and furniture blocks and their attributes have been created on layer 0 to provide complete flexibility in subsequent assignment of layer for each unique item given the requirements of a specific Template project. A LISP routine (.lsp file) is provided that when run will place each item on its assigned layer and its attribute on a corresponding text layer. Layering assignments are managed via text file generated by the furniture and equipment specification database. As the procurement category, mounting requirements, utility requirements, or any other criteria change for a given furniture or equipment item, the assigned layer for that item can be easily changed by updating the data base text file and rerunning the LISP routine. LAYER within the electronic Template drawing file controls layer color and line type.

The matrix below suggests a layering strategy that can be employed to manage the furniture and equipment blocks. Once blocks are assigned to specific layers, those layers can be frozen, colors changed, line type changed, and backgrounds created to be referenced into other drawings. For example, all ceiling mounted, Contractor furnished equipment can be isolated and provided as background for a reflected ceiling plan; or all systems furniture that will be Owner furnished and vendor installed can be screened and provided as a background for an architectural plan to indicate to the Contractor where structural backing will be required. By changing layer color and line type, the same systems furniture information may be isolated and used to create furniture drawings.

ELECTRONIC MEDIA GUIDELINES

| SAMPLE MATRIX | | | | | | | | | | | | | | | |
|---------------|--------|-------|-----------|-----------|-----------|-----------|-----------|-----------|---------------|---------|-------|-----------|----------|-------|-------|
| JSN | Equip. | Furn. | Log Cat | | | | | | Mounting Req. | | | Utilities | | | Layer |
| | | | Log Cat A | Log Cat B | Log Cat C | Log Cat D | Log Cat E | Log Cat F | Wall | Ceiling | Floor | Elec. | Plumbing | Mech. | |
| E5501 | | X | | | | | | X | X | | | X | | | F-FWE |
| F0205 | | X | | | X | | | | | | | | | | F-C |
| A1030 | X | | X | | | | | | X | | | | | | Q-AW |
| A5180 | X | | X | | | | | | | X | | | | | Q-AC |

3. Storage and access methodology.

DEVIATIONS

Deviations - The guidelines and template planning solutions in this manual are approved by the Indian Health Service. Some project-specific deviation from the guidelines and template planning solutions may be permitted in response to unique conditions; however, these should be made only when the effects are fully understood. Deviations due to code developments should be addressed to the Contracting Officer. Operational deviations from the guidelines and template planning solutions should be approved via the project design team prior to the implementation of the changes.

It should be noted that the time required to obtain approval for deviations might impact the project schedule.

It remains the Architect/Engineer responsibility to meet the contracted design criteria.

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APPENDIX "F"
Submission Checklist

Certification - Pre-design Activities

| Completed | Activity |
|--------------------------|---|
| <input type="checkbox"/> | 1. Provide Program Verification Summary |
| <input type="checkbox"/> | 2. Provide Site Analysis |
| <input type="checkbox"/> | 3. Investigate and Document Existing Conditions |
| <input type="checkbox"/> | 4. Provide Pre-Design Report in required format |

I certify that the above indicated actions are completed as required.

(Signature)

(Date)

APPENDIX "F"
Submission Checklist

Certification - Concepts Activities

| Completed | Activity |
|-----------|---|
| [] | 1. Conduct work session with IHS and Client staff |
| [] | 2. Develop three schemes including existing utilities, connections etc. |
| [] | 3. Conceptual design activities incorporated with the site plan. |
| [] | 4. Develop Building organization and Massing Concepts (One for each Site-Layout): |
| [] | a. Interdepartmental Proximity Diagrams |
| [] | b. Existing Functional Diagrams |
| [] | c. Locations and Types of Building Access |
| [] | d. Other Drawings as directed |
| [] | 5. Present general plan alternative concepts. |
| [] | 6. Provide Space Comparison Report |
| [] | 7. Provide Cost Estimate |
| [] | 8. Provide a written analysis and summary of all planning and systems concepts |
| [] | 9. Submit final Concepts and site Drawings |

I certify that the above indicated actions are completed as required.

(Signature)

(Date)

APPENDIX "F"
Submission Checklist

Certification - Schematic Design Activities

| Completed | Activity |
|-----------|---|
| [] | 1. Conduct Work Session with IHS and Client Staff |
| [] | 2. Establish Preferred Building Scheme |
| [] | 3. Verify the Capacity of Scheme to Accommodate All Supporting Systems and Equipment. |
| [] | 4. Provide Narrative of the Design Thought Process. |
| [] | 5. Provide Outline Technical Specification |
| [] | 6. Provide Updated Space Comparison Report. |
| [] | 7. Provide Refined Cost Estimate. |
| [] | 8. Provide Drawings and other information to Include: |
| [] | A. Site Plan, Roof Plans, Elevations. |
| [] | B. Provide Floor Plan Showing : |
| [] | 1). All Required Smoke and Fire Partitions on the Floor Plan |
| [] | 2). Name, Function, Space Identification Number and the Net Area in Each Room or Space. |
| [] | 3). Entrances, Circulation Space, Stair, Elevators, Mechanical Equipment Space, Electrical Equipment, Toilet Rooms, and Wire Rooms. |
| [] | 4). Designated First Floor, Basements, Etc. by Number. |
| [] | C. Plan, Elevation, and Building Section Drawings Indicating Planned or Possible Future Expansions in Dotted Lines. |
| [] | D. Sections Through the Building in Both Longitudinal and Transverse Section. |
| [] | E. Typical Window Arrangements and Exterior Materials |
| [] | F. Mechanical Schematic. |
| [] | G. Space Allotments for Electrical Equipment. |
| [] | 9. Provide Economic Analysis of at Least Three Mechanical Systems Usable in the Building. |
| [] | 10. Provide Analysis showing comparative cost and recommendations on fuel for heating. |
| [] | 11. Verify That Each Space Allowed in the POR Are Shown on the Drawings. |
| [] | 12. Verify That Each Space Provided on the Drawing Is Allowed in the POR. |

I certify that the above indicated actions are completed as required.

(Signature)

(Date)

APPENDIX "F"
Submission Checklist

Certification - Design Development Activities

| Completed | Activity |
|-----------|--|
| [] | 1. Integrate All Preceding Design Effort and Studies |
| [] | 2. Refine Approved Schematic Design Documents |
| [] | 3. Provide General and Detailed Floor Plans, Elevation and Building Sections |
| [] | 4. Conduct Work Sessions with ES and Client Agency Staff |
| [] | 5. Provide Design for Specialty Services: Radiation Shielding, Incineration, Medical Gas Storage and Dispensing Etc. |
| [] | 6. Provide Fire Protection Plans Showing Required Features of NFPA 101, "Life Safety Code |
| [] | 7. Provide Energy Consumption Calculations. |
| [] | 8. Identify Provisions for Handicap Access Compliance. |
| [] | 9. Provide Well Articulated Site Plan. |
| [] | 10. Provide Updated Space Comparison Report. |
| [] | 11. Provide Project Outline Specifications in Developmental Draft Form. |
| [] | 12. Provide Refined Cost Estimate. |
| [] | 13. Provide Drawings to Include: |
| [] | A. Site Plan Indicating Annotation of Topographic Survey Date. |
| [] | B. Floor Plans |
| [] | 1) The Date of the POR. |
| [] | 2) Wall Thickness, Door Swing and Size. |
| [] | 3) Room Name and Number. |
| [] | 4) Section Lines and Views of Longitudinal and Transverse Sections. |
| [] | 5) Licitation of all Vertical Structural Members and Rough Size Horizontal Members |
| [] | C. Elevations with Materials Noted |
| [] | D. Wall Sections Through Window and Wall Proper. |
| [] | E. Preliminary Sketches showing Special Areas Including: Kitchens, Laboratories, Lobbies, Etc. |
| [] | F. Possible Future Expansion Identified with Dotted Lines |
| [] | G. Prospective Sketch and Render Perspective as Required in Contract. |
| [] | H. Accepted Value Engineering Items Coordinated. |
| [] | 14. Provide Plumbing Drawings and Other Information Including: |
| [] | A. Location of Existing Utilities and Service Connections. |
| [] | B. Arrangement of Major Equipment. |
| [] | C. Preliminary Calculations for Size Equipment Etc. |
| [] | D. Layout of Typical Toilet Room. |
| [] | E. Schematic Drawings of Plumbing System. |

