

A LIBRARY
FOR
VIRGINIA POLYTECHNIC INSTITUTE

by
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The teaching and research programs at the Virginia Polytechnic Institute have been hampered for many years by the lack of adequate library facilities. Even though books are available through gift and exchange sources, the lack of a library building precludes the effective expansion of the book collection. The use of the present collection, which numbers about 150,000 volumes, is difficult because the present facilities are overcrowded and unattractive.

The library collection is divided into three main groups that are located in separate buildings on the campus. These are the Agricultural Library, the Engineering Library, and the Main Library. Various departmental libraries contain the remainder of the book stock. The administration and operation of this scattered system is difficult and expensive.

The worst problems are encountered in the Main Library, which is housed in a building that was originally erected as a chapel. The reading room will seat approximately one hundred and twenty-five students out of the enrollment of almost five thousand. This room contains the collection of fiction, general reference works, current periodicals and newspapers. Poor lighting, squeaky floors, and overcrowding destroy its usefulness as a place for study or pleasant reading.

Even less adequate provisions are available for the Librarian and his staff. A small wing of the building contains the librarian's office, the documents room, and the entrance on the first floor; the periodicals stacks, the order department, and the cataloging department are in one room on the second floor. A major portion of the processing of books for the entire library system is accomplished in this room. The extent of crowding in this area is evidenced by the aisles, which are scarcely more than two and a half feet wide.

It becomes quite obvious from the facts stated above that temporary measures will not solve the library problem at V. P. I. Provision of adequate space for books, readers, and staff will require the erection of a library building in the near future. A central library that can be efficiently operated and administered will best serve the needs of the college.

It is the purpose of this thesis to analyze the library situation at V. P. I., and to present a design study for a library building to effectuate an adequate library program for V. P. I. The success of the thesis is considered to be inherent in its usefulness to those who must ultimately plan a library for the college.

EDUCATIONAL POLICY

At the second Princeton Conference of the Cooperative Committee on Library Building Plans,¹ the members were conscious of the need for emphasizing that library planners should have at least some understanding of the stated educational policy of the institution before they attempt to establish a program for the design of a new building. Particularly important to the library is the relationship between undergraduate study, graduate study, and research work. Most of the members felt that it is also necessary to know the emphasis to be placed on general education in relation to the specialized education that is already offered.

Since V. P. I. is primarily a technical school, it must continue to concentrate its efforts upon providing the best possible facilities and staff to attain quality in its educational program. However, this does not preclude intensive effort to offer facilities for research, or for the stimulation of cultural pursuits.

During an interview with Dr. Walter S. Newman, President of Virginia Polytechnic Institute, he indicated that the trend of the college's educational policy will be toward more emphasis upon graduate and research work. The policy must include, of course, continued provision of adequate means of upholding or improving

¹ Report of the Second Princeton Conference of the Cooperative Committee on Library Building Plans, 1947.

the standards of undergraduate instruction. Thus, the technical phases of education at V. P. I. must receive the greatest attention.

Dr. Newman also pointed out that the present policy of consolidation of college facilities in Virginia limits the possibility of V. P. I. offering courses in the arts and humanities. The stimulation of cultural interests, therefore, becomes largely the work of the library. The success of V. P. I. graduates as future leaders will depend largely on their background of technical training, tempered by an understanding of those other fields so important to modern life.

...the library should be organized to meet the needs of the community. It should be a place where people can find the information they need to live better lives. The library should be a place where people can learn, grow, and improve themselves. It should be a place where people can find the books, newspapers, and magazines they need to stay informed. It should be a place where people can find the help they need to solve their problems. The library should be a place where people can find the support they need to overcome their challenges. The library should be a place where people can find the resources they need to succeed. The library should be a place where people can find the help they need to get ahead. The library should be a place where people can find the support they need to reach their goals. The library should be a place where people can find the resources they need to make a difference in the world.

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LIBRARY AIMS

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As a part of the written program for any library, the aims of the library must be considered carefully. The first of the main objectives of any college library² is the primary function of supply. This function consists of acquiring, cataloging, classifying, and shelving a book collection complementing the instructional program of the college. It necessarily entails the efficient production of information and material for the reader's use.

Secondly, the college library must offer guidance to the student, and assist him in making the best possible use of its facilities. In some cases this function may consist of courses in library use; in other cases it will merely consist of informal help in finding materials. Ideally, any library can offer guidance to its readers by the careful placement and presentation of the materials.

The third function, stimulation of the students' interest in reading and in cultural pursuits, vitally affects the planning of the library building. Emphasis on this aim of service will require the provision of comfortable and attractive rooms for leisure reading; individual studies for faculty and students

² Edna R. Hanley, College and University Library Buildings, American Library Association, 1939.

doing special work; exhibition space for use in enhancing the cultural life of the college; and special rooms for music and other cultural pursuits.

Since V. P. I. is primarily a technical college, emphasis must be placed on an adequate supply of materials for research and curricular endeavors. The primary aim to be kept in mind while planning the building must be efficient service to the technical reader. That involves particularly, adequate facilities for graduate students and faculty members engaged in research and the advanced technical studies.

In addition, the library must provide facilities that will stimulate students' interest in acquiring the cultural background that is necessary for successful professional leadership. Care must be taken to place materials where they can most easily be used by the readers.

LIBRARIAN'S PROGRAM

Mr. Seymour Robb, Librarian for Virginia Polytechnic Institute, suggests the following program as his estimate of the basic facilities that will be needed to provide adequate library service. These facilities are expected to fulfill the needs of the college for an enrollment up to six thousand students for the next twenty years. However, provision should be made for further expansion if that becomes necessary.

Staff

Work space should be provided for an anticipated staff as follows:

Administration:

1 Librarian, 2 Associate Librarians, 2 Clericals

Order and Accession Department:

2 Professionals, 2 Clericals

Cataloging Department:

8 Professionals, 6 Clericals

Processing Department:

2 Clericals

Gifts and Exchanges Department:

1 Professional, 1 Clerical

Periodicals:

2 Professionals, 2 Clericals

Reference and Circulation:

8 Professionals, 4 Clericals

Binding:

1 Professional, 1 Clerical

Service:

2 Janitors

Readers

The following areas and facilities will be required for the readers use:

Reading Rooms: Seating space should be provided for twelve to fifteen hundred readers in four or five reading rooms as follows:

- General Reading Room
- Reserve Book Reading Room
- Periodical Reading Room
- Physical Sciences Reading Room
- Biological Sciences Reading Room
- Children's Reading Room

Carrels or Study Cubicles: Two to four hundred individual study areas arranged near the stacks.

