DESIGN CRITERIA

FOR

OSW ALTERNATE POWER

DEPARTMENT OF ENERGY

MOUND PLANT

MIAMISBURG, OHIO

JANUARY, 1989

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

Project Manager: W. D. Williams

Prepared by:

W. A. Saul

APPROVALS:

LP&EC Representative: F. G. Krach Date: 1/27/89

F. G. Krach

Sponsor: William A. Saul Date: 1/29/89

W. A. Saul

Conts. Eng. Mgr.: W. D. Williams Date: 1/30/89

W. D. Williams

TABLE OF CONTENTS

SECTION I. PURPOSE AND PHYSICAL DESCRIPTION

OSW ALTERNATE POWER

A. PURPOSE

1. The purpose of this project is threefold. First to provide a reliable and more continuous source of electrical power to the Operational Support Building-West (OSW) in order to better serve Mound financial and CAD computer facilities. This increased reliability shall be accomplished by the installation of a tie breaker that will connect the 480 volt secondary of the OSW substation with the 480 volt secondary of B substation, within 200 feet of the building. The OSW substation is in the penthouse of the four (4) story OSW building. The B substation is outside along the plant roadway.
   Installation of the tie breaker will also permit work to be done on the primary (12,470 volt) side of the transformer without a shutdown of the building.

2. Secondly, the replacement of the OSW substation PCB transformer shall be done in order to eliminate the risk of a fire spreading PCB vapors to the building ventilation system.

3. Thirdly, the replacement of the switchboard on the 480 volt secondary of the OSW substation with more reliable breakers. Also, the existing switches do not allow expansion of the 480 volt supply to building equipment. One of the new breakers shall supply power to a new power panel, thus providing breaker space for installation of new equipment.

B. PHYSICAL DESCRIPTION

1. This Design Criteria is intended to be a general guide for the A/E. The drawings in Appendix A provide a conceptual design of the switchgear and layout and location of the power panel. Also, included are building drawings indicating the roof structure in the location of the trap door for replacement of the transformer.

2. Removal and replacement of the 1000 KVA transformer includes disconnect from the existing 12,470 volt air break switch compartment, disconnect from the low voltage section, removal of roof material, removal of trap door, and lifting out of the transformer from the fifth floor by use of a crane. The new transformer shall be designed to mate with the existing air break switch compartment and the new secondary switchgear.

3. The new switchgear shall be designed so that a minimum number of breakers are used. The essential breakers are: Main, Tie, Power Panel, MCC, and at least two (2) spares. Frame sizes and trip settings shall be properly engineered to safely carry the intended loads and in accordance with the latest version of the National Electric Code.

4. The new power panel shall be designed so that all existing 480 volt equipment is properly served and there is future space for 25% more capacity.

5. The 480 volt, 3 phase tie to B Substation shall be in existing 4" underground conduit to OSW.

B. EXECUTION

1. The project phasing must maintain building activities as continuously as possible. Therefore specifications and drawings shall indicate the exact sequence and timing of demolition and new equipment installation and start-up.

2. The A/E shall have the following responsibilities:

   a. Complete design of demolition.

   b. Complete design, including one-lines of the new transformer installation, switchgear, power panel, and 480 volt tie.

   c. Complete specifications for equipment and ratings.

   d. Supervision of equipment removal.

   e. Supervision of equipment delivery, off-loading, and storage.

   f. OSHA compliance.

   g. Supervision of all interconnections.

SECTION II. ARCHITECT-ENGINEER REQUIREMENT

A. GENERAL

1. The A/E will provide the complete Title I, Title II, and Title III design and construction services for the OSW Alternate Power Project, including all support utilities, civil, mechanical, and electrical systems for a complete and usable installation. The A/E will utilize state-of-the-art concepts and design to obtain the overall objective at the lowest cost consistent with a high quality facility. The narrative and drawings included herein are intended to be guidelines for the design effort and should not be construed to limit the A/E from proposing more cost-effective alternatives. It remains the responsibility of the A/E to develop and economically justify final functional solutions within the prescribed budget and space allocations.

2. Specifications shall follow the CSI format using Mound Master Specifications as a guide.

3. All drawings shall be standard "D" size and conform to the Mound standard format. Master drawings will be made on mylar to be supplied by Mound with Title Block.

4. The A/E will be responsible for updating the master mylar drawings to their "As Built" condition upon completion of Title III work. Mylar construction drawings will become the property of the Government upon completion of construction.

5. The A/E shall, during design, field verify existing building site, utility conditions and any critical field conditions.

6. The A/E shall furnish the appropriate plans, specifications, sections, isometrics, profiles, details, and engineering diagrams, schedules, notes and legends to accurately convey all pertinent information to the construction contractor. Use the scale and arrangement selected by Mound and approved by Mound.

7. The A/E will provide an experienced Project Manager capable of effectively coordinating a multi-disciplined engineering team. His communication and administrative skills should be substantiated by prior successful experience in a similar role.

8. The A/E, upon final design review and approval, will prepare a lump sum bid package with bound specifications and drawings in specified quantity for bidding by Mound, as listed in Paragraph F,6.

9. The A/E shall investigate and employ the most efficient methods of engineering and drafting possible (i.e. overlays, computer aided drafting, photo drafting, etc.)

10. The A/E shall provide in his proposal an estimated cost of construction of the all elements of the project.

B. TITLE I - 40% TO 50% COMPLETE

1. Field work shall be complete to include conduit run investigations, location of existing conduit and equipment, location of new equipment, and breaker sizing and ratings.

   Temporary electrical supply needs shall be addressed.

2. Preliminary drawings shall be complete. These may be in sketch form, but must be sufficient to convey the concepts to be carried forward into definitive design drawings.

3. Specifications shall be in outline form with all sections covered which are applicable to the completed document.

4. Design calculations shall be completed and in a form to permit detailed review by Mound. Structural calculations shall include 100% complete gravity lateral and stability analysis with dimensions of all members and components.

5. Alternatives specifically required and those suggested by the A/E and economic analysis supporting the alternatives should be completed and submitted for approval.

6. Component cost analysis shall be complete for Title I submittal of the complete building phase. Energy conservation reports are required for both Title I and Title II.

7. Electrical line diagrams portraying the sizing of the electrical system will be complete.

8. Based on the submitted economic analysis, a master equipment list will be submitted with the detailed data and calculations supporting the equipment sizing.

9. Specification of equipment and materials of construction shall be complete in a form to provide a preliminary estimate of construction costs.

10. Revised detailed construction cost estimates shall be submitted. The estimates shall include separate

estimated costs for any construction alternates included in the bid documents but not part of the base bid.