APPENDIX "F"
Submission Checklist

Certification - Design Development Activities (conld)

- 15. Provide Heating Drawings and Other Information Including:
 - [] A. Preliminary Layout of Outside Distribution System.
 - [] B. Location and Arrangement of Major Heating Equipment.
 - [] C. Block Load Heating Calculations.
 - [] D. Single Line Piping Diagrams.
 - [] E. Complete Sequence of Operation and Schematic Control Diagrams.
 - [] F. Economic Analysis.
 - [] G. Complete Equipment and Piping Diagrams.
- 16. Provide Air Conditioning Drawings and Other Information Including:
 - [] A. Location and Arrangement of All Major Equipment.
 - [] B. Block Load Air Conditioning Calculations.
 - [] C. Economic Analysis.
 - [] D. Economic Justification If High-velocity Duct Is Proposed.
 - [] E. Single Line Layout for Ventilation and AC System.
 - [] F. Psychrometric Chart Study.
 - [] G. Complete Sequence of Operation and Schematic Control System.
 - [] H. Schematic Flow Diagram.
 - [] I. Air Outlet Locations for Typical Areas.
 - [] J. Cooling Tower and Screening Method.
 - [] K. Orientation Arrow and Room Numbers on Drawings.
- 17. Provide Electrical Drawings and Other Information Including:
 - [] A. Location of Services and Major Equipment.
 - [] B. Lighting Layouts and Calculations.
 - [] C. Fire Detection and Alarm System Devices.
 - [] D. One Line Diagram of Power Distribution Scheme.
 - [] E. Outline Specifications.
 - [] F. Orientation Arrow, Room Numbers and Names on All Drawings.
 - [] G. Cut Sheets for Proposed Fixture, Receptacle, Systems, Etc.

I certify that the above indicated actions are completed as required.

(Signature)

(Date)

APPENDIX "F"
Submission Checklist

65%, 100%, and Final Construction Document Submission Checklist are in Development.

APPENDIX “G”

Various Excerpts from
TECHNICAL HANDBOOK FOR ENVIRONMENTAL HEALTH AND ENGINEERING
VOLUME III - HEALTH CARE FACILITIES DESIGN AND CONSTRUCTION
PART 21 - DESIGN CRITERIA AND STANDARDS
September 30, 1996 TN - 3 (21-2) 1

CHAPTER 21-2 GENERAL/ARCHITECTURAL GUIDELINES

[Excerpt Paragraph D. from 21-2.2 Architectural]

D. Guidelines

(1) Appropriate IHS Health Care Facilities Architecture for facilities owned and used by IHS should result from the successful blending of:

- a. Tribal culture,
- b. function,
- c. environment,
- d. economy,
- e. durability,
- f. operation and maintenance, and
- g. location.

(2) Architecture for IHS facilities should place proper weight and emphasis on each element, and should not let one of these elements dominate at the expense of the others.

(3) Architecture for IHS facilities should reflect and support the characteristics and function of a health care facility with the exterior of the facility not disguising the function of the facility.

(4) Architecture for IHS facilities must avoid transient architectural styles that are short-lived and become obsolete and outdated quickly. Care should be taken to avoid the use of multiple materials and forms for purely decorative reasons.

(5) Architecture for IHS facilities should be an integral part of and compliment the community.

(6) Architecture for IHS facilities should be straight-forward, resulting in a high quality, cost-effective facility.

(7) Architecture for IHS facilities should be respectful of and relate to the building location and surroundings through the use of appropriate color, materials, and detailing. Overall architecture should enhance the facility by honoring and preserving significant architectural, historical, cultural, and community themes which bring consistency to the facility.

In summary, acceptable architecture for IHS facilities, and those used by IHS, should reflect the function of the facility, the environment and culture of the people being served, respect and enhance its immediate environment, and achieve its mission in a quality and cost-effective manner.

[Excerpt Paragraph C. & D. from 21-2.3 Dental Shielding]

C. Guidelines

While conventional building materials in partitions, floors, and ceilings may provide sufficient radiation shielding, each dental clinic design must be evaluated using standards of the NCRP. Factors that determine the need for additional shielding include workload, use factors, occupancy, maximum permissible dose equivalent, etc. New construction or major renovation of existing facilities should include funding for design review by a board certified medical physicist. Existing facilities will generally be evaluated by IHS, Division of Environmental Health (DEH) field staff. The Area Institutional Environmental Health (IEH) Officer (for those Areas with such position) may assist in determining if the design is correct. A formal barrier survey may be conducted by the IHS Area IEH Officer after construction if there are concerns about the design or quality of the construction.

D. Reference Standards

The NCRP Report No. 35, Dental X-Ray Protection dated 1970, and NCRP Report No. 49, Structural Shielding Design and Evaluation for Medical Use of X-Rays and Gamma Rays of energies up to 10 MeV dated 1976, will apply to all IHS dental clinics. The design application based on the two reports will be done on a case by case basis, each dental clinic design involving new construction or major renovation must be evaluated using these standards.

21-2.4 RADON CONTROL AND MITIGATION (Added 5/12/03)

A. Purpose

The design and construction of all new buildings, including quarters, will take into consideration the control and potential mitigation of radon, regardless of the risk zone.

B. Background

Radon gas is present in all soils to varying degrees; amounts cannot accurately be predicted from site to site. Radon is carcinogenic in higher concentrations. The Environmental Protection Agency (EPA) "action level" is 4 pCi/L. Since it is easier and cheaper to build in protection during construction than to correct after a building is completed, criteria for incorporating mitigation actions in initial construction should be defined.

C. Guidelines

1) All buildings which accessible crawl space and all buildings which will never be regularly occupied (e.g. storage) require no special initial construction techniques unless

significant radon emissions are expected or found. If significant radon emissions are expected or found in buildings with crawl spaces, procedures detailed below shall be followed, unless the building is permanently unskirted and there is free flow of outside air.

2) For buildings with lowest occupiable level on or below grade:

a) An impermeable barrier shall be installed on the crawlspace floor, under the slab on grade, or under the occupiable floor. Sufficient overlapping and sealing shall be provided to prevent leakage through joints and at edges. The impermeable barrier shall be adequately protected to prevent future punctures. Where it is undesirable for concrete curing purposes to place a concrete slab directly on an impermeable barrier, a layer of granular fill may be installed over the impermeable barrier under the floor slab as recommended by the American Concrete Institute (ACI).

b) All penetrations through on or below grade slabs or through foundation walls below grade will be sealed.

CHAPTER 21-3 CIVIL GUIDELINES

[No Excerpt]

CHAPTER 21-4 MECHANICAL GUIDELINES

[Excerpt Paragraph C. from 21-4.2 Nitrous Oxide Guidelines]

C. Guidelines

(1) At health care facilities where **low pressure** nitrous oxide is in **three or more** locations, nitrous oxide should be supplied in a piped medical gas system with a multiple cylinder, auto switching manifold and appropriate alarm systems.

(2) In areas where nitrous oxide is being used to operate cryosurgical units, locations must be monitored to determine the adequacy of environmental controls. The following guidelines must be applied in these locations:

- a. Annual monitoring of exposed workers using both short term personal samples and eight hours time-weighted- average (TWA) samples;
- b. Annual preventive maintenance surveys of the cryosurgical units to check for leaks;
- c. In existing facilities, where no medical vacuum is available, the cryosurgery procedure should be conducted in a room with an outside wall to allow gravity venting of the device through an open window; and
- d. In major renovations or new construction, rooms used for cryosurgery should contain a medical vacuum outlet equipped with a regulator to allow the mechanical venting of the unit.

(3) Before design that includes installation or modification of nitrous oxide, the designer should review the current Indian Health Service Dental Program Operational Manual, Section N20 - 02 Analgesia, pages VII-3 through VII-12.