Study Desks: Two hundred prefabricated study desks are desirable, to be placed at suitable points in the stacks as they are needed.

Projection Room: A projection room should be provided with sufficient space to seat one hundred and fifty persons. A film vault will be required near this room.

Music Rooms: It is desired that at least six soundproof booths be provided for use with the library's record collection.

Seminars: Facilities for group study should be available in at least six seminar rooms.

Typing Room: Space for typing should be provided where others will be protected from the sound disturbance.

Service

Provision must be made for the following service areas:

Photo Duplication: Some space must be allowed for the service of providing photostats, etc. for the use of the students and faculty.

Parking Area: Service turnaround for trucks must be provided adjacent to a service entrance.

Equipment

The following equipment is considered by the librarian to be essential to the successful operation of the library:

Book Lifts:

Pneumatic Tube System:

Electric Eye Counters:

Stacks to Handle 600,000 Volumes:

QUANTITATIVE ANALYSIS1. STAFF AREAS:

ADMINISTRATIVE: The librarian will require a suite of offices consisting of his private office, a reception area, space for his secretary, and a conference room for meetings of the library board or committee. In addition, he will need a vault for the storage of records and valuables that are to be kept in his charge. Storage space will also be necessary for supplies.³

The amount of space required for these offices will be determined largely by the furniture and equipment to go in them. They should be as pleasant and attractive as possible. This not only helps to provide a comfortable working space for the librarian, but commands respect of visitors for the position which the librarian holds.⁴ The furnishings for these offices will include desks, shelving for professional literature, vertical files for correspondence, and comfortable chairs for visitors. The conference room will require tables and chairs for the use of the library committee. The librarian may also use this space for interviewing student delegations.

TECHNICAL PROCESS: The technical process of the library will be best served by planning for the functions that actually

³ Robert A. Miller, "The Technical and Administrative Functions of the Library", Library Buildings for Library Service, American Library Association, Chicago, 1947, p. 52.

⁴ Ibid, p. 53.

occur within the separate departments. These will be discussed later. In general, all departments will require a minimum of one hundred square feet of floor space per worker.⁵ This figure will provide a starting point for determining the area needed, but the space must be increased if it is found that more is required for the equipment needed.

The figure mentioned above allows for sufficient aisle space and working area in front of files. In planning the building, however, the equipment should be placed in accordance with the following standard minimum spacings:⁶

1. Main aisles, 48" to 72" wide.
2. Secondary aisles, 36" wide.
3. Desks side by side.
4. Front of one desk to back of another, 48".
5. Aisle between outside wall and desks.
6. Working space in front of files, 48".

The actual pieces of furniture to be used, when placed according to these figures, will indicate much more accurately the area needed. Allowance must be made for the expanded staff if adequate facilities are to be provided.

Receiving Room

The receiving room should have sufficient space for the unpacking of shipments of books, for two desks, and for storage of shipments until they can be processed. There is no way to

5 Ibid. 41.

6 Ibid.

determine the size of this area other than the librarian's estimate of the number of books that will have to be handled at one time.

Order and Cataloging

The following items are necessary for order and cataloging work; space allotments should be made for them in the planning stage:⁷

1. Shelving for every available foot of wall space.
2. Shelving reserved for publishers' catalogs and other trade bibliographies.
3. A stand-up consulting table where the heavier trade books may be used conveniently.
4. Vertical correspondence file.
5. Card cabinet for the order department's file of "books on order".
6. Convenient housing for the accession books or cards, whichever are used.
7. A large stand-up sorting table for the receiving and checking of books.
8. Card cases for shelf list. This item will require one card for each book in the library. Sufficient space must be provided for several people to work conveniently at one time.
9. One large flat top desk for each professional assistant.
10. Typewriter desk for each clerical assistant.
11. A chair for each desk.
12. One book truck for each two assistants.

⁷ Joseph L. Wheeler and Alfred Morton Githens, The American Public Library, American Library Association, Chicago, 1941.

13. Card mimeograph machine or other equipment for reproducing cards, in a soundproof enclosure.
14. One electric eraser for each three or four typists.
15. Work tables for pasting, labeling, and other work to finally prepare the books for the shelves.
16. A generous supply of cupboards.
17. Book lift or elevator.
18. Washbowls with hot and cold water at least every thirty or forty feet within the department.
19. Twelve to fifteen feet of shelf space for each cataloger.

CIRCULATION: A major part of circulation work is done in the stacks and the reading rooms. The principal work areas required for the circulation staff are the desks in the various reading areas, the main desk, and the workrooms associated with them.

Circulation Desks

The size of circulation desks will be determined by the number of people that will be served, and the staff that will be provided at the desk to handle those people. The main circulation desk will be the largest since it will handle all charging, and since all books will be returned there. Standard units are available for making up desks in various multiples of those units.

Circulation Workrooms

Workrooms for the circulation staff require a minimum of seventy-five square feet per worker; certainly a space not smaller than

from two to three hundred square feet. All available wall space should have shelving. Space must be allowed for desks for each assistant, a table for sorting books, storage cabinets for stationary and supplies, and a washbowl with shelving above for small tools.⁸

SUPPLEMENTARY STAFF AREAS:

Bindery

The equipment and furniture needed will determine the area requirements for the bindery. A desk will be necessary for the professional in charge. Shelving will be necessary on all available wall space. For a small bindery, which can operate economically by doing only minor repairs and covering, the equipment required will usually be one or two work tables, several cabinets for supplies, electric glue pot, and possibly a small press. Extensive binding operations are usually more economically done outside of the library.⁹

Building Service

Building service involves cleaning and minor repair and maintenance. A janitor's closet will be required on each floor with a low slop sink and space for mops, buckets, mop trucks, polishing machine, brooms, soap, and other supplies. Additional storage for supplies must be provided, usually in the basement

⁸ Ibid, p. 186.

⁹ Ibid, p. 198.

near the janitors' room. The janitors' room should have a table, chairs, lockers, and a washroom. A desk will also be needed for the janitor in charge of the building.¹⁰

PROVISIONS FOR STAFF WELFARE:¹¹ The general trend in the management of libraries is toward the decentralization of restrooms, lockers, and drinking fountains for the staff. It is certainly desirable to have some facilities reasonably near the areas of work. The areas required for these facilities can best be determined by the number of persons to be served in a particular area.