11. Prepare a Conceptual Design Summary following guidlines in the Mound Project Management manual #804 and DoE Order #6430, latest version.

C. TITLE II - 100% COMPLETE

1. Contract documents for the project shall be complete and ready
for signatures. Only minor corrections shall be required after this review.

2. All corrections to drawings, specifications, calculations to be accomplished after Title I and subsequent intermediate reviews shall be complete.

3. The A/E shall provide a detailed Logic Bar Chart schedule for project construction and identify the critical path. The schedule shall include purchase and delivery activities and durations for all major equipment and building components.

4. Revised, detailed construction cost estimates shall be submitted. These estimates shall become the basis for the Government estimate to be used at bid opening. The estimates shall include separate estimated costs for any construction alternates included in the bid documents but not part of the base bid.

5. The A/E shall assist the Government in solicitation of bids and provide all specifications, drawings, and any amendments.

6. During the construction bidding, the A/E Project Manager shall accept and reply to all contractor inquiries relating to clarification and interpretation of the plans and specifications. These questions and answers will be formally documented and those which identify significant change or clarification will form the basis of a formal contract addendum prior to actual contract award. The A/E Project Manager shall participate in all pre-bid meetings and publish minutes of those meetings.

D. TITLE III - CONSTRUCTION SERVICES

1. The A/E shall receive, review, approve, and log all required submittals during the construction phase to ensure compliance with contract requirements and to evaluate alternate materials and equipment. The Mound Construction Manager will act as the central focal point of all reviews during the construction.

2. The A/E Construction Manager will attend the regularly scheduled weekly Construction Progress Meeting as needed to review the physical construction with the Mound Construction Inspector and to provide assistance on construction problems and clarification of drawings. He will promptly document and assist in resolving all issues arising from his visit. Under normal circumstances the project meeting and site review will occupy one day each week for the Construction Manager.

3. The A/E will provide design input on changes during construction and ensure the timely updating of drawings for "As Built" purposes.

4. The A/E will participate in the final construction checkout and punchlist.

5. The A/E will provide assistance in the design and cost estimating of proposed construction changes, and will act as the focus for transmittal of this information to the Mound Construction Manager.

E. SCHEDULES AND REPORTS

1. The A/E will provide Mound with design schedules in bar chart form. Backup for these schedules shall include a preliminary list of required drawings and estimated engineering and drafting hours for each drawing.

2. Title I services shall commence at award of the contract. Four weeks for review by DOE and Mound shall be allowed.

3. Title II services shall commence upon approval of Title I design. Include four weeks for review by DOE and Mound.

4. Title III engineering services shall commence with the award of the construction contract and continue until start-up and "beneficial occupancy". The duration and level of this service shall be determined by the approved construction schedule upon award of the construction contract and subject to the continuing evaluation of the Mound Construction Manager.

5. Allow a minimum schedule for advance notice and CBD announcement:

10 days	to place Ad.
15 days	for advance notice
30 days	for bids to be due
55 days	minimum allowance

6. The A/E shall prepare the Project Cost Closing Statement and Construction Completion Report in accordance with the Mound Project Management manual #804. Mound will provide cost data for this report.

F. MEETINGS AND DESIGN REVIEWS

1. Title I Design:

a. Design Progress Reviews: Bi-weekly progress reviews during Title I will be held with the Mound Construction Manager. The purpose of this meeting is to review design progress in accordance with the approved schedule and to resolve issues that require team management decisions beyond the normal one-on-one telephone communications.

This will be the forum for major design issue discussion and solution. Formal minutes will be published with clear delineation of unresolved issues, the individual(s) responsible for resolution, and target date for resolution. The A/E Project Manager will provide a formal status briefing for the team.

b. Additional informal reviews will be held as required by the project status.

c. Title I Design Review Meeting: Upon completion of Title I review, changes will be made during Title II design. Four weeks will be required for review by Mound. In addition to the comment review, the Project Manager will present a revised Title II design schedule for approval by Mound.

2. Title II Design:

a. Design Progress Reviews: Bi-weekly progress reviews during Title II will be held with the Mound Construction Manager. The purpose of this meeting is to perform a comprehensive review of project status including schedule and cost. Major unresolved issues will be discussed. Formal minutes will be published by the A/E with clear delineation of unresolved issues, the individual(s) responsible for resolution and the target date for resolution.

b. Additional informal reviews will be held as required by the project status.

c. Final Design Review Meeting: Upon completion of Mound reviews of Title II design a final meeting will be held to review all design plans, specifications, and construction documents. Four weeks will be required to permit timely review and assembly of discipline comments prior to the meeting. At this point, the A/E will have a bid package completely assembled.

4. Design Changes:

Design changes may be proposed by the A/E or directed by Mound at any time during the design. These changes shall be fully discussed to determine their impact. All deviations from the design criteria or "Title I Design Summary" must be approved by the Mound Construction Manager. A sequentially numbered Change Order Log will be kept by the A/E to show a description of change, date, cost, and schedule impact.

5. Issue Lists:

The A/E shall issue and continually update a list that indicates outstanding issues to be resolved, by whom, and the target date for resolution (both original and current). This list shall be a main force of discussion at the bi-weekly design progress meetings and shall be maintained during the life of both Title I and Title II design phases of the project. It will be updated continuously as new issues arise and others are resolved. A separate list will be maintained by the construction Manager during the Title III phase.

6. Document Issue Requirements:

Specifications, estimates, drawings, and time schedules shall be prepared in such form and furnished in such quantity as directed by Mound. Minimum requirements are:

	Title I	Title II	Bidding Doc.	Comp. Proj.
Specifications	20	20	40	-
Drawings	20	20	40	-
Origs.	-	-	-	Mylar*
Cost Estimates	3	3	3	-
Schedules	3	3	3	-
Design Calculations and Studies (Des. Basis Report)	3	3	-	-
Cost Closing Statement	-	-	-	**
Construction Completion Report	-	-	-	**

NOTE: Copies of drawings shall be provided for design progress reviews and informal reviews as required.

* In "As Built" condition.

** Provide on 5-1/4 inch floppy disk in ASCII or Multimate format compatible to IBM PC.

SECTION III. REFERENCE DOCUMENTS

A. DEPARTMENT OF ENERGY

1. General Design Criteria Manual, DoE Order 6430.1A

2. Project Management System, DoE Order 4700.1.

3. Environmental Protection, Safety and Health Protection Program for DoE Operations. DoE 5480.1B, Chapter VII, Fire Protection.

4. Environmental Protection, Safety, and Health Protection Program for DoE Operations. DoE Order 5480.1B, Chapter I, Environmental Protection Safety, and Health Protection Standards.