[Excerpt Paragraph B. from 21-4.3 COLOR CODE, SIGNAGE, AND IDENTIFICATION OF BUILDING UTILITY PIPING SYSTEMS]

B. Reference Standards

The following standards are to be applied during planning, design, and construction, including renovation, improvement, and/or expansion, of all IHS and tribal health care facilities:

- (1) Piping - American National Standards Institute latest edition, A13.1, Scheme for Identification of Piping Systems;
- (2) Medical Gases Signage - National Fire Protection Association 99 latest edition, Standard for Health Care Facilities, Gas Systems Information and Warning Signs;
- (3) Gas Cylinder - Compressed Gas Association Pamphlet latest edition, C-9, Standard Color-Marking of Compressed Gas Cylinders Intended for Medical Use; and
- (4) Physical Hazards - Occupational Safety and Health Act, 29 CFR 1910.144, Safety Color Code for Marking Physical Hazards.

[Excerpt Paragraph D. from 21-4.4 SMOKE DAMPER USE (TOXIC VAPOR CASES)]

D. Design Criteria

For IHS health care facilities, smoke dampers shall be used in duct penetrations of all smoke barriers.

[Excerpt Paragraph B. from 21-4.5 VENTILATION DESIGN FOR THE INSTALLATION OF TUBERCULOSIS CONTROL BOOTH]

B. Design Criteria

The procedures such as the administration of aerosolized pentamidine and sputum induction should be performed in a self-contained booth equipped with a minimum of 10 air changes per hour (ACH) and high efficiency particulate air (HEPA) filters, with a time interval of 45 minutes between patients treatments. The number of units in a facility will be determined by the hospital infection control committee based on facility needs, and it should be located in the treatment room.

[Excerpt Paragraph B. from 21-4.6 VENTILATING DESIGN FOR ISOLATION ROOMS]

B. Design Criteria

In addition to existing guidelines on design and construction of isolation rooms, the following criteria will be applied:

- (1) Doors shall be provided between corridors and anteroom, and between the anteroom and patient room;
- (2) Air mixing devices in the patient room shall be designed to allow air to move from the supply air outlet located at or near the ceiling level, across the occupied space, and then to the exhaust grille located 150 millimeters above the finished floor;
- (3) Germicidal ultraviolet lamps shall not be used as a supplemental method of reducing the concentration of infectious droplet nuclei. The effectiveness of such lamps has not been adequately evaluated to permit their being substituted for other engineering controls; and
- (4) Acquired Immune-Deficiency Syndrome (AIDS) patients shall not be placed in positively pressurized protective isolation rooms.

[Excerpt Paragraph B. from 21-4.7 FIRE SPRINKLERS VERSUS ALTERNATE PROVISIONS (QUARTERS)]

B. Design Criteria

In addition to existing guidelines on design and construction of IHS quarters or residential units, the following criteria will be applied:

- (1) Multi-Family Units acquired after October 26, 1992. Provide a fully automatic sprinkler system (or equivalent) and hardwired smoke detection system for multi-family units of four or more stories above ground level. For all other multifamily units, provide a hard-wired smoke detection system.
- (2) All Other Housing - Provide hard-wired smoke detection system for all existing housing when vacated or not later than October 25, 1995.

[Excerpt from 21-4.8 DENTAL VENTILATION REQUIREMENTS]

Ventilation Requirements for Areas Affecting Patient Care in Dental Facilities ¹

| Area Designation | Air movement relationship to adjacent area ² | Minimum air changes of outdoor air per hour ³ | Minimum total air changes per hour ⁴ | All air exhausted directly to outdoors ⁵ | Relative humidity ⁶ | (%) Design temperature ⁷ (degrees F/C) |
|--|---|--|---|---|--------------------------------|---|
| Enclosed Dental Operatory (w/nitrous Oxide) ^{8,9} | In | 3 | 12 | Yes | 30-60 | 75 (24) |
| Open Dental Operatory (w/nitrous oxide) ¹⁰ | --- | --- | --- | --- | --- | --- |
| Open Dental Operatory (w/o nitrous oxide) | --- | 2 | 6 | --- | 30-60 | 75 (24) |
| Cleanup/ Sterilization | In | 2 | 10 | Yes | --- | 75 (24) |
| Laboratory | In | 2 | 6 | Yes | --- | 75 (24) |
| Dark Room | In | 2 | 10 | Yes | --- | 75 (24) |

Notes

¹ The ventilation rates in this table cover ventilation for comfort, as well as for asepsis and odor control in areas of dental facilities that directly affect patient care and are determined based on health care facilities being predominantly ANo Smoking@ facilities. Areas where specific ventilation rates are not given in the table shall be ventilated in accordance with ASHRAE Standard 62-1989, *Ventilation for Acceptable Indoor Air Quality*, and ASHRAE *Handbook of Applications*. OSHA standards and/or NIOSH criteria require special ventilation requirements for employee health care facilities. Central systems shall be provided with 90% filters (ASHRAE dust spot efficiency).

² Design of the ventilation system shall provide air movement which is generally from clean to less clean areas except in the enclosed dental operatory where containment of nitrous oxide is desired. If any form of variable air volume or load shedding system is used for energy conservation, it must not compromise the corridor-to room pressure balancing relationships or the minimum air changes required by the table.

³ To satisfy exhaust needs, replacement air from the outside is necessary. The Table does not attempt to describe specific amounts of outside air to be supplied to individual spaces except for certain areas such as those listed. Distribution of the outside air, added to the system to balance required exhaust, shall be as required by good engineering practice. Minimum outside air quantities shall remain constant while the system is in operation.

⁴ Number of air changes may be reduced when the room is unoccupied if provisions are made to ensure that the number of air changes indicated is reestablished any time the space is being utilized. Adjustments shall include provisions so that the direction of air movement shall remain the same when the number of air changes is reduced. Areas not indicated as having continuous directional control may have ventilation systems shut down when space is unoccupied and ventilation is not otherwise needed, if adjacent pressure balancing relationships are not compromised.

⁵ Air from areas with contamination (i.e. bioaerosols, respirable particulates, nitrous oxide, and/or odor problems) shall be exhausted to the outside and not recirculated to other areas.

⁶ The ranges listed are the minimum and maximum limits where control is specifically needed.

⁷ A single figure indicates a heating or cooling capacity of at least the indicated temperature. Nothing in these guidelines shall be construed as precluding the use of temperatures lower than those noted when the patients' comfort and medical conditions make lower temperatures desired.

⁸ National Institute for Occupational Safety and Health (NIOSH) "Technical Report: Control of Nitrous Oxide in Dental Operatories" indicates a need for both local exhaust (scavenging) systems and general ventilation of the areas in which the respective gases are utilized.

⁹ Airflow patterns shall be controlled to reduce nitrous oxide exposure to the staff.

¹⁰ Nitrous oxide administration in an open dental operatory is not allowed. Nitrous oxide exposure to staff cannot be effectively controlled in this setting.

CHAPTER 21-5 ELECTRICAL GUIDELINES

[Excerpt Paragraph .2 from 21-5.2 ALTERNATE POWER FOR HEALTH CARE FACILITIES

21-5.2.2 FACILITY ALTERNATE POWER REQUIREMENTS

The listed AP requirements are only intended to meet the previously listed reference codes and standards as they relate to the operation of IHS facilities. AP equipment and distribution should be limited to only essential loads so as to improve reliability, and reduce system operation and maintenance costs. The essential AP equipment is not intended to ensure full function of a facility during a power outage, but is intended to meet certain present emergency codes and standards.

Minimum AP distribution requirements defined in listed references are listed below as "Basic". Other AP distributions permitted, but not required, are listed below as "Additional". On a case by case basis, as justified due to proven history of unreliable utility power, standby power may be authorized in the Program of Requirements (POR) to allow the facility to function or near fully function during extended power outages, if critical care areas are present in a facility.

A. HOSPITAL

NFPA 99/101 Listing - Hospital

(1) Basic: Hospital must have AP providing Type I Essential Electrical System service to functions requiring AP per NFPA 99. In addition, the AIA Guidelines for Construction and Equipment of Hospital and Medical Facilities requires the following:

- (a) Where stored fuel is required for emergency electrical source, storage capacity shall permit continuous operation for at least 24 hours; and
- (b) As a minimum, each patient bed and treatment space shall have access to a receptacle on the critical branch of the emergency power system.

(2) Additional: AP consideration may be provided for the following:

- (a) automatic lab bio-analyzers,
- (b) data processing equipment rooms which are designed to meet NEC Art. 645, and
- (c) selected oral surgery operatory lights, receptacles, and equipment.