The staff should have lounge space, kitchen facilities, and restroom facilities in addition to those mentioned above. Space for recreational activities should be generous, and should take into account the provision of comfortable furniture.

2. READERS' FACILITIES:

READING AREAS: The minimum space requirements for all reading areas should be twenty-five square feet per reader. Provision of thirty square feet per reader is not too much, especially if the reading areas are broken into smaller units such as alcoves.¹²

10 Supra (7), p. 194.

11 Supra (3), p. 54.

12 Supra (7), p. 131.

Planning the areas for the actual furniture that will go into them will probably change this figure. The following is a checklist of the equipment usually required in reading areas with the minimum spacings desirable:¹³

1. Tables spaced 60" apart and 40" to 60" from end to end. All aisles four to five feet wide.
2. Shelving for the number of volumes deemed suitable by the librarian.
3. Vertical files for pamphlets and clippings, where applicable.
4. Atlas and map cases, unless these items are to be concentrated in a separate area.
5. Several display racks for special books.
6. Dictionary consulting stand.
7. Shelving for Poole, the Readers Guide, the International Index, and other similar publications in the periodicals area.
8. Racks for newspapers and magazines in the periodicals area.

CARRELS: Carrels vary in size from about four to eight feet square. The smaller carrels are usually open to the stacks, and provide no more than a desk and some separation between students. The larger carrels may have doors with locks, and are usually used for faculty and graduate studies.¹⁴

¹³ Ibid, pp. 102 - 132.

¹⁴ Summary of information from all sources.

SEMINARS: Seminar rooms should be provided for assignment for use in group study. These rooms should be from three hundred to four hundred square feet,¹⁵ to accommodate twenty to thirty persons.

3. SPECIAL FACILITIES:

The following elements are desirable, and should be provided in any college library that is to offer a constructive program for general education. They are particularly necessary in the technical college, where such facilities are not likely to be provided elsewhere on the campus.¹⁶

1. Projection room with film vault.
2. Music area with soundproof booths.
3. Typing areas, soundproof.
4. Faculty studies for extended research.
5. Microfilm facilities.
6. Exhibition area.
7. Map area.

There are no standards available for the area requirements of these spaces. Judgement can only be based on the number of people likely to be served.

4. STACK AREAS:¹⁷

A rough estimate of the size of stack areas may be made by the use of the "Cubook" as a unit of measure. The Cubook is defined

¹⁵ James Thayer Gerould, The College Library Building, Its Planning and Equipment, Scribners, New York, 1932, p. 43.

¹⁶ Supra (14).

¹⁷ Supra (7), p. 414.

as the volume of space required to shelve the average size book in a typical library. There are eleven Cubooks per square foot of stack area, or 1.47 Cubooks per cubic foot of stack. Division of the total number of volumes to be housed by eleven will give an approximate estimate of the floor area required, including ranges, range aisles, main aisles, stairs, and elevators. A check on this figure may be made after the sketch plan stage by using the figure of two hundred and fifty volumes per double faced compartment as a working capacity. This is the figure suggested by Wheeler and Githens as "fairly safe" for estimating capacity.

5. MISCELLANEOUS ELEMENTS:

THE CATALOG AREA: The catalog area will require space for the catalog cases and sufficient working space between them. Six feet of space is desirable in front of the cabinets to allow sufficient working space.¹⁸

The number of catalog cases will depend on the type of cases used. In general, although readers do not like to use very low or very high trays, cabinets twelve trays high are desirable. If standard units are used, additions are much easier to make later, and it may not be necessary to provide all the catalog cases in the original space.¹⁹

¹⁸ Supra (15), p. 54.

¹⁹ Supra (7), p. 460.

"To estimate catalog capacity, take the book-stock estimate for two years hence and multiply by four cards per volume, to cover the average of author, title, subject, and analytic cards. Allow $6\frac{1}{2}$ " width on centers for each vertical row of trays and partitions, and 4" height per tier, beginning 1" above the base or stand."

The above procedure is based on a tray capacity of one thousand to thirteen hundred cards per tray, depending upon the weight of the cards.²⁰ Cases are available in standard units, and planning should be based on sizes from manufacturers' catalogs. Stand-up tables near the catalog cases are desirable in place of the sliding shelves for a busy catalog area.

LOBBIES AND CIRCULATION SPACES: No figures are available as recommendations for circulation areas; however, they must be fairly large, and should provide some seating for persons who may be waiting for books from the stacks.

TOILETS AND COATROOMS: The amount of space needed for toilets and coatrooms will depend upon whether they are to be centralized or not. This particular point will be discussed later under the functioning of the building plan.

MECHANICAL EQUIPMENT: The space to be allotted for the mechanical equipment will be determined by the type and kind of equipment used. About five per cent of the total building

²⁰ Ibid.

TABLE OF AREA REQUIREMENTS

NOTE: This table is based on a 600,000 volume capacity.

STAFF:

<u>SPACE</u>	<u>UNIT</u>	<u>SQUARE FEET</u>	<u>AREA</u>
Librarian's Office			200 FF
Reception Area			200 Prob - loc
Vault			75 ✓
Storage			75 ? office
Lounge and Kitchen			400 ✓
Toilets and Lockers			200 ✓
Receiving Room			225 500 Base
Bindery			300 Base
Photostat			400 Base
Janitors			300
Order and Accession	4	100	400 1st floor
Cataloging	14	100	1,400 acc to card index
Processing	2	100	200
Gifts and Exchanges	2	100	200 Base
Periodical	4	100	400
Reference and Circulation	12	100	1,200
3875			
<u>READERS:</u>			
<u>Reading Areas:</u>			
General	150	25	3,750 + 1000
Periodical	250	25	6,250
	150		3,750 + 1000
	250		6,250

SPACE	UNIT	SQUARE FEET	AREA
Reserve	100	25	2,500
Physical Sciences <i>Eng</i>	200	25	5,000 + 1000
Biological Sciences <i>Eng - 54 present</i>	200	25	5,000 + 1000
Carrels	<i>100</i> 200	20	<i>2000</i> 4,000
Double Closed Carrels	20	60	1,200
Seminars	10 <i>5 from 6000</i>	300	<i>1500</i> 3,000
Children's Room	50	25	1,250
Typing Area <i>check with Rob</i>	20 <i>5</i>	25	<i>125</i> 500
Music Area <i>check with Rob</i>			600
Projection Room	150	7	1,050
Film Vault			150
Micro-film			300
Exhibition			1,000 4X
<u>STACKS:</u> 600,000 volumes			
11 Cubooks/ square foot of Stack Area =			54,500
<u>CIRCULATION:</u> Including toilets and coatrooms			10,000
<u>MECHANICAL EQUIPMENT:</u>			<i>1000</i> 6,000
<u>TOTAL</u>			116,000

36 272

40.155

includes above 116,252

447,000

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ANALYSIS OF FUNCTIONS1. THE BOOK FLOW:²¹

The flow diagram on page 21 shows the operations that are usually performed in preparing books for the use of the readers. This analysis of the "technical processes" is based on information from the sources cited, modified by information obtained from the library staff.

