S T U D Y

of

HEATING, VENTILATING, AIR CONDITIONING

PLUMBING, AND ELECTRICAL SERVICES

for

THE GEORGE MASON COLLEGE

NORTHERN VIRGINIA BRANCH OF THE UNIVERSITY OF VIRGINIA

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C O N T E N T S

I N T R O D U C T I O N

The following preliminary report presents our initial investigation of utility requirements for the George Mason College of the University of Virginia.

The information contained in this report, as well as the conclusions which have led to this outline design and outline specification, are based on preliminary data supplied by Saunders & Pearson, Architects; the Governor's Office of the State of Virginia, and utility companies which would supply basic utility services at the Fairfax, Virginia, site.

The purpose of this report is to give direction to the engineering work which will be required for the successful conclusion of the design stage of this project.

Upon approval of this Preliminary Outline Design and Specification by the Architects, it will be possible to proceed with the final engineering.

G E N E R A L

The Master Plan for George Mason College shows the expansion of the College in several stages, or phases. At present, three or four stages are planned. The first stage comprises five buildings which will form the nucleus around which the future college will expand. It is foreseen that, as the college grows, a central heating plant might be installed in a service area apart from the academic sections, where the shops of the physical plant would also be housed. Later, still other facilities may be added.

On the other hand, notwithstanding the overall future size of the college expansion, the present thinking has to deal primarily with the first stage. A solution must be found which is self-sufficient and economical for a number of years, and which still permits later integration in an overall scheme with a minimum of cost.

PRELIMINARY RECOMMENDATIONS

HEATING, VENTILATING AND AIR CONDITIONING

1. Primary Heat Source

A heat pump system for heating and cooling purposes is recommended to carry the base load because of its great advantages in flexibility and operating economy, with a standby and peak-load auxiliary to meet the maximum demand. This preliminary recommendation is subject to more detailed data and economic analysis, particularly in regard to the well water availability at the site, which would be preferred for a heat pump installation.

2. Secondary Interior Air Distribution

A dual duct, high velocity air distribution system is recommended for circulation inside each of the buildings. Individual room control will be by thermostically controlled mixing boxes.

3. Fan Room

A fan room located in attic space of each building will supply air to the rooms, with perimeter heating to reduce cold downdrafts, particularly in spaces with large glass areas.

4. Ventilation

Ventilation will be controlled and introduced at the fan room to take full advantage of regenerative heat exchanger.

5. Accessories

An air-to-air regenerative heat exchanger in each fan room is recommended to increase system efficiency.

ELECTRICAL SERVICE

1. Overall Power Distribution System

a. Capacity required for Stage 1 is approximately 500 KVA.

b. Primary service voltage is 7200/12500 wye, 3 phase grounded neutral.

c. Site distribution voltage is 2400 delta, 3 phase.

d. Utilization voltage within buildings is 120/208 wye, 3 phase, grounded neutral.

e. Use underground distribution feeders.

f. Capacity required for future Stages 11, 111 and 1V will be approximately 1000 KVA additional; all other factors b, c, d, & e will remain the same.

2. Interior Electrical System

a. Loads to be determined when design criteria, e. g. type and location of lighting fixtures, become available.

b. National Electrical Code, together with local codes where applicable, to be regarded as minimum standard.

c. Use 208 volt 3 phase motors.

3. Exterior Area Lighting System

a. Power supply from adjacent building sources.

b. Minimum area lighting to be provided under Stage 1.

c. Time switch control.

4. Communications and Signaling System

a. Requires further study and conference with the University to analyze exact requirements.

PLUMBING SERVICES

1. Water Distribution System

The use of a single metered service line and a water distribution system between buildings is recommended. Either brass or copper piping and fittings are suggested for interior water distribution.

2. Drainage System

A sanitary house sewer system of cast iron bell & spigot pipe and fittings should be provided and only a limited storm sewer system primarily serving the asphalt surfaced parking lot shall (at least initially) be installed.

3. Gas System

Provided a municipal gas main is furnished to the site at the utility company's expense, a gas distribution system is favored over the use of bottled gas both from the standpoint of future expanding requirements as well as from the point of view of reliability.

4. Fire Protection System

A system of fire hydrants located close to buildings on the Campus in combination with wall-hung soda-acid type hand fire extinguishers inside buildings is suggested provided local code and Fire Underwriters requirements are thereby fulfilled.

5. Miscellaneous

Laboratory fixtures and equipment require determination prior to establishing final plumbing requirements. Future pool drainage and pool sanitation depends upon size and design of pool.

PART I

HEATING, VENTILATING AND AIR CONDITIONING

In multi-building projects a degree of centralization becomes possible, with location of heat generating equipment at a central point convenient to the cluster of buildings being served. As the size of a project increases, the advantages of centralization become more apparent with a few large units in a single central heating plant replacing numerous small units scattered over a sizable area. The size of the plant generally dictates whether or not centralization of the primary system is advantageous.

For the ultimate phase, a central heating plant is recommended in the physical plant area, reserved for this purpose in the MasterPlan. The Master Plan shows the stages in which the College will be expanded. However, it is presently unclear what timing is proposed for the various stages. Our present thinking has to be concentrated on the most favorable solution for the first stages only, but should be compatible with the general scheme applicable to the entire College.

GENERAL CONSIDERATIONS

Analysis of a heating system for a new group of buildings - or conversion of an existing heating plant to incorporate latest technological improvements - invariably concerns itself with the economics of the project. While there may be peripheral considerations, the final selection or improvement of the plant must be based on procuring the greatest return for the money spent.

A logical investigation must consider the following factors: the required investment, operating costs, and space requirements. Each of these factors must be considered as they apply to the various alternate systems available.

A. Investment

Proper appraisal of investment costs requires a sufficiently complete initial survey to show the various technically feasible systems. Actual investment costs can then be estimated with a high degree of accuracy for each of the alternates which appear technically sound. Finally, investment costs will have to be determined on the basis of expected life of each of the alternate systems under consideration.