NOTE: Dental Scavenger Gas Exhaust will not be on AP. The presence or absence of AP shall not effect the decision to use nitrous oxide for dental analgesia.

B. AMBULATORY HEALTH CARE CENTER

NFPA 99/101 Listing - Ambulatory Health Care Center

(1) Basic: Ambulatory Health Care Center must have AP providing Type III Essential Electrical System service to functions that requires AP per NFPA 99 (battery powered). Type I Essential Electrical System service may be required if critical care areas are present in this facility.

(2) Additional: When Type I Essential Electrical System is required AP may be considered to support the following:

(a) automatic lab bio-analyzers;

(b) data processing equipment rooms which are designed to meet NEC Article 645; and

(c) selected oral surgery operatory lights, receptacles, and equipment.

NOTE: Dental Scavenger Gas Exhaust will not be on AP.

C. HEALTH STATION

NFPA 99 Listing - Clinic

(1) Basic: Health Clinics will be equipped with AP providing Type III Essential Electrical System service to functions that require AP, per NFPA 99 (battery powered)

(2) Additional: None

D. INTERMEDIATE/SKILLED NURSING FACILITY

NFPA 99 Listing - Nursing Home

(1) Basic: Nursing Homes will be equipped with AP providing Type II Essential Electrical System service to functions that require AP, per NFPA 99.

(2) Additional: None

E. SUPPORT FACILITY

NFPA 101 Listing - Business Occupancy

(1) Basic: No AP is required to Support Facilities.

(2) Additional: None

F. STAFF RESIDENTIAL BUILDING

NFPA 101 Listing - Multi-family/Single-family Residence

(1) Basic: No AP is required for Staff Residential Buildings.

(2) Additional: None

G. YOUTH TREATMENT CENTER

NFPA 101 Listing - Residential Board and Care Occupancy

(1) Basic: Youth Treatment Center will be equipped with AP (battery powered) emergency service, per NFPA 101-22.

(2) Additional: None

[Excerpt from 21-5.3 STANDBY POWER SYSTEM GENERATOR SELECTION CRITERIA

21-5.3.1 PURPOSE

This chapter provides guidelines for determining when optional, non-code mandated standby power system generators are recommended for Indian Health Service (IHS) and tribal facilities. The emergency generators required for health facilities by the National Fire Protection Association (NFPA), American Institute of Architects (AIA), and IHS are discussed in the Technical Handbook for Environmental Health and Engineering, Volume III, Part 21, Chapter 21-5 "Electrical Guidelines."

21-5.3.2 SCOPE

IHS and tribal facilities that do not have a demonstrated need for alternate power (emergency generators) per NFPA, IHS, and AIA guidelines as noted above, may still be considered for a standby power system generator(s). Evaluation criteria in this chapter may be used to determine whether standby power is required, and if so, whether it should consist of an installed generator, or only wiring and connections for placing and using a portable generator. The selection form included with this chapter provides a Standby System Risk Calculation (SSRC), which considers facility "risk" and provides a standby system recommendation. The SSRC satisfies the economic and human safety justification requirements for standby power system generators at HIS facilities.

21-5.3.3 REFERENCE STANDARDS

Latest edition of the AIA Guidelines for Construction and Equipment of Hospital and Medical Facilities.

Note: The American National Standard Institute (ANSI) and the National Fire Protection Association (NFPA) requirements referenced in the AIA standard are listed below:

ANSI/NFPA 70 National Electrical Code
ANSI/NFPA 99 Standard for Health Care Facilities
NFPA 101 Life Safety Code
NFPA 110 Standard for Emergency and Standby Power
Systems
ANSI/IEEE Standard 446 - IEEE Recommended Practice for
Emergency and Standby Power for Industrial and
Commercial Applications.

21-5.3.4 DEFINITIONS

A. ALTERNATE POWER SOURCE - An alternate power source is, one or more generator sets or battery systems, where permitted, intended to provide power during the interruption of normal electrical service or the public utility electrical service intended to provide power during interruption of service normally provided by generating facilities on the premises.

B. EMERGENCY POWER SYSTEM - An independent reserve source of electric energy that, upon failure or outage of the normal source, automatically provides reliable electric power within a specified time to critical devices and equipment whose failures to operate satisfactorily would jeopardize the health and safety of personnel, or result in damage to property.

C. STANDBY POWER SYSTEM - An independent reserve source of electric energy that, upon failure or outage of the normal source, provides electrical power of acceptable quality so that the user's facilities may continue in satisfactory operation.

21-5.3.5 PROGRAM OF REQUIREMENTS

A facility's Program of Requirements will state whether standby generators are needed. The Area Facility Engineer will determine the need for standby system generator(s).

21-5.3.6 RISK CALCULATION FACTORS/SELECTION CRITERIA (Rev. 5/12/03)

A. Risk Calculation Factors: A common criteria used to determine the need for specific facility equipment or systems is the risk factor evaluation. Such evaluations provide specific recommendations for such equipment as facility seismic and lightning arrester systems.

The selection criteria discussed below is the Standby System Risk Calculation. This calculation will help determine whether:

- (1) to provide facility standby generator(s),
- (2) to provide portable generator connections only, or
- (3) that standby power is not justified.

A "risk value" calculation greater than eight will demonstrate the need for an on-site standby system generator for facilities where there is no strict code requirement for Alternate Power (AP) using generator(s).

STANDBY SYSTEM RISK CALCULATION FACTORS (Rev. 5/12/03:

| | |
|---|---------------------|
| A = TYPE OF OCCUPANCY | <u>INDEX</u> |
| 1 – Hospital | 10 |
| 2 – Ambulatory Health Center | 8 |
| 3 – Large Health Center greater than 920 GSM | 8 |
| 4 – Alcohol/Substance Abuse Program Facility (ASAP) | 5 |
| 5 – Health Clinic or Station 920 GSM or under | 4 |
| 6 – Staff Residential Building | 2 |
| 7 – Support or Other Facility | 1 |
| B = UTILITY VARIANCE HISTORY | |
| (Variation at utility service transformer, typically 600 volt or less system) | |
| 1 - Greater than 10% voltage variation..... | 10 |
| 2 – Between 6% to 9% voltage variation..... | 6 |
| 3 – 0-5% voltage variation..... | 0 |
| C = PERSONS RESIDENT (OVERNIGHT) IN FACILITY | |
| 16 or greater..... | 10 |
| 10 to 15 | 7 |
| 1 to 9 | 5 |
| D = FULL TIME ON-SITE MAINTENANCE STAFF – (trained to maintain/ operate a generator) | |
| Yes | 5 |
| No..... | 0 |
| E = UTILITY FEEDER TYPE | |
| Single Radial Line Feed | 10 |
| Dual Line Feed | 5 |
| Grid Line Feed..... | 1 |
| F = DESIGNATED BY EMERGENCY MANAGEMENT PLAN FOR CONTINUOUS SERVICE (see NFPA 99, CHAPTER 12) | |
| Yes | 10 |
| No | 0 |
| G = UTILITY POWER OUTAGE | |
| (15-MINUTE OUTAGES PER YEAR – record of last 3-years from the Local Utility Co.) | |
| None or 1..... | 5 |
| 2 to 3 | 4 |
| 4 to 5 | 3 |
| 6 to 12 | 2 |
| 13 or Greater | 1 |

Standby System Risk Calculation (SSRC)

SSRC Value = Risk Factors (A+B+C+D+E+F) / Risk Factor (G)

If the SSRC Value

On-Site Generator

Greater than 8

Standby Generators Justified

Between 5 to 8

Connection for Portable Generator Only

Less than 5

Generator NOT Justified

The SSRC value is only for a Standby Generator and not for an Emergency Generator selection. Note that criteria does not preclude a generator for peak shaving and other energy conservation reasons where the generator meets life cycle costing payback analysis of the federal energy policies using the NIST BLCC 5 calculation or latest edition thereof.