RECEIVING ROOM: The receiving room serves as the unloading point for all materials that come into the library. Boxes are uncrated here, and the books are placed on book carts in preparation for sending them to processing departments.

Materials when unpacked are sent to one of the following three areas:

1. Order department.
2. Gifts and exchanges department.
3. Periodicals work area.

The gifts and exchanges work space should be near the receiving room, since the books handled there must be ordered, received, and checked separately before they are cataloged. All other books are handled in the regular order department. There should be direct access from the receiving room to the order room, either vertical or horizontal.

²¹ Most of the basic functions in this section are presented in (7) supra, p. 154.

ORDER DEPARTMENT: Titles of books suggested for order are copied on order slips. The order librarian's preliminary work consists of checking author, title, publisher, edition and price, and filling in these items on the order slip. This will require that the order librarian be placed near the trade bibliographies. The volumes most often used are the publishers' trade bibliographies, Cumulative Book Index, Reference Catalog for Union List of Serials, and booklists. Several of these references are heavy volumes that will require a stand-up table with sloping surface. The Library of Congress reference should be near at hand for the ordering of L. C. cards.

After the orders have been approved by the librarian, they must be written up and sent to the publisher or dealer. Copies of the order slip are usually placed in a "books on order" file and in the catalog. A copy of the order slip must be sent to the Library of Congress.

After the books are received, the order librarian must check the books against the invoice and the original order, and prepare financial records showing the date and net price. In the V. P. I. library, these records are kept by the order department. Record of the book must next be transferred from the "books on order" file to the "books in process" file.

The books are then accessioned, i. e., assigned a consecutive serial number as added to the library. This will require the addition of a card to the "shelf-list". This operation may be performed by the cataloging department in some libraries.

CATALOG DEPARTMENT: The cataloger's work consists of cataloging, classifying, shelf-listing new titles, and assigning subject headings. Each of these processes is complicated and involves specialized knowledge. They are usually performed by one individual as a single process. For that reason, they are simply grouped together here. The tools required for this work should be as close as possible to the catalogers. These are the same tools mentioned above for the order librarian. The shelf-list must be near the catalogers, since keeping up that file is a part of their work in the V. P. I. library.

After the cataloger has completed the above steps, the typists adapt L. C. cards for the catalog. If L. C. cards are not available, cards may be either typed or duplicated in the department. The cards must then be checked by the cataloger, who also files the cards in the catalog.

The rest of the technical process consists of the mechanical preparation of the books for the shelves. Book cards, pockets, and bookplates are typed, and pasted in the books. The backs

of the books are then lettered with the call numbers. This is usually done with electrically operated stylus and tape. Pamphlets and other ephemeral material may be reinforced here, or may be sent to the bindery.

The books are now ready to be sent to the shelves. A large table will be required for sorting the books to be sent to the stacks.

A careful study of this process would seem to indicate that it is desirable to combine the catalog and order departments in one area. This is usually the arrangement in most large libraries. This procedure allows placement of the bibliographical materials where they are available to both the order and catalog personnel. These staffs often find it necessary to use the bibliographical materials that are usually placed in the reading rooms. If possible, it would be desirable to concentrate the main stock of bibliographical material in one area near the order department, the catalog department, and the main circulation desk. This would place the material where all of the staff members could reach it easily. It would not interfere with the use the readers make of the material, since they would not usually be referring to it intermittently.

One major problem that is encountered in planning for the functions of the technical departments, is that of separation of typing to relieve catalogers from the noise. However, the use of acoustical materials may avoid the need for separation. Use of resilient floors and acoustical ceiling materials will allow placement of the typists next to the professionals where they function best. If separation seems necessary, partitions of glass will break the sound sufficiently and still allow good supervision.

The following areas should be as close as possible to the order and catalog departments in the order listed:

1. The catalog.
2. The stacks.
3. Bibliography.
4. Circulation staff area.
5. Lobby.
6. The receiving area.

2. THE STAFF FLOW:

The most important staff flow encountered is that of the members engaged in the technical processes. This has already been discussed under THE BOOK FLOW. As many of the staff functions as possible will center around the processing departments.

ADMINISTRATIVE: The administrative staff will consist of the librarian, his secretary, the associate librarian in charge of

processing, one clerical assistant, and the associate librarian in charge of reference and circulation work.

The only administrative offices that should be concentrated are those for the librarian and his secretary. This area usually includes the conference room for the library committee. The administrative area should be on the first floor, if it does not displace important technical or reader functions. It is desirable that the librarian's office be accessible to visitors,²² without having it become a gathering place for loungers and those who just want to talk. It is not necessary that it be located in a prominent position, as those persons who really desire to see the librarian on business may easily find out how to get to his office.

Another criterion for the placement of the administrative offices is the relationship to the technical functions of the library. It is advisable to have the offices as near to these functions as possible, for ease of supervision by the librarian and accessibility to the personnel of the technical departments.²³ However, it must not be overlooked that it is desirable for these offices to have natural light. This indicates a location on the exterior of the building.

²² Supra (15), p. 85.

²³ Ibid.

CIRCULATION WORK AREAS:²⁴ A circulation desk will be placed in the main lobby and in each of the major reading areas. They should be placed so that the staff can easily oversee the reading areas and the entrances. Work spaces should be located behind the desks, and separated by glass partitions for quietness. All circulation work areas should have easy access to the stacks. All circulation work that is not handled in these work areas will usually be done in the stack and reading areas.

The principal operations of the circulation personnel are finding books, finding information, offering advice to readers, charging-out books, receiving, sorting, and returning books to the stacks. Most of the circulation functions will be taken care of at the main desk, while the reference work will occur in the reading areas.