5. Handbook for Preparation of Specifications for Construction Contracts.

6. Physical Protection of Security Interests, DoE Order 5632.4.

B. MOUND

1. Master Construction Specifications - Mound

2. Mound Engineering Design Standards.

3. Existing Mound drawings. (Note: It is standard for Mound drawings to have north pointed down).

4. Facilities Engineering Quality Assurance Manual 807.

5. General Requirements for A/E Work - Manual 808.

C. NATIONAL CODES, STANDARDS, AND GUIDES

Unless specifically noted otherwise, the edition in effect on the date of the design contract of the following documents shall apply to the design of this project.

1. State of Ohio Department of Transportation "Construction Material Specifications", and "Standard Construction Drawings", and Location and Design Manual.

2. Life Safety Code, NFPA Standard 101.

3. National Electric Code, NFPA 70-1987.

4. NFPA Standards 13, 14, 24, 72A, and 78.

5. Uniform Building Code for seismic and masonry calculations only.

6. American National Standards Institute, ANSI A58.1, Building Code Requirements for wind, snow and Minimum Design Loads in Buildings and Other Structures.

7. Ohio Basic Building Code (OBBC)

8. Factory Mutual (FM) 1-28.

9. American Society for Testing Materials (ASTM)

10. American Society of Mechanical Engineers (ASME).

11. AWWA 600 Cast Iron Piping and 603 Asbestos-Concrete Piping.

12. American Iron and Steel Institute, "Specification for the Design of Cold-Formed Steel Structural Members".

13. American Institute of Steel Construction, Manual of Steel Constructions.

14. American Concrete Institute Building Code Requirements for Reinforced Concrete, ACI 318-83.

15. American Welding Society, Structural Welding Code D1.1.-80.

16. EPA Erosion Control for Construction Sites.

D. OSHA

1. Occupational Safety and Health Standards of the Occupational Safety and Health Administration, Department of Labor, Federal Register, Title 29, Chapter XVII, Part 1926 during construction and Part 1910 for design.

E. OTHER

1. Federal Regulation 40 CFR part 112 - Oil Pollution Prevention.

2. Federal Regulation 40 CFR part 261 - PCB's

3. IEEE 142: Recommended Practice for Grounding Industrial and Commercial Power Systems.

4. IEEE 242: Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.

5. ANSI C2 NESC

6. IEEE C37 Standards: Circuit Breakers, Switchgear, Relays, Substations, and Fuses

SECTION IV. CIVIL

NOT APPLICABLE

SECTION V - ARCHITECTURAL

A. GENERAL

The following information is provided as a guide in establishing the architectural requirements for this project and should not be construed to limit the Architect-Engineer from proposing more cost-effective alternates. This information is subject to review and change during the design process.

1. Drawings and Sketches

The following listed drawings and sketches provide a guideline to the Architect-Engineer in designing the facilities.

Sketch No. 1 Vicinity Plan (Mound Site)
Sketch No. 2-B Building Plans

2. Design

a. General Design Criteria, DOE Manual Appendix 6430, and all applicable codes or standards therein are a part of this section. See also Section III - Reference Documents.

b. The plans and requirements, as delineated herein are intended to show the general siting conditions, general space requirements, space relationships, and the basic Architect-Engineer (A-E) services required. They are for general guidance only and should not be considered as absolute. The Architect-Engineer's work should include, but not be limited to, further study to determine the most functional arrangement possible, and meet the equipment/operational requirements for a completed facility satisfying the intention of this design criteria. It is standard at Mound to have North pointed down or to the right. The A/E shall insure that the Contract Documents conform to the Mound standard. The A/E shall match the existing drawing's orientation and column center-line notation.

c. The names of the designer and checker shall appear on each drawing. Each drawing shall be independently checked for method, accuracy and coordination with other disciplines/specialties involved by a checker having professional credentials and experience equivalent to, or exceeding, the designer.

B. BUILDING REQUIREMENTS

1. The equipment room shall meet the requirements as defined in the Ohio Basic Building Code (OBBC), Current Edition, in general. However, the requirements of the Uniform Building Code, 1985 Edition, shall be used in the determination of earthquake loads for Seismic Zone 2 and for masonry design. ANSI A58.1 shall be used for wind and snow loadings. Refer to Structural, Section VI.

2. The building shall be constructed of fire resistant materials and will have an automatic fire protection system.

   a. Fire Ratings

      The floor and floor/roof assemblies shall at least equal the requirements of the O.B.B.C. for Use Group B.

C. THERMAL AND MOISTURE PROTECTION

1. Roofing

   a. Roof(s) shall conform to Mound Standards and NRCA Roofing Manual. Slope on built-up roofs shall be at least 1/4 inch per foot.

   b. The standing-seam metal roof for the Penthouse equipment is preferred and shall be designed in accordance with STRUCTURAL section herein. In addition the metal roof shall be in accordance with Metal Building Manufacturers Association Standards. Roof shall be galvanized or aluminized and painted with an aliphatic urethane system.

   c. Provide roofing manufacturer's approved flashings for all roof penetrations. Penetrations shall be limited to absolute necessity.

   d. Built-up roofing (if used) shall be Mound Standard of the 4-ply, fiberglass-felt, coal-tar type with two (2) ply base flashing. Insulation shall be rigid phenolic foam board with perlite topping board (NRCA requirement). Design the roof deck and perimeter in accordance with STRUCTURAL section herein. Design the roof, deck, and seals to eliminate fire propagation hazard on the underside of roof dock (FM I-28). Roof systems of lesser fire and insulation qualities than the above will not be acceptable.

2. Flashing and Sheet Metal

a. Materials and installation shall comply with recommendations of SMACNA and NRCA.

b. Typical flashing shall be 26-gage minimum, (match existing).

c. Provide roof parapet copings, fasteners, solder, bituminous cement and other accessories as necessary.

3. Joint Filler and Gaskets

a. Typical interior and exterior moving joints shall be sealed with 2-part polysulfide or polyurethane based sealant complying with FS TT-S-00227, Class A.

b. Typical interior non-moving joints shall be sealed with flexible, non-staining, non-bleeding acrylic latex sealant or polymerized butyl rubber.

c. Silicone rubber sealants shall conform with FS TT-S-001543, Class A. (Use non-acetoxy types only.)

d. Preformed Sealants: Self-adhesive butyl rubber tape.

e. Provide miscellaneous materials including joint cleaner, joint primer, bond breaker tape and foam tape backer rods.

D. FINISHES

1. Flooring

a. Provide sealed concrete floor in Mechanical Equipment Rooms.