21-5.3.7 (Added 5/12/03)

Proposed health care facilities not meeting the Section 21-5.3.6 criteria for standby generator based on risk calculation may be authorized to include a standby generator in the facility Program of Requirements if supported by specific and compelling medical needs. In such cases, these needs shall be documented in a detailed narrative report describing the medical issue(s) and the need for a standby generator. This report shall be endorsed by the Area Chief Medical Officer and submitted to the Office of Public Health, HQE, for review. Final decision shall be made by the Director, OEHE, HQE.

21.5.3.8 (Added 5/12/03)

It is recognized that the business operating plans at existing IHS health care facilities may effectively require continuous electrical power. To address this need, standby generators may be permanently installed at these locations, subject to review and approval of the respective Area Facility Engineer. The Section 21-5.3.6 risk calculation/selection criteria are not applicable to generators installed at existing facilities to meet the requirements of the operating entity's business plan.

The generator and related equipment shall be sized, designed, and installed in accordance with the applicable Codes and Standards referenced in Section 21-5.1. The operating entity shall operate and maintain the generator in accordance with NFPA 110. In no case shall New Construction, Maintenance & Improvement, or Facility Support funding be used for the purchase, replacement, or installation of the generator and related appurtenances approved under this Guideline sub-section.

21.5.3.9 (Added 5/12/03)

It shall be the policy of the Indian Health Service that the designer, in consultation with the Area Facility Engineer, shall determine the appropriate electrical loads, generator configuration and load growth for the standby power circuit. The entire building load may be used; however, not all building loads must necessarily be carried by the standby generator. Proper protection shall be provided by the use of transfer switches to insure the selected standby load matches the chosen generator. Examples of loads that could potentially be excluded include building chiller equipment (depending on climatic zone),

elevators and parking lot lights. In all cases, the basis for the standby generator design shall be documented in the Operation and Maintenance Manuals for the facility.

[Excerpt Paragraph .5 from 21-5.4 ELECTRICAL POWER QUALITY]

21-5.4.5 FACILITY ELECTRICAL POWER QUALITY REQUIREMENTS

A. Introduction –

Successful practices, which will assure reliable facility electrical power quality, are a joint effort of the local power company and the facility designers. The power company normally provide service that will minimize waveform distortion and outages as a result of lightning, heavy rains, strong winds, ice build-up, heavy snow, and system load. The designer must verify existing service power quality and site facility conditions and practices in addition to the new project requirements that will allow for acceptable power quality. Example design considerations are site grounding, harmonic currents generated by adjustable speed drives/electronic ballasts and computers etc., distance from electrical panels to electronic loads, lightning activity, and alternate power supply switching transients (generator start-up) to mention a few concerns. An evaluation of utility service and facility power quality elements has resulted in the information detailed in the following paragraph for seven types of IHS/Tribal facilities.

B. Power Quality Requirements –

Basic requirements are mandatory minimums. Additional requirements shall apply as warranted for the installation as a result of the designer verification of existing service/site facility conditions and the review of new project requirements.

(1) HOSPITAL

NFPA 99/101 Listing - Hospital

a. Basic: Install Transient Voltage Surge Suppression at the main electrical service, telephone, data, cctv, and mctv service connection panels. Building service ground shall be 25 ohms or less as measured using the fall of potential method. Test results shall be posted adjacent to the main electrical service panel directory. Electronic equipment specifications shall include a selection factor of low Total Harmonic Distortion (THD). Example: electronic ballast for fluorescent light fixtures shall have less than 20% THD. AC Distribution Systems - Four hundred eighty volts system 3 phase is recommended when economically feasible as opposed to 208 volts 3 phase. Connect electronic loads near the source not at a downstream panel. Don't use 120 volts for the distribution voltage.

b. Additional: Transient voltage surge suppression shall additionally be provided at electrical subpanels and branch circuits when facility conditions indicate this need. Example potential application would provide surge protection on branch circuit with dedicated fluorescent lighting/electronic ballast load with localized surge activity. Isolation transforms with shielded windings for disturbances on

the power system conductors. Noise filters when low energy, high frequency noise on conductors. Harmonic filters to trap harmonic currents from being feed back to line. Standby power system (battery-inverter type) operating as a UPS will provide power when utility power fails.

(2) AMBULATORY HEALTH CARE CENTER

NFPA 99/101 Listing - Ambulatory Health Care Center

a. Basic: Install Transient Voltage Surge Suppression at the main electrical service, telephone, data, cctv, and mctv service connection panels. Building service ground shall be 25 ohms or less as measured using the fall of potential method. Test results shall be posted adjacent to the main electrical service panel directory. Electronic equipment specifications shall include a selection factor of low Total Harmonic Distortion (THD). Example: electronic ballast for fluorescent light fixtures shall have less than 20% THD.

b. Additional: Transient voltage surge suppression shall additionally be provided at electrical subpanels and branch circuits when facility conditions indicate this need. Example potential application would provide surge protection on branch circuit with dedicated fluorescent lighting/electronic ballast load with localized surge activity. Isolation transforms with shielded windings for disturbances on the power system conductors. Noise filters when low energy, high frequency noise on conductors. Harmonic filters to trap harmonic currents from being feed back to line. Standby power system (battery-inverter type) operating as a UPS will provide power when utility power fails.

(3) HEALTH STATION

NFPA 99 Listing - Clinic

a. Basic: Install Transient Voltage Surge Suppression at the main electrical service, telephone, data, cctv, and mctv service connection panels. Building service ground shall be 25 ohms or less as measured using the fall of potential method. Test results shall be posted adjacent to the main electrical service panel directory. Electronic equipment specifications shall include a selection factor of low Total Harmonic Distortion (THD). Example: electronic ballast for fluorescent light fixtures shall have less than 20% THD.

b. Additional: Transient voltage surge suppression shall additionally be provided at branch circuits when facility conditions indicate this need. Example potential application would provide surge protection on branch circuit with dedicated fluorescent lighting/electronic ballast load with localized surge activity.

(4) SUPPORT FACILITY

NFPA 101 Listing - Business Occupancy

a. Basic: Install Transient Voltage Surge Suppression at main service entrance panel. Electronic equipment specifications shall include a selection factor of low Total Harmonic Distortion (THD). Example: electronic ballast for fluorescent light fixtures shall have less than 20% THD.

b. Additional: Transient voltage surge suppression shall additionally be provided at branch circuits when facility conditions indicate this need. Example potential application would provide surge protection on branch circuit with dedicated fluorescent lighting/electronic ballast load with localized surge activity.

(5) STAFF RESIDENTIAL BUILDING

NFPA 101 Listing - Multi-family Residence

a. Basic: Install Transient Voltage Surge Suppression at main service entrance panel. Electronic equipment specifications shall include a selection factor of low Total Harmonic Distortion (THD). Example: electronic ballast for fluorescent light fixtures shall have less than 20% THD.

b. Additional: Transient voltage surge suppression shall additionally be provided at branch circuits when facility conditions indicate this need. Example potential application would provide surge protection on branch circuit with dedicated fluorescent lighting/electronic ballast load with localized surge activity.

(6) YOUTH TREATMENT CENTER

NFPA 101 Listing - Residential Board and Care Occupancy

a. Basic: Install Transient Voltage Surge Suppression at main service entrance panel. Electronic equipment specifications shall include a selection factor of low Total Harmonic Distortion (THD). Example: electronic ballast for fluorescent light fixtures shall have less than 20% THD.

b. Additional: Transient voltage surge suppression shall additionally be provided at branch circuits when facility conditions indicate this need. Example potential application would provide surge protection on branch circuit with dedicated fluorescent lighting/electronic ballast load with localized surge activity.

CHAPTER 21-5.5 BUILDING AUTOMATION SYSTEMS

[Excerpt Paragraph .2 from 21-5.5 BUILDING AUTOMATION SYSTEMS]

21-5.5.2 POLICY

A. GENERAL - There is considerable diversity in IHS facility types and locations. This, coupled with the large number of acceptable operational strategies, makes it impossible to absolutely define building automation system architecture or its implementation for each occupancy or building type. A more flexible and reasonable method is to consider

general requirements that have led to successful installations. The following information is intended to assist Area Office Project Managers, Engineering Services (ES) Project Managers, and Service Unit representatives to understand and consider an appropriate building automation system for inclusion in project design.