The main desk, or "charging desk", should be in the lobby, and should survey the main entrance and approaches to other entrances. This is absolutely necessary for effective control. In order of importance, its other proximities should be the catalog and bibliography area, main reading area entrances, and entrances to the main stack level.²⁵

BINDERY AND BUILDING SERVICE AREAS: The bindery and the building service facilities are usually placed in the basement, as they

24 Supra (7), p. 96.

25 Ibid, p. 95.

have no direct relation to any other particular areas. It is natural to place them in space that is the least satisfactory for other purposes. It is very desirable, where possible, to have the bindery and the janitors' room at the perimeter of the building where light can be obtained.

STAFF LOUNGE AND KITCHEN: In the past, staff facilities have been placed in the least desirable areas. This is certainly not a desirable practice, since it is not an encouragement to prospective personnel. Basement, mezzanine, or penthouse areas all offer reasonable solutions to the problem. In any case, these areas should be related to the staff entrance and the various work levels by an elevator, if possible.

3. THE READER'S AREAS:

A study of the plans of recent college and university library buildings, most of which are not yet executed, indicates that there is no agreement on the function of the reading areas.²⁶ Each of the plans has reading areas placed according to a different educational and library policy. Each library is planned to serve the needs of an entirely different type of educational program, and a particular type of student body.

²⁶ "Report of the Chicago Conference of the Cooperative Committee on Library Building Plans, Chicago, January 27-28, 1948".

The typical arrangement would place the general reading area, the periodical reading area, and the main circulation desk and technical processes on the main level. Other reading areas would then be relegated to other levels. The disparity of thought about reading area placement indicates that it would be wise to study carefully the needs of the student body, and not allow inhibitions to prevent arrangements other than the obvious ones previously used.

In support of this contention, the following remarks of William M. Randall, Director of Libraries, University of Georgia, may be of interest:²⁷

"We have a bad habit of allowing our minds to become confused with professional, "pattern" words, instead of going behind these words to the things they represent and studying these in the light of knowledge of needs and functions. Before we know it, we find ourselves enmeshed in tradition, and we find ourselves building structures that are no different from the structures that have been built - no different from the structures which were intended to house an older and a different librarianship. This we must avoid."

"Please do not misunderstand. This does not mean that new libraries must be different just to be different. It means that the plans for

²⁷ William M. Randall, "The Constitution of the Modern Library Building", from Library Buildings for Library Service, papers presented before the Library Institute at the University of Chicago, August 5-10, 1946, American Library Association, Chicago, 1947, p. 188.

new library buildings must grow out of a new and honest appraisal of library functions and not out of a picture of what libraries have been."

In the light of recent planning trends,²⁸ it seems wise to use the relationships shown in the general flow diagram on page 32, as a starting point for the basic planning. Further study of the relationships, and conference with the librarian may indicate entirely new and better arrangements.

²⁸ Supra (26).

CONCLUSION

CONCLUSIONS AND RECOMMENDATIONS

The design of the structure has been completed in accordance with the requirements of the project. The design has been based on the following assumptions and conditions. It is recommended that the design be approved for construction. The design is based on the following assumptions and conditions. It is recommended that the design be approved for construction.

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DESIGN ANALYSIS

The design of the structure has been completed in accordance with the requirements of the project. The design has been based on the following assumptions and conditions. It is recommended that the design be approved for construction. The design is based on the following assumptions and conditions. It is recommended that the design be approved for construction.

DESIGN ANALYSIS1. LIBRARY DESIGN TRENDS: STRUCTURE

In the past decade vast changes have occurred in the design of library buildings. In general, the trend has been toward a completely flexible building, which is usually referred to as "Modular". Modular construction refers simply to a building planned on a series of regular bays, often cubes. The building then consists of a series of floors supported by columns evenly spaced. Walls or partitions become merely screens to separate areas, and are as light as possible, so that they can be easily moved.²⁹

The library buildings studied and criticized by the Cooperative Committee on Library Building Plans, are all planned on a modular basis. Some, however, have not taken full advantage of light movable partitions to attain complete flexibility. The buildings are the most recent designs for the larger colleges and universities in this country. Many of them are still in the planning stage.³⁰

The most advanced idea in modular planning for library buildings was suggested by Mr. Angus Snead MacDonald, who has specialized

²⁹ Supra (27), p. 199.

³⁰ Supra (26).

in library equipment and design for many years. He suggests a structure designed on a modular basis, with the columns, beams, and floors designed as hollow members which carry the air conditioning and ventilating, without the use of ducts. The ceiling panels could be designed as perforated units to carry the conditioned air to all spaces in the building. With a lighting system designed as a part of the ceiling also, movable partitions could be used to divide the interior into whatever spaces are desired.³¹

Mr. MacDonald believes that the savings, using nine foot story heights, with an increase of from thirty-five to forty per cent of net floor space over a building with normal fifteen foot story heights, would pay for the best in lighting, air conditioning, and complete acoustical treatment.

In commenting on this system of construction, Mr. Randall has pointed out that modern methods of air conditioning and lighting have eliminated the necessity of having high ceilings. However, "modular construction" does not necessarily require low ceilings. The use of low ceilings does effect tremendous savings in building cost, with the resultant replacement of large monumental areas with smaller, more comfortable areas.³²

31 Angus Sneed MacDonald, "New Possibilities in Library Planning", Library Journal, December, 1945.

32 Supra (26), p. 200.

Buildings similar to the libraries mentioned above may be built by any of the usual methods of construction. However, the savings which are expected in modular construction are based on the use of dry construction, i. e., steel rather than concrete or masonry materials. Use of prefabricated panels and finishing materials would effect large savings over site-fabricated construction.

2. MATERIALS:³³

FLOORS: In planning a modular library building, the floors and ceilings throughout should have a uniform quality suitable for work areas, stacks, or reading areas if maximum flexibility is to be obtained. The two essential qualities for flooring are resiliency and durability. The more resilient the flooring is, the quieter will be the atmosphere for working or reading. Resilient flooring is also more comfortable for walking for long periods of time. It is, therefore, desirable to have such flooring throughout the building, not only for the comfort of the readers, but for the comfort of the staff, who must work there many hours each day.