2. Painting

a. Paint all surfaces exposed in the final construction except items furnished finished (i.e., acoustical ceiling grid) or items not normally requiring finish treatment (i.e., stainless steel, anodized aluminum, glass, etc.).

b. Typical field applied paint finish shall be alkyd paint, one prime coat and two finish coats.

c. Colors shall be selected to conform with Mound standard colors and based on Bruning Company color charts.

3. Color Coding of Piping

a. Color code all pipe in accessible (above ceiling spaces) and visible areas.

b. Color coding includes painting pipe exposed in accordance with 09900 of Mound Master Specs and banding pipe 20 feet o.,c. with self-adhesive vinyl cloth tape, color as specified and lettered to identify pipe. Brady pipe markers and labels are the Mound Standard System.

SECTION VI. STRUCTURAL

The following information is provided to guide the Engineer in complying with Mound structural engineering requirements for determining loads relative to the new transformer and power panels.

A. STANDARDS AND CODES

1. Steel:

   AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings, 8th edition, latest revision.

2. Concrete:

   American Concrete Institute, Building Code Requirements for Reinforced Concrete ACI 318, latest edition.

3. Concrete Masonry and Seismic Design:

   Uniform Building Code (UBC), latest edition.

4. American Welding Society (AWS):

   Structural Welding Code AWS D1.1 (Steel)
   Structural Welding Code AWS D1.3 (Sheet Steel)
   Structural Welding Code AWS D1.4 (Reinforcing Steel)

5. DoE Manual 6430.1A

6. American National Standard Building Code Requirements:

   ANSI A58.1, latest edition

7. Ohio Basic Building Code: latest edition

B. CALCULATIONS

1. Detailed structural calculations are required to support the plans and specifications. Standard recognized computation techniques shall be used. Short cuts, "rules of thumb", etc., are not acceptable. The computations shall be presented in a well indexed report format with all assumptions and references stated including all supporting documents and texts. The names of the designer and checker shall appear on each calculation sheet with date of origin. Each calculation shall be independently checked for method, accuracy, and coordination with other disciplines involved, by a checker having professional credentials and experience equivalent to, or exceeding, the designer. Both shall be professional engineers with

current active licenses.

2. Computations for all structural design shall be submitted to Mound with preliminary and final drawings. If computer print outs are used as design documentation, a description of the program shall be included.

3. Mound publication, "Guide for Presentation of Structural Design Computations, " illustrates acceptable formats for the documentation of design computations. Note the use of dimensioned sketches, free-body diagrams with descriptive headings and explanatory information. The discussions included under Information and General Requirements in this document should be noted prior to initiating the design.

C. DESIGN LOADS

1. Floor Loadings:

   a. Minimum design live loads for base floor slabs shall be 200 psf.

2. Roof Loadings:

   a. Manholes, Minimum - H20/32k Axle/16k Wheel

3. Materials:

   a. Reinforcing steel shall be ASTM A-616 Gr60, A-616 "R", Gr60, ASTM A-185 (Bar Mats) and ASTM A-185 (welded wire fabric).

   b. Concrete shall be specified in terms of 28-day compressive strength, slump and air content.

   c. The design and construction of concrete masonry shall conform to the Uniform Building Code requirements, including vertical reinforcements. Do not use stresses requiring special inspection.

   d. Bolted connections rather than welded, shall be used with structural steel design.

4. Other Requirements:

   Design conditions such as material designation, soil bearing pressure, stress levels, live load, and wind conditions, etc., will be noted on the pertinent construction drawings.

5. Construction Drawings:

a. Construction drawings shall contain the design loadings (dead, live, wind) material design steel levels (steel, reinforced concrete, soil bearing, etc.) assumed during the design.

b. Drawings shall clearly reflect and detail nonstandard details and critical construction sequences. These shall include, but not be limited to:

Construction and expansion joints
Shoring requirements
Special jacking and lifting procedures
Construction Sequences
Protective covers
Anchor bolt torques, projection
Connection capacity
Special connection details and assembly
Water-stops, etc.
Lightning Protection
Demolition Sequence

SECTION VII - MECHANICAL

A. GENERAL

The following information is provided as a guide in establishing the Mechanical HVAC, piping and utility requirements for this project and should not be construed to limit the Architect-Engineer from proposing more cost effective alternatives. This information is subject to review and change during the design process.

1. CODES, STANDARDS AND REFERENCES

a. National Standard Plumbing Code
b. Ohio Building Code
c. ASHRAE Manuals
d. SMACNA Manuals
e. AMCA Standards
f. Industrial Ventilation Manuals
g. AABC Standards Manuals
h. National Fire Protection Association

2. DRAWINGS AND SKETCHES

Sketches and drawings in Appendix A provide a guideline to the Architect-Engineer in designing the facilities.

Note: The information shown on the above sketches and drawings represents the most recent information available at this time. This does not relieve the A-E from the responsibility of verifying the accuracy of the above material.

B. DESIGN

1. Provide a Design Summary Documentation in a well indexed report format with all assumptions and references stated. Report shall include design calculations, basis of design equipment information (e.g. catalog material, charts, tables, performance curves, etc.), Energy Conservation Report (Section VII.J.3), AHU systems and potential heat recovery applications life cycle costing investigations.

2. Provide for construction materials consistent with good design practice and in accordance with DOE and Federal Standards and other pertinent codes. Particular attention shall be directed to DOE Order 6430.1.

3. Each equipment item shall be assigned a unique alpha-numeric symbol coordinated with existing building numbering sequence and as directed by Mound personnel. The assigned symbol shall be used throughout all documents whenever identifying each particular piece of equipment.

4. Direct the Construction Contractor to provide:

   - Detailed project submittals for all equipment and materials which are to be used in construction. Submittals shall include shop drawings (ductwork, equipment, piping, etc.), certifications, catalog material, performance curves, schedules, diagrams, installation instructions and all additional information required for a thorough review by Mound and A-E engineering personnel.

   - Provide an instructional and operational period at the completion of construction period as required to educate and prove systems operation to maintenance and engineering personnel in all aspects of systems installations.

   - Operation/maintenance manuals and instructions, recommended spare parts listing and schematic drawings of systems and subsystems.

5. Design drawings shall clearly indicate all appropriate plans, section views, system isometrics, details, flow diagrams (steam, brine, water systems, air, etc.), control systems schematics, equipment schedules, notes, legends, etc. as required to provide a complete and detailed system designs. The above requirements shall be indicated on the Title I submittal and revised for Title II.