B. BACKGROUND - The technological revolution in the computer field has directly affected building automation systems. The technology now allows for dependable direct digital control of a wide variety of equipment that has traditionally been controlled by pneumatic systems. This new technology comes at a time when buildings need to become more efficiently operated and dependable. The appropriate use of building automation systems permits increased monitoring and control of specified environmental conditions, energy consumption, and equipment status and performance within the facility. It encourages increased equipment efficiency and reliability through the use of dynamic feedback and data comparison, which can be used to detect trends and/or changes from the original or normal readings. This information can even be analyzed at locations that are remote from the facility itself. These capabilities allow building automation systems to also offer significant improvements to the risk management and quality assurance activities of health care facilities.

C. APPLICATIONS - The users and designers must determine, early in the planning and development phases of projects, the building systems or environments that will be controlled or monitored by the BAS. The Area, ES, and the Service Units will each have a role in determining the degree to which each building system will be controlled or monitored. The designers must consider, during the selection of the BAS, that it meets the following: ease of operation, ability to be upgraded/expanded, location and ability of available support service centers, reasonable cost, reliability, associated training requirements, the facility's long term needs, and an ability to interact with the various types of equipment or systems it controls or monitors. The design effort must ensure that the technical specifications clearly define the system's salient features. It should also be compatible with a facilities maintenance management program. The minimum requirements for installing a building automation system for a renovation or expansion project should match those mentioned above. In addition, the new system must be compatible with any existing control or monitoring system that is retained. The design and installation of a BAS on a renovation or expansion project in an existing facility is highly variable, and must be considered on a project specific basis. Items to be considered in the determination of the extent of the new system include the size of the project, the type and importance of the areas impacted by the project, the type and extent of any existing BAS, the availability of funds, the expertise of the staff maintaining the facility and the BAS, the past performance of the existing control system, and changing regulatory requirements. The installation of building automation systems in new construction is highly desirable. A more comprehensive building automation system may be possible for a new facility, compared to a renovation project on an existing facility. It should be noted that a building automation system installed in a completely new facility will dictate that the building will not be ready for occupancy until the BAS is operational and the system operators are satisfactorily trained.

D. PRIORITY OF APPLICATION OF BUILDING AUTOMATION SYSTEMS - The type, number, and importance of systems and equipment for inpatient health facilities is usually of a higher magnitude than those found at outpatient facilities. From a risk management perspective, the effective use of available resources is to provide building automation systems at inpatient health care facilities first before outpatient facilities.

Most Indian Health Service outpatient facilities are located at remote sites and are not usually occupied 24 hours per day. Therefore, the need to assess the status of plant equipment during occupied and unoccupied hours at these facilities will often be justified. The declining cost of building automation systems allows an appropriate level of control and monitoring for both inpatient and outpatient facilities.

E. SUGGESTED SYSTEMS & FORMATS - Most problems with the operation of building automation systems are not caused by failure of the system, but rather from the user not understanding the system well enough to make it work for the staff. It is expected that a complex building automation system will require considerable resources in staff time as well as operating funds for operator training and development. Adequate training must be included so that staff operating the BAS fully comprehends the theory of operation of the systems being controlled, as well as the operational theory of the BAS itself. From this perspective, it is important that the designer carefully consider the staff's ability to operate the selected building automation system. The designer should work with the staff responsible for maintaining the BAS to ensure that they understand the difference between the two main types of programming for building automation systems: line-by-line programming, or graphic interfacing. Designers of successful systems ensure that the owner has a vested interest in the type of system selected and its operation. The following systems and points should be considered for monitoring and controlling by the building automation system. The selected points should be controlled and monitored at a central location, as well as from remote workstations or computers.

Systems and Points to be included in the BAS

- (1) Air Handling Units
 - a. Damper and valve actuators - control and position
 - b. air and fluid temperatures
 - c. motor status
 - d. motor start-stop
 - e. filter pressure drops
 - f. humidifier control and humidistat alarm conditions relative to specific sequence of operation or application flow rate
 - g. static pressure status
 - h. flow rates

- (2) Terminal Equipment
 - a. space thermostats
 - b. reheat coil controls
 - c. duct coils
 - d. VAV boxes
 - e. alarm conditions relative to specific sequence of operation or application

- (3) Perimeter Baseboard Zones
 - a. valve control
 - b. pump start-stop
 - c. pump status
 - d. zone and fluid temperature sensors
 - e. alarm conditions relative to specific sequence of

(4) Fire Alarm and Fire Suppression (components addressable each with unique address)

- a. status of all central fire alarm panels
- b. water flow and pressure switches
- c. temperature sensors
- d. smoke detectors
- e. smoke and fire dampers
- f. pull stations
- g. horns
- h. lights
- i. valve supervisory switches
- j. magnetic door holder at fire and smoke doors
- k. alarm conditions relative to specific sequence of operation or application

(5) Security

- a. status of central panel
- b. status of each addressable security sensor or relay
- c. alarm conditions relative to specific sequence of operation or application

(6) Vertical Transport

- a. status of all elevator control panels
- b. status of all elevator pit sump pumps
- c. sump moisture detector
- d. alarm conditions relative to specific sequence of operation or application

(7) Medical Gases

- a. central oxygen manifold cylinder bank in use status (primary/reserve)
- b. central oxygen pressure
- c. central oxygen general unit alarm to annunciate any alarm monitored by local equipment panel
- d. central nitrous oxide manifold cylinder bank in use status (primary/reserve)
- e. central nitrous oxide pressure
- f. central nitrous oxide general alarm to annunciate any alarm monitored by local equipment panel
- g. for each medical gas zone panel;
oxygen pressure nitrous oxide pressure
medical air pressure medical vacuum pressure
dental air pressure general zone alarm to annunciate any alarm monitored by local equipment
general unit alarm to annunciate any alarm monitored by local equipment
- h. status of medical air compressor

- (8) Laboratory Flow Hoods
 - a. fan status
 - b. fan start/stop
 - c. air flow switch
 - d. air volume control based on sash opening height

- (9) General Exhaust Fans
 - a. fan status
 - b. fan start/stop
 - c. air flow

- (10) Boiler Plant Equipment (boiler typically controlled by boiler manufacturer provided packaged control system - BAS monitors only)
 - a. boiler status
 - b. boiler start/stop
 - c. boiler general alarm
 - d. supply header pressure or temperature
 - e. supply header set point
 - f. return header pressure or temperature
 - g. flowmeters for steam
 - h. glycol make-up pump status
 - i. hydronic circulating pump
 - status start-stop pump failure alarm
 - lead/lag control
 - j. alarm conditions relative to specific sequence of operation or application
 - k. stack temperature
 - l. fuel consumption

- (11) Chilled Water Pump
 - a. pump status
 - b. pump start/stop
 - c. flow rate

- (12) Domestic Water Hot Water Generators
 - a. circulating pumps
 - b. temperatures
 - c. flow rates

- (13) Water Softener
 - a. status
 - b. alarm conditions relative to specific sequence of operation or application

- (14) Incinerator
 - a. burner status
 - b. secondary combustion chamber temperature
 - c. alarm conditions relative to specific sequence of operation or application

- (15) Chillers (controlled by manufacturer's self contained, packaged control system, interlock unit control panels with BAS. Allow override of unit controls by BAS)
 - a. chiller status
 - b. chiller start/stop
 - c. lead/lag chiller selection
 - d. chilled water return temperature - each circuit
 - e. chilled water supply temperature - each circuit
 - f. master chilled water supply setpoint
 - g. general unit alarm to annunciate any alarm monitored by local unit controls
 - h. chilled water flow rate through chiller
 - i. evaporator refrigerant pressure and temperature
 - j. condenser refrigerant pressure and liquid temperature
 - k. compressor refrigerant discharge temperature
 - l. compressor refrigerant suction temperature

 - m. pressure at chilled water inlet and outlet
 - o. pressure of condenser water at inlet and outlet
 - p. alarm conditions relative to specific sequence of operation or application
 - q. condenser water flow rate

- (16) Dietary Walk-in Freezers
 - a. compressor status
 - b. freezer space temperature

- (17) Blood Banks
 - a. blood bank temperature

- (18) Fuel Supply Systems
 - a. storage tank fluid level
 - b. leak detectors
 - c. transfer pump status
 - d. general leak detection alarm panel

- (19) Essential Electrical Systems
 - a. generator status
 - b. generator oil pressure
 - c. generator cooling fluid temperature
 - d. transfer switch status
 - e. voltage for each phase
 - f. amperage for each phase
 - g. total run-time
 - h. general alarm from unit's control panel
 - i. frequency
 - j. total load (KW, KVA) at system bus

- (20) Electrical Service Metering
 - a. provide energy use (KW, KVA and power factor)

- (21) Natural or Liquefied Gas
 - a. provide energy usage

- (22) Nurse Call System
 - a. power status
 - b. trouble alarm

- (23) Lighting
 - a. general and/or specific areas

- (24) Specific Relative Pressure/Temperature Alarms
 - a. operating rooms
 - b. nursery
 - c. ICU
 - d. computer room
 - e. isolation rooms
 - f. laboratory

F. REFERENCE - Related information on building automation systems can be found in the latest edition of the American Institute of Architects Guidelines for Construction and Equipment of Hospital and Medical Facilities.