In offices and small areas, where particularly comfortable surroundings are desirable, heavy pile carpets may be used

³³ Supra (7), p. 384.

on the floors. Elsewhere in the building, a floor finish of the resilient type should be used. The materials used most often in descending order of desirability are rubber tile, cork tile, battleship linoleum, and asphalt tile. It should be pointed out that costs vary in the same relationship, from high to low. The asphalt tile satisfies minimum requirements for sound reduction in most areas, but will probably not be satisfactory for the noisier working areas. Test data of the National Bureau of Standards indicate that the rubber tile tested offered better resistance to wear abrasion, and fracture than other type of flooring. Various linoleum tiles showed good results, as did asphalt tile. All of these performed better on concrete sub-floor than on wood.³⁴ It is desirable for floor finishes to be light in color. In stack areas particularly, light floors will help light books on the bottom shelves.

It should be noted that outer vestibule floors should be of non-slip materials, since they are subject to water in rainy weather. Asphalt tile or special non-slip tile floors are satisfactory for this purpose.

34 "Building Materials and Structures Report, BMS 34, Performance Tests of Floor Coverings for Use in Low Cost Housing;" parts 1, 2, 3, 4. National Bureau of Standards.

CEILINGS:³⁵ Ceilings should provide two of the qualities recommended for floors; they should have a high sound reduction coefficient, and they should be light in color for high reflective value.

In general, the hard smooth finishes such as smooth plaster reflect sound, and result in poor acoustics. Rough plaster is slightly better. The only materials that are really effective in reducing sound are the various acoustical plasters, and acoustical tiles or pans. These are expensive materials, but the results in better work, less maintenance, and the flexibility make them worthy of consideration. Acoustical materials offer sound reduction coefficients of from .40 to .85. If other materials are used, ceiling beams breaking the ceiling are effective in reducing sound reflection.

PARTITIONS: All partitions should be movable panel construction. In some areas glass panels or screens may be used. Where solid partitions are needed, light steel partitions should be used. Such partitions are made by various manufacturers. Snead and Company, specialists in library stacks and equipment, offer a steel partition that compares favorably to the usual four-inch gypsum block-plaster partition in sound absorption qualities. The partition is hollow and filled with rock wool insulation.

35 Ibid.

Its most important advantage is that it can be moved to another position in about forty-five minutes by two untrained men. This type of partition costs about twice as much as the block wall mentioned above, but its cost, moved and re-erected, is less than that of the block partition replaced.³⁶ Since flexibility in libraries is deemed essential in present designs, it seems desirable to use movable partitions throughout the building, except where elements will remain fixed or require high fire resistance ratings.

3. MECHANICAL EQUIPMENT:

HEATING AND VENTILATING: Modern library buildings, with their vast amount of interior spaces, require an air conditioning system, or a combination of a heating system with a forced ventilation system for warm weather use. Most new libraries are using a complete year round air conditioning system, not only to provide for human comfort, but to protect the book stock from the damaging affects of changing humidity conditions.

Mr. R. H. Gates, a consulting engineer, recommended to the Library Institute at the University of Chicago,³⁷ use of a

36 "Report of the North Carolina Conference of the Cooperative Committee on Library Building Plans, Chapel Hill and Durham, N. C., March, 1947".

37 R. H. Gates, "Modern Air Treatment", Library Buildings for Library Service, papers presented before the Library Institute at the University of Chicago, American Library Association, 1947.

system employing modular construction, volume control, and the T. E. G. (triethylene glycol) system of dehumidification. Initial costs as well as operating costs are considerably lower than normal systems employing refrigeration and constant volume control. He says,

"The many intangibles and indeterminate factors to be considered comparatively do not promote the advisability of expressing categorically the degree of saving to be expected from a system employing modular construction, volume control, and the dehumidification process to be recommended, in lieu of a conventional system employing refrigeration. It may be stated safely, however, that, under favorable conditions, both installation and operation costs can be cut in half."

LIGHTING:³⁸ It is desirable, where possible, to use natural lighting, particularly in reading and work areas. Light colored walls opposite the windows will aid in diffusing and distributing the light. For reading, windows on a northern exposure are desirable. Where southern exposures occur, readers must be shielded from direct sunlight.

"The consensus of opinion on artificial light indicates that visual acuity is best when the luminosity of the surroundings is about one-half that of the central area under observation and should not drop below one-tenth of that."

³⁸ Supra (7), p. 393.

There are several principles to be kept in mind in selecting a lighting system for a library. The most important factor is the prevention of glare and contrasts. It is necessary to keep bright light sources out of the field of vision, which is usually considered to be from thirty to forty-five degrees from the horizontal. In general, indirect lighting systems are best with respect to glare. Local lights on reading tables are glare producers, and are entirely unsatisfactory.

Proper diffusion, with an intensity of from twenty to twenty-five footcandles, is the condition that is considered to be most desirable. Generally, coffer, troffer, cove, or indirect light systems are the most desirable with respect to results and costs.

At the Second Princeton Conference of the Cooperative Committee,³⁹ an extended discussion of artificial lighting occurred. The discussion led to later correspondence and resulted in recommendations for good lighting, by Professor Parry Moon of M. I. T. The recommendations are summarized in the following table.

³⁹ Supra (1).

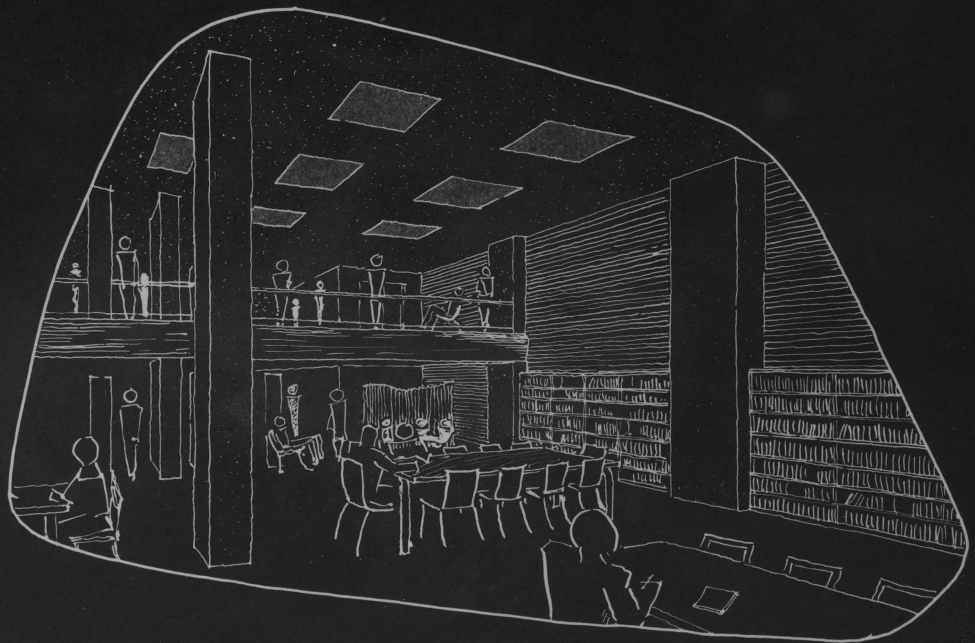
TABLE ITentative Standards for Obtaining Best Vision