6. All legend symbols used as part of design shall be listed in the ASHRAE Handbook of Fundamentals.

7. Major equipment items to be used as basis of design shall be approved by Mound personnel prior to design start.

8. The specific space utilization schedule for each task shall be provided to A-E at design start indicating occupied/ unoccupied schedule for people, lighting, process equipment, HVAC equipment, etc.

C. UTILITIES

1. Cooling requirements shall be accomplished through the use of the central plant chilled brine system unless otherwise indicated. Reference the Physical Description for each task indicated in Section I.

2. Heating requirements shall be accomplished through the use of the central plant steam and condensate systems in conjunction with a hot water/glycol convertor systems, whenever possible, and shall be utilized with preheat and reheat coils. Reference the Physical Description for each task indicated in Section I.

3. All utility systems shall be evaluated to the extent necessary to determine that sufficient capacity exists to meet new design needs without adversely affecting central system or existing adjacent system operations.

4. Provide floor drains to storm sewer in mechanical rooms adjacent to equipment requiring drainage. One capped floor drain to the sanitary sewer shall also be provided in each equipment room.

D. PIPING AND PLUMBING

1. Specify testing of all piping systems in accordance with requirements of the National Standard Plumbing Code. Specify chlorine sterilization of all potable water systems with flushing and test following to assure acceptable bacteria, chlorine and containment levels prior to final pressurizing of system for use.

2. All branch circuits from the mains shall be valved in accordance with best practice in building maintenance. A union shall be installed downstream of each screwed valve. In addition, provide sufficient flanges and unions for removal of equipment/coils without major dismantling of pipe.

3. Each piping/plumbing system shall be illustrated isometrically on the Title I and II drawings. These isometrics shall also be included in the design calculations to effectively facilitate review of the piping/equipment selections. The Title I drawings need only include the system isometrics and equipment/Fixture locations on plan view. The Title II drawings shall include detailed isometrics, plans, and sections such that a complete materials list may be compiled by the contractors, The Title II calculations shall include pressure loss calculations for each system. pressure drops consistent with the design shall be listed in component specifications.

4. Steam condensate piping from equipment to receiver shall be designed to facilitate complete gravity drainage.

5. All brine, steam and condensate piping up to 2" shall be schedule 80 black iron, piping greater than 2" shall be schedule 40 black iron. Note: Interior brine piping may be specified using type K hard drawn copper pipe, where cost justified.

6. Hot water piping shall be Type L copper, except at the pumps and convertor locations where schedule 40 black iron pipe shall be used.

7. Pipe connections including cooling coil, heating coil, humidifier and other miscellaneous construction shall be in accordance with latest Mound standards which will be provided to the A-E upon initiation of design.

E. NOISE AND VIBRATION

1. The design calculations, drawings, and specifications submitted for Title II shall clearly demonstrate that the following noise criteria levels shall be achieved.

- Conference Rooms	NC 20-30
- Private Offices	NC 30-35
- Open Offices, Corridors	NC 35-40
- Stores, Shops, and Warehouse Areas	NC 40-50
- Mechanical Equipment Rooms	NC 45-65

2. A summary shall be included in the Title II design calculations, which specified the maximum sound power level (PWL) for each noise generating item in the project. The summary shall also list the attenuation requirements of items used for this purpose. This data shall also be included in the specifications for each item.

3. Proper vibration isolation shall be provided where necessary. The concept, type, location, and other data necessary for a budget cost estimate will be required for Title I submission. The sizing, specifications, etc., shall be clearly defined.

4. The ASHRAE Systems Manual shall be used as a guide in the determinations.

F. INSULATION

1. Provide insulation on pipes and ducts where:

   - Heat transmitted will significantly affect the ambient temperatures in spaces requiring temperature control.

   - Heating or cooling effect will be significantly affected due to heat flow into or out of the pipe or duct.

   - Condensation will occur as a result of the material surface temperature approaching the dew point of the ambient air.

   - Significant energy loss would result from heat transfer.

   - Personal injury may result.

2. Plumbing insulation systems shall include all domestic cold water, hot water supply and return, horizontal storm drain lines, roof drain sumps, and exposed waste line and hot water lines of fixtures for handicapped.

3. Use of any materials containing asbestos is to be prohibited.

4. Insulation used shall have a flame-spread rating of 25 or less, a fuel contributed rating of 50 or less, and a smoke development rating of 50 or less.

5. Insulation type and thicknesses shall be base standard Mound specifications.

6. Duct insulation shall be of a rigid type in all exposed areas or where the duct configuration facilitates its usage.

G. IDENTIFICATION AND LABELING

1. All equipment shall be labeled in accordance with its designated alpha-numeric symbol. Equipment shall also be labeled with any special applicable information such as system warnings, function, filter requirements, etc..

2. Piping shall be labeled and color coded as per Mound standards. All labels shall indicate service, line size, flow direction, pressure, temperature, etc..

3. Valve tags shall be provided and a corresponding schedule made indicating location, service and application description.

4. HVAC control devices shall be clearly labeled at all locations corresponding to HVAC controls diagrams

5. HVAC controls conduit shall be labeled as per Mound standards.

6. Ductwork shall be labeled indicating associated system or fan, zone, flow direction, etc..

SECTION VIII ELECTRICAL

The following information is provided as a guide in establishing the electrical requirements associated with this project and should not be construed to limit the Architect-Engineer and Mound Engineering from proposing more cost effective alternates. This information is subject to review and change during the design process.

A. GENERAL REQUIREMENTS

Provide the electrical design for this project in accordance with the General Design Criteria, DoE Manual Appendix 6430.1A utilizing Mound Master Specifications and specific criteria included herein.

B. CODES AND STANDARDS

1. All electrical work shall be in accordance with the requirements of the National Electrical Code (NEC), ANSI/NFPA-70, and other applicable references as included in Section III.

2. All electrical equipment and materials furnished and installed shall bear the Underwriters' Laboratories Label of Approval for the particular service fitted.

C. IDENTIFICATION

1. Installation for permanent identification of electrical equipment and systems shall be specified per Mound standards:

    a. Panels at 480 and 240 V, 3 phase: PP

    b. Panels at 208/120 V, 3 phase and 240/120 V, 1 phase: LP

    c. Room number shall follow the above designations.

    d. Multiple panels in a single room shall be labeled as above with the added suffix A,B, or C... starting with the second panel.

    e. A panel in a corridor shall be assigned the number of the room on the other side of the wall from the panel.

f. Special cases shall add a designated prefix to the PP and LP identification:
E - Emergency Power
(cover shall be painted yellow)
U - Uninterruptible Power Source
C - Conditioned Power
D - Direct Current

g. The format shall be: _ _ _-_ _ _-_
1 2 2 3 3 3 4
1=Prefix for special case (E, U, C, D)
2=PP or LP
3=Room Number (24, 106)
4=Additional Panels (A, B, C...)