CHAPTER 21-7 ACCESSIBILITY STANDARDS

[Excerpt Paragraph A. from CHAPTER 21-7 ACCESSIBILITY STANDARDS]

A. INTRODUCTION

This chapter adopts Title III of the Americans with Disabilities Act (ADA), Public Law 101-336, as the accessibility standard for Indian Health Service (IHS) health care facilities and quarters. This law passed by Congress on January 26, 1992, prohibits discrimination on the basis of disability by private entities in places of public accommodation, and requires that all new places of public accommodation and commercial facilities be designed and constructed so as to be readily accessible to and usable by persons with disabilities. The ADA Title III will be the IHS standard for ensuring IHS health care facilities and quarters comply with the design criteria requirements for handicapped accessibility. Two slightly differing standards exist, the Uniform Federal Accessibility Standards (UFAS) and the Americans with Disabilities Act (ADA). The ADA is the more comprehensive of the two standards, and UFAS is being revised, to eventually conform to the ADA.

CHAPTER 21-8 METRICATION

[Excerpt Paragraph A. from CHAPTER 21-8.2 GUIDELINES]

A. IMPLEMENTATION –

Effective October 1, 1993, all IHS health care facilities planning, design, construction, and leasing activities shall be accomplished using metric system (SI), including all maintenance and improvement projects, all "federally-assisted" construction projects, and quarters projects. Metric measurements must be used exclusively; no dual measurements will be accepted. The basic modules will be standard, logical, rounded, and rational metric units. No mathematical conversions (soft metric) will be allowed. Where accepted metric modules are not available, professional judgment shall be exercised when converting and rounding from inch-pound units. Inch-pound units shall not appear in reports, drawings, specifications, or submissions of any documents. Metric guidelines used on IHS health care facilities projects shall conform to:

- (1) The U.S. General Services Administration (GSA), Metric Design Guide(M2), October 1993, and Metric Design Guide,(PBS-PQ260), May 1994;
- (2) The Construction Subcommittee of the Metrication Operating Committee, Interagency Council on Metric Policy, Metric Guide For Federal Construction, latest edition; and
- (3) The U.S. Department of Commerce, Metric Style Guide For The News Media, latest edition.

CHAPTER 21-13 COMPUTER-AIDED DESIGN

[Excerpt Paragraph B. from CHAPTER 21-13 COMPUTER-AIDED DESIGN]

B. REFERENCE STANDARDS

The standard for all computer-aided design in the IHS will be the "CAD Layer Guidelines Recommended Designations for Architecture, Engineering, and Facility Management Computer-Aided Design."

A copy of the current edition of the CAD Layer Guidelines Recommended Designations for Architecture, Engineering, and Facility Management Computer-Aided Design, is included in the IHS Technical Handbook for the Environmental Health and Engineering by **reference only**. Copies are available for a fee from the American Institute of Architects Press, 1735 New York Avenue, North West, Washington D.C. 20006.

CHAPTER 21.15 - SECURITY LEVEL SELECTION FOR USE IN THE DESIGN OF NEW FEDERAL FACILITIES

[Excerpt Paragraph .2 from CHAPTER 21-15 - SECURITY LEVEL SELECTION FOR USE IN THE DESIGN OF NEW FEDERAL FACILITIES]

A. Guideline –

The recommended minimum security standards based on the guidelines published by DOJ Vulnerability Assessment of Federal Facilities, dated June 28, 1995, are a set of standards that can be applied to various federal facilities. The USMS recommended five levels of security; classifying each level of security by the number of employees, size of facility, and the volume of public contact (See Exhibit 1). These recommended security standards cover the subjects of perimeter, entry, interior, and security planning of a facility (see Exhibit 2). Items that are not required by this DOJ report may be required and desired by others, including JCAHO, etc.

B. Design Criteria

(1) Security levels I and II shown on Exhibit 1 are applicable for all new IHS construction projects, and the minimum recommended security standards which must be included in the design requirements are as follows:

a. Perimeter Security

- *Provide adequate lighting for facility parking areas;
- *Provide control of facility parking areas; and
- *Provide all outside lighting of facility and facility parking areas with emergency power backup.

b. Facility Entry Security

- * Provide an intrusion detection system with central monitoring capability;
- * Provide fire detection, fire suppression, and others based on the current life safety standards; and
- * Provide high security locks on all exterior doors.

c. Interior Security

- * Provide security locks to all utility areas; and
- * Provide emergency power to critical systems such as alarm systems, radio communications, computer facilities, and others.

(2) Security levels III, IV, and V are not applicable to new IHS new construction programs, even though the number of employees and size of facility exceed level III standards. IHS opted not to exceed security level II.

CHAPTER 21.15 - SECURITY LEVEL SELECTION FOR USE IN THE DESIGN OF NEW FEDERAL FACILITIES

[Excerpt Paragraph .3 from CHAPTER 21-15 - REFERENCE STANDARDS]

21-15.3 REFERENCE STANDARDS

The Department of Justice's document, Vulnerability Assessment of Federal Facilities dated June 28, 1995, addresses two parts; 1) security of existing facilities, and 2) recommended minimum security standards and application to security levels of federal facilities. This chapter only addresses Part 2 of that document.

EXHIBIT 1 - (USMS) Classification Table--Recommended Levels of Security

| Security Level | Employee s | Square Meters (m²) | Public Contact | Remarks |
|-----------------------|-------------------|--------------------------------------|---|--|
| I | 1-10 | 230 or less | Low volume public of contact | Small store front type operation, such as recruiting office. |
| II | 11-150 | 231-7430 | Moderate volume of public contact | Routine activities, similar to commercial activities. |
| III | 151-450 | 7431-13 930 | Moderate to high volume public of contact | Law enforcement agencies, court, government archives, or multi-tenant. |
| IV | over 450 | more than 13 930 | High volume public contact | High risk law enforcement agencies, judicial offices, or government records. |
| V | over 450 | more than 13 930 | High | Such as Pentagon or CIA. |

NOTES:

- A. Security level recommended for new IHS construction projects:
 - (1) LEVEL I - DENTAL OR HEALTH STATION,
 - (2) LEVEL II - HOSPITAL, HEALTH CENTER, OR QUARTERS COMPLEX.
- B. Security levels III, IV, and V not applicable to IHS.