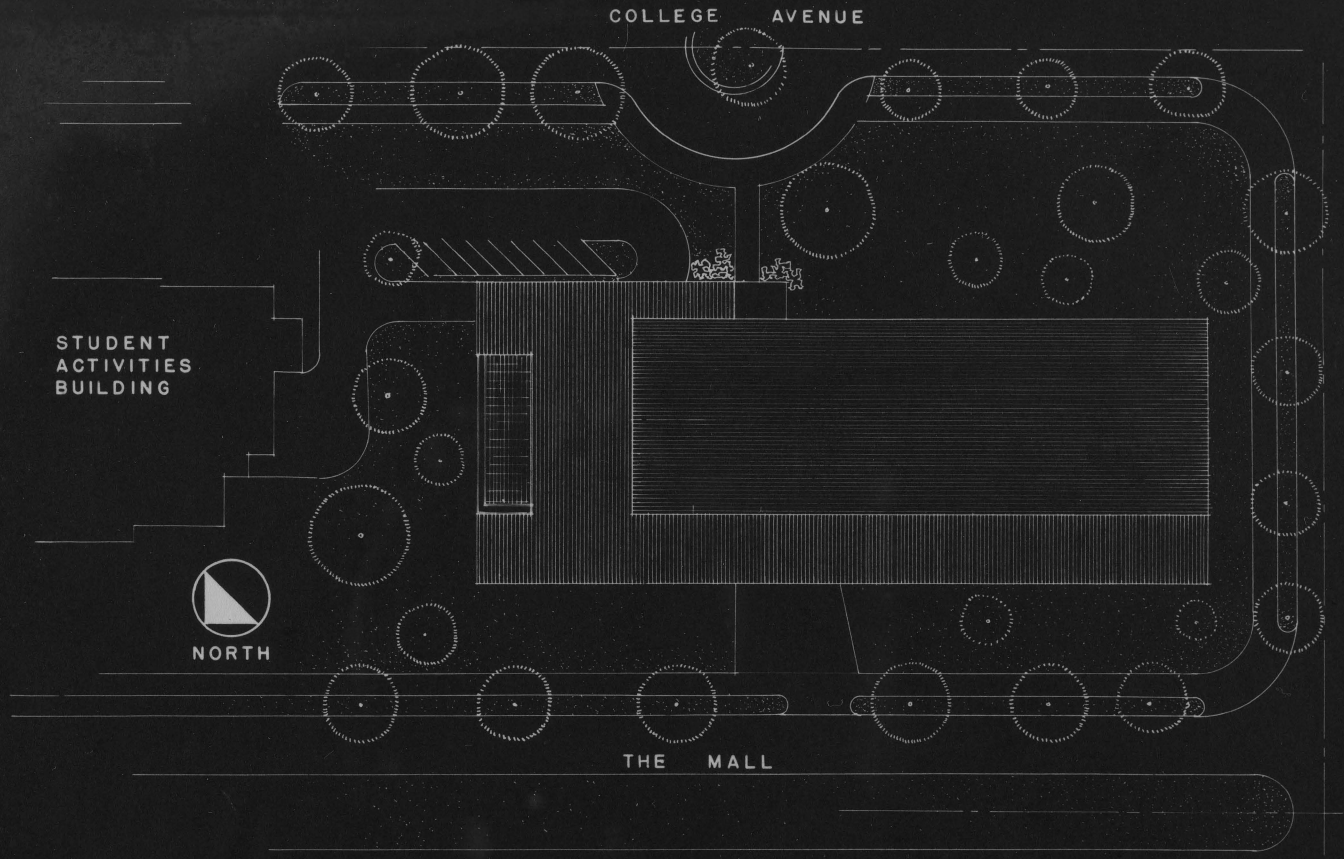
1. Ceilings should be pure white (not "off-white") and should have initial reflectances of at least 0.80 (Munsell value 9.4).
2. Wall surfaces (including chalkboards) should have reflectances of at least 0.50 (Munsell value 7.8) and chromas that do not exceed 4.
3. Floors should have reflectances of at least 0.30 (Munsell value 6). Chromas should not exceed 4.
The purpose of the foregoing high reflectances is to obtain
 - a. A bright, cheerful appearance for the room;
 - b. Low contrasts, to promote good vision;
 - c. A maximum of interreflections of light among the various surfaces, to give a diffused quality to the light and freedom from shadows;
 - d. A maximum of useful light for a given lighting system.
4. Desk tops and table tops should have reflectances of at least 0.30 (Munsell value 6) with chromas not exceeding 4. Lower reflectances will produce too much contrast with white paper and will tend to cause eye strain. These values for desk tops can be realized by using unstained wood or by covering the surface with a light-colored linoleum.
5. Furniture and trim should preferably be as in (4). Lower values and higher chromas may be employed, but only if the size of the object is small compared with the distance at which it is viewed.
6. Venetian blinds should be white and should be drawn at night.
7. Average illumination at desk level, produced by the artificial lighting system, should be at least 20 lumens per square foot (20 "ft-candles").

8. Maximum brightness of a luminaire should not exceed 3 times the brightness of paper on the desk. Usually the eyes adapt themselves to the brightness of the paper, and any extended surface having a brightness more than 3 times this value is a source of annoyance and possible eye strain. Even if the luminaire is completely out of the normal field of view, it is almost sure to cause trouble because of specular reflections if its brightness is more than 3 times the brightness to which the eyes are adapted.