2. Nameplates shall be made of sandwich type plastic with white letters on a black background. Letter size shall be 1/8" for control devices, push buttons, etc., and 1/4" for distribution panels, control panels, etc., unless otherwise directed. Nameplates shall be mounted on the outside surfaces of all equipment within easy sight of all personnel.

3. Wire markers shall be on waterproof cloth tape of high adhesion and tensile strength. Brady used as basis of design.

Distribution panels shall be provided with a typed or neatly printed directory. Circuits shall be identified as shown on the panel drawing layouts or as directed in the field. Directory shall indicate source of power, including building.

D. DISCONNECTS (MOTOR AND CONTROL)

1. General

a. Motors and other equipment not within sight of their feeder overcurrent protection devices shall be fed from non-fusible type disconnect switches located at the motor. Exception to this criteria may be made on approval of Mound Electrical Engineering.

b. Safety disconnect switches shall be of the non-fusible type unless otherwise indicated.

c. Fusible safety switches shall be heavy duty type with single-throw knife blade construction and fuse clips (class R preferred).

d. Non-fusible safety switches shall be heavy-duty type with single-throw knife blade construction and no fuse clips.

E. CONDUIT

1. General

Conduit systems may consist of rigid galvanized steel, IMC, EMT (electrical metallic tubing), or a combination of the three as required by applicable codes and standards. EMT shall not be used outdoors, in wet locations, in crawl spaces, or below 5 feet AFF. Type EB PVC, encased in concrete, shall be used in all duct banks.

F. WIRES AND CABLES

1. Conductors and Cables, 600V or less

a. Single conductor power and control wire shall be uncoated, class B or compressed stranded soft copper with NEC type THW flame retardant, moisture and heat resistant, colored PVC insulation. Insulated conductor shall conform to Underwriters' Laboratories Specification UL44.

b. Power conductors shall be 12 AWG copper or larger.

c. Control conductors shall be 14 AWG copper.

d. Specify type THW insulation for all wire sizes.

e. Specify stranded wire for #8 AWG and larger and solid for #10 AWG and smaller.

2. 15KV Single Conductor Cable:
Single conductor power cable shall consist of Class B stranded copper, rated at 90 degrees C, tinned copper semiconducting tape, ethylene-propylene insulation, lapped bare copper shielding tape, and an overall polyvinyl chloride (PVC) jacket of 80 mils.

3. Color code shall be as follows:

	480 And Greater	277 and lower
A	BROWN	BLACK
B	ORANGE	RED
C	YELLOW	BLUE
NEUTRAL	WHITE	WHITE
GROUND	GREEN	GREEN

4. Phase rotation on 12,470 volt systems shall be ABC.

5. Connectors and Devices:

   a. Conductors larger than #10 AWG shall be joined by compression type connectors. Terminal connections shall be made using solderless pressure lugs, except when factory installed set screw connections are supplied.

   b. Conductors #10 AWG and smaller may be joined with electrical spring connectors with vinyl tape or insulated wire nuts.

   c. Cable ties shall be nylon self-locking type suitable for the environment in which they are installed.

G. PANELBOARDS

1. Provide panelboard schedule showing all power distribution panelboards, lighting and receptacle panelboards including type and ratings. Identification of panelboards shall conform to Mound standard criteria as noted in previous section.

2. Panelboards shall be of the dead-front safety type constructed and labeled in accordance with UL Standard for Panelboards, UL67.

3. All panelboards shall be constructed using non-tapered, full length bus and be mounted in an enclosure constructed in accordance with UL Standards for Cabinets and Boxes, UL50.

4. All new power distribution panelboards and power panelboards shall be fused switch type and shall be 480 V, 3 phase, 3-wire, 60 HZ service, and be provided with the quantity and rating of main and branch circuit protective devices as indicated on the panelboard schedule and one-line diagrams. If physical space prohibits the use of fused switches, then Square D, I-Line circuit breaker panels can be used. Short circuit withstand rating shall be at least 25,000 amperes symmetrical at 480 volts.

5. All new lighting and receptacle panelboards shall be suitable for 208/120 V, 3 phase, 4-wire, 60 HZ service, and be provided with a minimum of 24 branch circuit breakers and a 100 ampere main breaker.

6. Where, feasible, all panelboard front covers shall be constructed with the opening on the left edge. A continuous hinge shall be riveted or welded to the right edge if opening is on the left, otherwise hinge shall be on the left.

7. All low voltage (480 volt) protective devices at unit substations shall be of the switchgear type, with a minimum number of breakers. Switchgear shall feed power distribution panels and Motor Control Centers (MCC) rated for 600 Amps or more and motors rated 200 HP or greater. Switchboards are not allowed.

8. Motor Control Centers shall be of the fused switch type and shall serve HVAC loads and other 3 phase motors. Provide space for power factor correcting capacitors for motors rated 20 HP or greater. Allen-Bradely model 2100 used as basis.

9. Unless otherwise noted, basis of design for this section is Square D Co.

H. WIREWAYS

1. Indoor type wireway shall be restricted to indoor use only.

2. Finish sheet metal parts shall be of 12 gage steel construction, flangeless design, with removable hinged cover. Wireway shall be with knockouts.

I. MOTORS

1. All 480 volt, 3 phase motors shall be high efficiency.

2. Generally, all motors rated 3/4 horsepower and greater shall operate at 480 volts, 3 phase, and will be equipped with capacitive power factor correction to 0.90 or better. Motors less than 1/2 horsepower shall operate at 115 volts, single phase. Consult Mound Electrical Engineering for deviations from this criteria.

3. Generally, HVAC motors shall be fed from Motor Control Centers (MCC).

J. MOTOR CONTROLS

1. Equipment and Materials

a. General- Starters shall be designed with "Hand-Off-Auto" selector switch for starting from an automatic controller or manually. All starters shall have a locking attachment. On-Off to be designed on switches not needing auto feature.

b. Use combination AC three-pole magnetic starters, FVNR with motor circuit protection in NEMA 1 enclosure. All control circuits shall be 115 volt or lower, supplied by a control transformer energized from the power supply of the equipment controlled, unless otherwise noted. Starters shall be complete with three melting alloy overload relays. The starter doors shall be interlocked with the associated disconnect switch to prevent opening unless the switch is in the "OFF" position.

c. Manual starters for 115 volt, single phase, fractional horsepower motors shall be single pole, manually operated toggle-type, with one thermal overload element and flush or surface mounted.

d. Wiring in control panels shall be arranged in a neat and orderly manner and conductors shall be grouped and laced or enclosed in a plastic duct designed for the application.

e. Terminal strips shall be provided for all wires running from the panel to other equipment. The design shall include a terminal strip layout schedule.