**EXHIBIT 2 - RECOMMENDED SECURITY STANDARDS CHART FOR NEW IHS
CONSTRUCTION PROGRAMS**

| Legend: | | | | | |
|---|----------|-----------|------------|-----------|----------|
| ▲ - Desirable; ○ - Standard Based on Facility Evaluation | | | | | |
| ● - Minimum Standard; - - - - - Not Required by DOJ Report | | | | | |
| ONLY LEVELS I & II ARE APPLICABLE TO IHS CONSTRUCTION PROGRAMS | | | | | |
| A. PERIMETER SECURITY | L | E | V | E | L |
| (1) PARKING | I | II | III | IV | V |
| Control of facility parking. | ● | ● | ● | ● | ● |
| Control of adjacent parking. | - | - | - | ○ | ○ |
| Avoid leases where parking cannot be controlled. | - | - | - | ▲ | ▲ |
| Leases should provide security control for adjacent parking. | - | - | - | ▲ | ▲ |
| Post signs and arrange for towing unauthorized vehicles. | - | - | - | ● | ● |
| ID system and procedures for authorized parking (placard, decal, card key, etc.). | - | - | - | ● | ● |
| Adequate lighting for parking areas. | ● | ● | ● | ● | ● |
| (2) CLOSED CIRCUIT TELEVISION (CCTV) MONITORING | | | | | |
| CCTV surveillance cameras with time lapse video recording. | - | - | - | ● | ● |
| Post signs advising of 24 hour video surveillance. | - | - | - | ● | ● |
| (3) LIGHTING | | | | | |
| Lighting with emergency power backup. | ● | ● | ● | ● | ● |
| (4) PHYSICAL BARRIERS | | | | | |
| Extend physical perimeter with barriers (concrete and/or steel composition). | - | - | - | ○ | ○ |
| Parking barriers. | - | - | - | ○ | ○ |

| Legend: | | | | | |
|---|---|----|-----|----|---|
| ▲ - Desirable; ○ - Standard Based on Facility Evaluation | | | | | |
| ● - Minimum Standard; = - Not Required by DOJ Report | | | | | |
| ONLY LEVELS I & II ARE APPLICABLE TO IHS CONSTRUCTION PROGRAMS | | | | | |
| B. ENTRY SECURITY | | | | | |
| (1) RECEIVING/SHIPPING | I | II | III | IV | V |
| Review receiving/shipping procedures (current). | = | = | = | ● | ● |
| Implement receiving/shipping procedures (modified). | = | = | = | ● | ● |
| (2) ACCESS CONTROL | | | | | |
| Evaluate facility for security guard requirements. | = | = | = | ● | ● |
| Security guard patrol. | = | = | = | ○ | ○ |
| Intrusion detection system with central monitoring capability. | ● | ● | ● | ● | ● |
| Design to current life safety standards (fire detection, fire suppression systems, etc.). | ● | ● | ● | ● | ● |
| (3) ENTRANCES/EXITS | | | | | |
| X-ray & magnetometer at public entrances. | = | = | = | ○ | ● |
| Require x-ray screening of all mail/packages. | = | = | = | ● | ● |
| Peep holes. | = | = | = | = | = |
| Intercom. | = | = | = | = | = |
| Entry control w/CCTV and door strikes. | = | = | = | = | = |
| High security locks. | ● | ● | ● | ● | ● |
| C. INTERIOR SECURITY | | | | | |
| (1) EMPLOYEE/VISITOR IDENTIFICATION | | | | | |
| Agency photo ID for all personnel displayed at all times. | = | = | = | ● | ● |
| Visitor control/screening system. | = | = | = | ● | ● |

| Legend: | | | | | |
|---|---|----|-----|----|---|
| ▲ - Desirable; ○ - Standard Based on Facility Evaluation | | | | | |
| ● - Minimum Standard; = - Not Required by DOJ Report | | | | | |
| ONLY LEVELS I & II ARE APPLICABLE TO IHS CONSTRUCTION PROGRAMS | | | | | |
| Visitor identification accountability system. | = | = | = | ● | ● |
| Establish ID issuing authority. | = | = | = | ● | ● |
| (2) UTILITIES | I | II | III | IV | V |
| Provide security locks to prevent unauthorized access to utility areas. | ● | ● | ● | ● | ● |
| Provide emergency power to critical systems (alarm systems, radio communications, computer facilities, etc.). | ● | ● | ● | ● | ● |
| (3) OCCUPANT EMERGENCY PLANS | | | | | |
| Examine occupant emergency plans (OEP) and contingency procedures based on threats. | = | = | = | ● | ● |
| OEPs in place, updated annually, periodic testing exercise. | = | = | = | ● | ● |
| Assign & train OEP officials (assignment based on largest tenant in facility). | = | = | = | ● | ● |
| Annual tenant training. | = | = | = | ● | ● |
| (4) DAYCARE CENTERS | | | | | |
| Evaluate whether to locate daycare facilities in buildings with high threat activities. | = | = | = | ● | ● |
| Compare feasibility of locating daycare in facilities outside locations. | = | = | = | ● | ● |

CHAPTER 24-11 INSTALLATION OF FIRE SPRINKLER PROTECTION IN HEALTH CARE FACILITIES

[Excerpt Paragraph B.(2) from Chapter 24-11.4 METHODOLOGY]

(2) NEW BUILDINGS

New inpatient health care occupancies will be sprinklered as required by the Life Safety Code. All new health centers (business occupancy) will be sprinklered even though they are not required by code. Personnel quarters will be protected in accordance with the Fire Administration Authorization act of 1992 and/or as required by NFPA 101.

APPENDIX “H”

Instructions For Using Review Comments Form

The Review Comments Form is to be used in the review of all phases of the drawings and specification. The instructions are provided in two parts, namely that which the Division of Engineering (DES) project manager and his design review team completes and that which the consultants complete. The intention of using the review form is to provide a standard methodology to document and track all proposed changes in the plans and specifications.

DES Project Manager Responsibilities:

1. The Project Manager and/or DES design team review member is to complete the header in its entirety and the first four columns of the comments table. The AE and DES project managers complete the “Action” column jointly. The DES Project Manager is to collect the DES design team review member comments and review for appropriateness and consistency before forwarding to the AE Project Manager.
2. Each subsequent submission requires a new Review Comments form with the new phase properly identified. Start a new sequence of comment numbering for each new phase of the documents. Include the phase and comment number of old comments not satisfactorily addressed.

Completion of Header:

3. The “Project Title” should be the name of the project. The name of the project should incorporate the name of the facility(ies) and the type of project, e.g., “Emergency Room Renovation” project.
4. The “Bergen No.” is the IHS project number. The Area usually provides this number. It consists of the following:
 - First two digits = Area Code (AB, AK, AQ, BE, BI, CA, NA, NS, OK, PH, PO, & TU)
 - Third digit = Year of receipt of construction funding
 - Fourth and fifth digits = Service Unit alpha code
 - Sixth, seventh & eighth digits = Unique Project No. Assigned by HQE for new projects and line item appropriation and by Areas for Area projects.
 - Ninth digit = Type of project, e.g., “H” for hospital, “C” for health center and clinics, “Q” for quarters, and “Z” or studies and all others. Outbuildings supporting a main facility are classified by the main facility.
 - Tenth digit = Funding source, e.g., “3” is for quarters rental funds, “5” is for Hospitals and Clinic funds, “6” is for Maintenance and

Improvement funds, “7” is for New Construction funds, and “8” is for Medicare and Medicaid funds.

5. The P3 number is the Primavera two-digit alpha code that uniquely identifies the project.
6. The reviewer who makes the comments puts in his or her name and phone number and the date comments are recorded.
7. The “Document Type” is identified, e.g., 65 percent Construction Drawings.
8. The “Discipline” is the discipline documents reviewed, e.g., Plumbing, Mechanical, & Fire Protection System drawings. A separate Review Comment form should be used for each discipline corresponding to the disciplines identified in the drawing set.

Completion of First Four Columns of Comments Table:

9. Number comments sequentially, and uniquely. If later reviews require additional comments relating to the same issue, use an alpha subdivision, e.g., 1a, 1b, etc.
10. Always use the page number and specification or detail name as appropriate.
11. Provide concise information in comments column. Do not use general terms and words like “should”.
12. After receipt of the completed Review Comments form back from the AE Project Manager, put in column four any comments withdrawn with a W and the initials of the reviewer. If the comment has been left blank by the designer and has not been satisfactorily addressed, leave it blank.

AE Project Manager Responsibilities:

13. The AE Project Manager, in coordination with the design team, completes the first three columns. The AE and DES project managers complete the fourth column jointly.
14. The AE Project Manager or the appropriate member of the design team put an “A” and initials the fourth column where reviewer’s comments are accepted.
15. The AE Project Manager or the appropriate member of the design team puts down the actions taken in response to the reviewer’s comment. If the designer disagrees with the reviewer’s comment or is requested to explain something the designer responds accordingly.
16. The AE Project Manager reviews the response and verifies the drawings and/or specifications have been corrected per the actions agreed upon by the appropriate member of the design team.
17. The AE Project Manager submits the completed Review Comments form with each subsequent submission of documents or before if requested by the DES Project Manager.

