

Analysis SEE 01.00
Project M
Stanford University

PROPOSED QUALIFICATIONS
SENIOR DESIGN AND SPECIFICATION ELECTRICAL ENGINEER,
ELECTRIC POWER UTILITIES PLAN
FOR TWO-MILE LINEAR ELECTRON ACCELERATOR

1. SCOPE OF RESPONSIBILITY

A. General

The Senior Design and Specifications Engineer must qualify for responsible charge of the planning, organization and the supervision of others in gathering data, developing a master plan layout, and preparing apparatus and equipment specifications and purchase requests for the power facilities as described. The prime purpose is to provide the necessary information to the purchasing administration for installation and construction contracts and apparatus procurement. In contributing toward the goal of the availability of adequate power facilities to serve Project M, the following responsibilities are included, interchange of information between project administration and contractor, preparation of revision and correction instructions, initiation of engineering inspection approval reports, provide legal signature on engineering plans and specifications of electrical nature, and the compilation of catalogs relative to the operation and maintenance of the power facilities.

B. Degree of Administrative Supervision

The performance of the above responsibilities is to be accomplished with a minimum of direct supervision from the project administration except for consultation on basic policies, specific electric power requirements, advice on fundamental revisions, and the final master plan approval.

II. QUALIFICATIONS

Education: B.S., Electrical Engineering, approved university.

Age: At least 35 years of age.

Experience: The individual's experience must include at least 10 years of active practice of the profession of electrical engineering including either electric power equipment design, construction, or manufacture. Industrial electrical or mechanical engineering training courses are included as professional experience. In addition, the individual must have had responsible charge for at least 5 years of important electrical design in industrial or utility construction. Technical familiarity with power transformers, rotating machinery, high voltage switchgear, power circuit breakers, high voltage entrance bushings, high voltage testing equipment, and similar apparatus is essential.

Professional Engineer's License: A California State Certificate No. EE will be required for authorized approval and signature on electrical plans and specifications.

III. BASIC OBJECTIVES

The primary goal of this portion of Project M is the preparation of the master plan, specifications and purchase requests from which the design and construction of the electric power facilities can be accomplished. These power facilities must be adequate to serve the Two-Mile Linear Electron Accelerator in producing a controlled and reliable source of particles of greatly extended range of energy and intensity to be used by physicists for high-energy research.

IV. DESIGN POLICY

The general policies that govern all designs of equipment and apparatus used in this project are derived from the basic objectives of reliability, controllability, flexibility, and minimum cost over a ten year period. This is to be accomplished by providing apparatus, equipment and facilities according to the following:

1. Ratings based on realizable performance of klystron amplifiers.
2. Apparatus adequate for but not in excess of the requirements of the project.
3. Division of the accelerator operation into sectors.
4. Conservatively engineering components designed on fundamentally proven principles.
5. New and untried circuits and designs are to be thoroughly tested. Test facilities will be provided for routine operations checks, inspection, design tests and personnel training.
7. Minimum number of different ratings of similar apparatus and a minimum number of stock parts specified.
8. Critical elements designed for draw-out and plug-in type replacement, and easy transportation to maintenance facilities outside the operating area. This is to be accomplished without interruption of the accelerator operation.
9. Elements provided to be self-protecting and in case of failure proof against interruption of accelerator operation.
10. Electric power apparatus in critical areas to be without insulating oil.
11. Critical equipment located outside the accelerator housing for purposes of easy servicing.
12. As far as possible, construction at the initial stage of the facilities will be arranged for total power requirements of both Stage I and Stage II.
13. Simplicity and flexibility of controls and protective schemes is essential.
14. The electrical power system will be supervised from a main control area.
15. All equipment is to be operated on a 24 hours per day, 7 day per week basis.
16. Dual electrical power supplies will be provided to major elements where the supply lines have questionable reliability.

V. DESCRIPTION OF ELECTRIC POWER FACILITIES

The facilities discussed herein encompass the following major elements:

1. Klystron modulator facilities,
2. Accelerator housing

facilities, 3. Lighting, 4. Utility building facilities and power, 5. Klystron housing ventilation, 6. Generator building apparatus and facilities, 7. Beam switch yard magnet power and facilities, 8. Target building cranes and facilities, 9. End station facilities, 10. Klystron laboratory, test accelerator and facilities, 11. Accelerator shop machinery power, 12. Administration building light and power, 13. General services building light and power, 14. Main electric power substation, 15. Yard cables and ducts, 16. Klystron modulator high voltage dc cables and ducts, 17. Communications, protection alarms, and control power.

P. C. Edwards, Chairman
Electric Power Utilities Committee