K. ELECTRICAL TIE-INS

1. General:

a. This section outlines contractor responsibility and procedure for energizing equipment for the first time and for tie-in into existing electrical lines or equipment for additions or expansions to Mound facilities.

b. Ratings - Mound's distribution voltage is 12,470 volts; utilization voltage is 480 volts.

c. Unless otherwise stated, the Contractor is responsible for all labor and materials for making electrical tie-ins.

d. Phase Rotation and Polarity:

480 volt - Mound has no polarity or phase rotation standard for 480 volts (or lower voltage)

12,470 volt - Mound has a fixed polarity and rotation standard for its distribution voltage. The Contractor shall, through the Mound Construction Manager, contact Mound Electrical Engineering Group for instructions on all terminations and tests for polarity.

e. There shall be no splices made in any 15 KV rated cables.

2. Power

Electrical characteristics for this project shall be 480 volts, three wire, three phase, 60 HZ.

3. Grounding

a. Building columns, roof steel, and footer steel reinforcing shall be made electrically continuous for grounding purposes. Driven grounds shall not be specified where soil conditions consist of rock. In such conditions, use a counterpoise system of no less than 4/0 bare copper cable.

b. Water lines, building steel, and a grounding conductor from existing building shall be bonded together.

c. Include a green insulated ground wire in all conduits, for equipment grounding.

4. Lightning Protection

Lightning protection shall be installed in accordance with AMCR 385-100, Chapter 8, for an integrally mounted system on masonry building and in accordance with NFPA No. 78. All equipment on roofs shall be provided with lightning protection. Underwriters' Laboratories, Inc. certification shall be obtained for all new systems and modifications to existing systems. Maxwell Lightning Protection Company used as basis.

L. INTERIOR

1. Distribution

a. Distribution of power, lights, fire alarm, telephone, and miscellaneous signals shall be in metallic conduit. EMT is suitable for all raceway, except rigid conduit shall be utilized where it emerges from concrete or where the conduit may receive physical abuse. EMT shall not be used outdoors or in wet locations.

2. Lighting

a. Provide illumination levels in accordance with IES for the various tasks and activities. In general, provide 50 footcandles at work stations, 30 footcandles in work areas, and 10 footcandles in non-work areas. Utilize the highest efficiency light sources (usually fluorescent with high efficiency ballasts, high pressure sodium, and metal halide).

b. Provide local switching for all lighting. Offices, halls, equipment rooms, etc. shall be provided with separate switches except for night lights.

c. Provide exit lights and emergency lights (local battery pack type) in accordance with the Life Safety Code. In accordance with Mound maintenance requirements the emergency lighting shall be Dualite No, EDC 204 with battery Dualite No. 12-567. Exit light fixture shall be Thomas No. EXM-1 with battery pack No. EX-2.

M. FIRE ALARM SYSTEMS

a. Codes and Standards: Unless otherwise noted on the Drawings, the equipment, devices, materials, and installation shall meet National Fire Code for Proprietary Protective Signaling Systems, Part 72D and the National Electrical Code.

b. Mound uses a multiplexed, computerized proprietary fire alarm system, Kidde Model SDS/10-24. Alarms and coded bells shall operate from a data gathering panel (DGP).

c. Products:

(1) Fire alarm devices must be compatible in all respects, including appearance, with the Mound site fire alarm devices. No substitution will be permitted.

4. Smoke Detectors

a. Design shall include an equal mix of ionization and photo-electronic type, duct smoke detectors, smoke detector panel, and zone annunciator panels. Basis of design is Pyrotronics, System 3.

b. Design shall include provisions for HVAC duct smoke detection and connections to the Mound Direct Digital Control (DDC) system.

N. TELEPHONE/HVAC

a. Telephone services shall be provided to the equipment room for the communication link of the DDC system. Distribution panel and outlet provisions shall be in accordance with the recommendations of the AT&T Company.

b. The individual control systems will be served through conduit, from the associated telephone cabinet to a location in the vicinity of the task work.

c. Telephone service will be required for each new Master HVAC control panel being installed.

O. EXTERIOR

1. Lighting

a. Provide outside lights at all exterior doors with switches inside the doors.

P. TESTING

1. Specify that the contractor is responsible for all testing, removal for testing, reinstallation, and deficiency correction.

2. Tests to be performed include:

Insulation resistance tests

Circuit breaker tests on all 225 ampere frame size or larger.

Motor overload tests on size 2 starters and larger

Rotation tests

Motor load tests

Outlet hot, neutral, and ground tests

Operational demonstrations including control schemes and interlocks

SECTION IX. FIRE PROTECTION

The following information is provided as a guide in establishing the Fire Protection sprinkler requirements for this sub-project and should not be construed to limit the Architect-Engineer from proposing more cost-effective alternates. This section includes piping and system requirements. Electrical and control requirements are included in Section VIII - Electrical. This information is subject to review and change during the design process.

A. GENERAL REQUIREMENTS

The new work associated with the individual tasks shall be designed and constructed of noncombustible materials. The facility shall be completely protected by a wet pipe automatic sprinkler system. All fire protection system components and materials shall be UL listed or FM approved. The Contractor shall be required to provide detailed shop prints for Mound approval. They shall include all calculations, plans and sections. All shop prints shall be updated to as-built conditions and submitted to Mound in reproducible format at the end of the project.

B. DESIGN - GENERAL

1. The installation of all pipe, accessories, and other automatic sprinkler components shall comply with the latest version of NFPA Standards 13. Design to pipe schedule at 100 square foot/head and 28 psi at most remote sprinkler location. Hydraulic calculations are to be provided to ensure the availability of pressure and water flow

2. Sprinkler Installation - The testing of the sprinkler installation shall conform to the applicable provisions of NFPA Pamphlet No. 13. Flow test shall be required.

3. Certification - Upon completion, and prior to the acceptance of the installation, the Contractor shall furnish the Contracting Officer three (3) copies of the Certification required.

C. PIPE AND FITTINGS AND FIRE SPRINKLER SYSTEMS:

1. All Piping Inside of Building: Schedule 40 black steel pipe with 175 psi cast-iron sprinkler fittings.

2. Where applicable, with the exception of branch piping, joints on straight runs of steel piping may be flanged, threaded or rubber gasketed-groove type listed by UL. Victaulic Style 77 or equal by Gustin-Bacon.

3. Install all branch piping with threaded fittings. At the base of each main riser, provide a flanged joint.

4. Valves:

   a. All Valves: UL approved and designed for a working pressure of 175 psi.

   b. All gate valves flanged OS&Y.

5. Pressure Gauge: Listed by UL. Bourdon spring type with 3-1/2" diameter dials, calibration screws and shutoff cocks. Brass case construction.

D. FIRE PROTECTION SPECIALTIES

1. Sprinkler Fittings - Shall be screwed type specifically designed and UL approved for sprinkler systems.

2. Sprinkler heads - Shall be Viking Model C, solder link, spray type, upright or pendant, and 160°F minimum (higher temperature if required by NFPA No. 13), with ceiling closure (escutcheon).

3. Alarm Check Valves - Shall be Viking Model E., or Grinnel Model F512 6" minimum size, with 2" drain valve, U.S. approved, with pressure switch, two pressure gauges with gauge valves, alarm bypass trim and without motor gong.

4. Ball Drip Valve - Underwriter listed or factory mutual approved, 1/2" automatic ball drip valve as manufactured by Grinnel, Model P775, Figure 1687.

5. Pressure Switch - Shall be Underwriter listed or factory mutual approved to match designed system.

6. Tamper Switch - Shall be single-pole, double-throw switch, roller-type switch actuator, spring loaded plunger, equivalent to Grinnel Model F640 or approved equal.

7. Fire Hose Station:

   a. All materials and equipment used in the installation of the fire hose stations shall be listed as approved by the UL Fire Protection Equipment List or the FM List of Approved Equipment for Industrial Fire Protection, and shall be the standard product and the latest design of the Manufacturer.

b. Fire Hose Cabinet (Capacity 100 Feet) - Recessed or surface mounted, 18-gauge steel tub; 16-gauge flat trim finished baked white interior, gray primer coat exterior, 20-gauge vue wire glass panel door with full piano hinge, chrome pull handles and friction catch.

c. Fire Hose Rack - Underwriter listed semiautomatic 1-1/2" swing hose rack unit, 100-foot capacity, one piece 16-gauge steel construction, 22 rack pin, steel cadmium plated, nozzle bracket capable of holding fog nozzle.

d. Fire Hose Rack Accessories:

(1) Hose rack bracket.
(2) Angle valve with hydrolator.

e. Fire Hose - Underwriter Listed, 1-1/2", minimum 500 lbs., lightweight, single-woven jacket, rubber lined (poly-flex polyurethane) 75 feet or 100 feet length as shown on Contract Drawings with Red Head NSI couplings.

f. Nozzle - Underwriter Listed, 1-1/2" adjustable fog nozzle for rubber-lined hose, industrial type, 45-60 GPM discharge at 50, 100 psi, satin brass, National Standard thread.

8. Inspector's Test Connections:

a. Sight test-steel, clear tube, smooth bore, non-corrosive orifice with flow equivalent to one sprinkler head, 1" NPT connection.

b. Blind test-bronze, non-corrosive, smooth bore orifice with flow equivalent to one sprinkler head, 1" NPT connection.

E. FIRE PROTECTION VALVES

1. GATE VALVES

a. 2" and Under - 300# WOG, bronze ASTM B-62, O.S. and Y., screwed ends.

b. 2-1/2" and Larger - 200# WOG, cast iron, A-126, Class B, O.S. and Y., flanged ends. (Underground application shall be indicator post type).

2. Check Valves - Straight Way Type:

a. 2" and Under - 300# WOG, bronze ASTM B-62, screwed cap, screwed ends.

b. 2-1/2" and Larger - 200# WOG, cast iron A-126, Class B, bolted cap, flange ends.

F. ELECTRICAL

The installation of the fire alarm system shall be in accordance with NFPA Standard 72 series. All alarm initiating devices shall be compatible with and connected to the existing plant-wide fire alarm system.

SECTION X. OCCUPATIONAL SAFETY AND HEALTH

A. All aspects of the project shall be designed in accordance with the requirements of the Occupational Safety and Health Administration (OSHA).

B. During construction the contractor shall follow the recommendations of the National Electric Codes and OSHA Part 1926.

C. Provide means, in the functional design, for the safe and orderly evacuation of all areas.

SECTION XI. QUALITY ASSURANCE PROGRAM

A. The A/E will be required to implement a quality assurance program commensurate with the types of construction. All pertinent design data and specifications will be reviewed for compliance to the criteria by the Mound project team members, as well as the A/E. The A/E will - in preparing design specifications - include a subsection in each specification section entitled: Quality Assurance, and will list all applicable codes and quality requirements including testing and reporting of quality by the contractor. The QA plan will contain the necessary elements and controls to assure compliance with the Design Criteria, internal coordination of features and dimensions, internal checking and cross-checking between drawings and specifications, and tracking to assure incorporation of review comments from Title I and Title II reviews.

B. During construction, submittals will be directed through the Mound Inspector to the A/E for review to determine compliance with the specifications. The inspection functions will include working jointly with the Mound Construction Manager through the project team. The project team includes Safety, Loss Prevention, and Environmental Control and other specialists who will review drawings, specifications and critical submittals to insure compliance with quality requirements.

C. Areas of the project that require special attention will be reevaluated jointly during Title I design. The extent of application of general and special quality activities will be consistent with the engineering practices, systems, materials or components to assure needed reliability.

D. The A/E shall, in conjunction with the Contractor, maintain a set of "as-built" records which define:

- Location of any lines, utilities and services which do not correspond with those shown in the reference materials.

- Location with elevations, of any lines,utilities and services moved to a new position from the original location.

(The locations shall be determined with the assistance of a licensed surveyor).

These records shall, at the conclusion of the project, be transferred to a set of "as-built" drawings which will be turned over to the buyer as a permanent record.

SECTION XII. SECURITY

A. Security escorts will be used with any uncleared personnel employed in the construction of these facilities when work is within the main security island, but outside of temporary construction fencing. Work in these areas will be subject to scheduling in order to assure adequate escort service by Mound Security personnel.

B. Parking will not be permitted within the construction site. A contractor parking lot is located with access off Benner Road from which the contractor will be required to ferry personnel to the job site.

APPENDIX A

APPENDIX B

PROPOSED SCHEDULE

FEB.15, 1989	TITLE I START
APRIL 15, 1989	TITLE II START
JULY 15, 1989	CONSTRUCTION START

COSTS

TIE BREAKER AND SWITCHGEAR	$100,000
REPLACE PCB TRANSFORMER	50,000
TOTAL	150,000
ED&I 15%	22,500
TOTAL	172,500
CONTINGENCY 15%	25,875
TOTAL	198,375