PRESENTATION

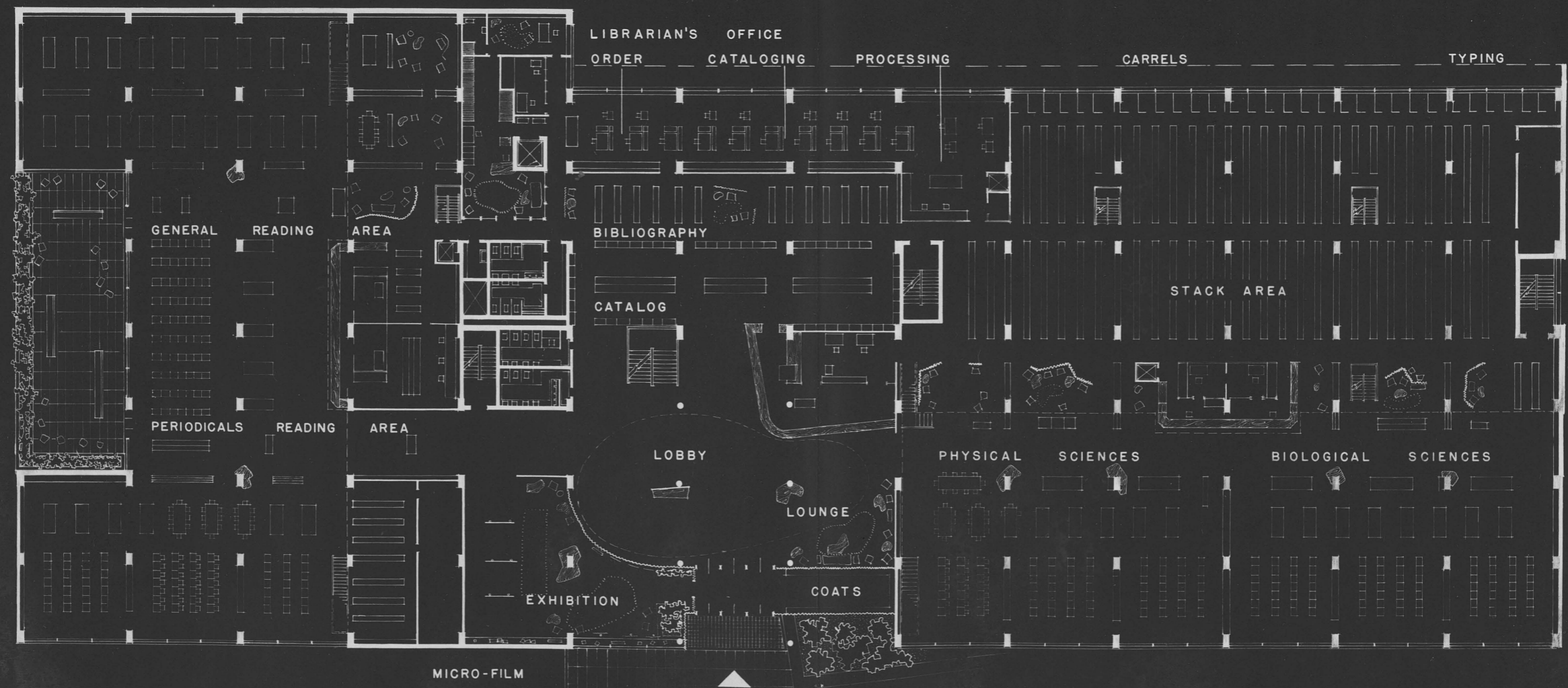
A LIBRARY FOR
VIRGINIA POLYTECHNIC INSTITUTE

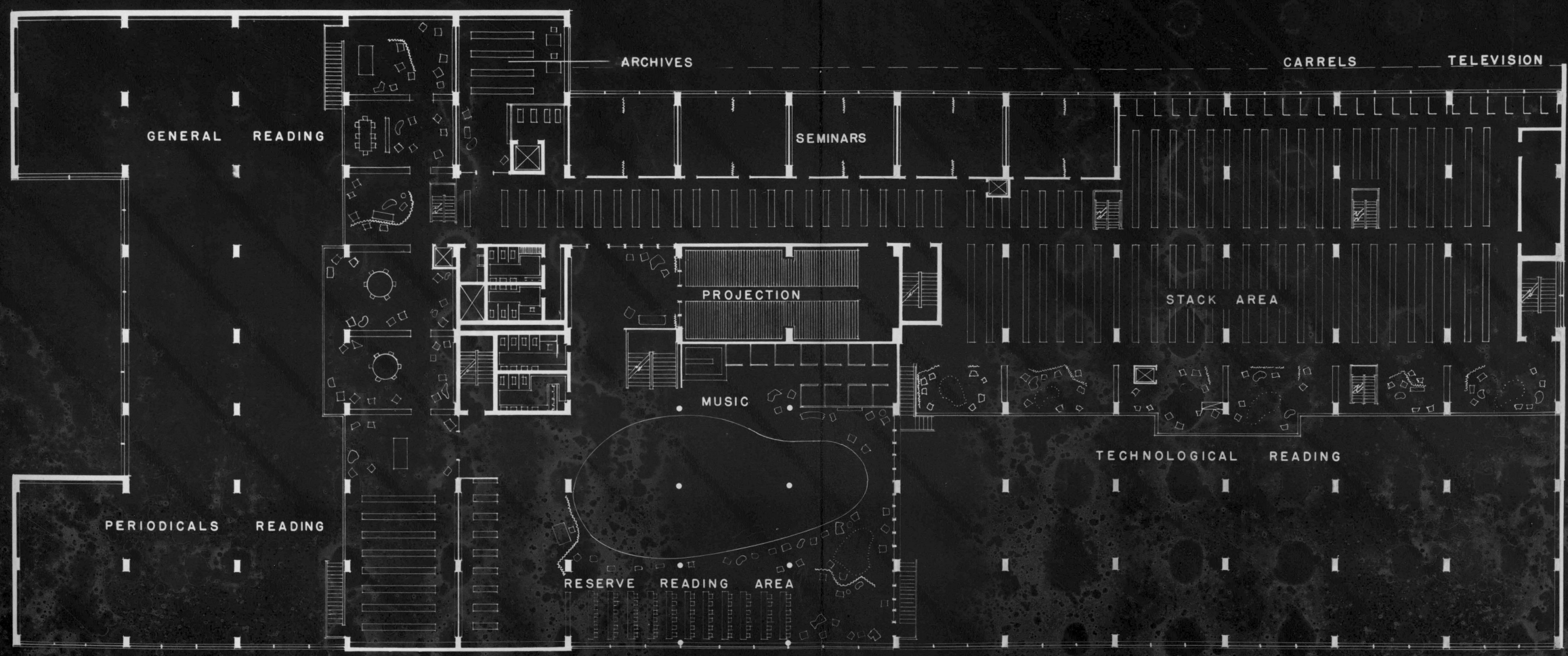




PLOT PLAN

SCALE 0 50 100' 200'

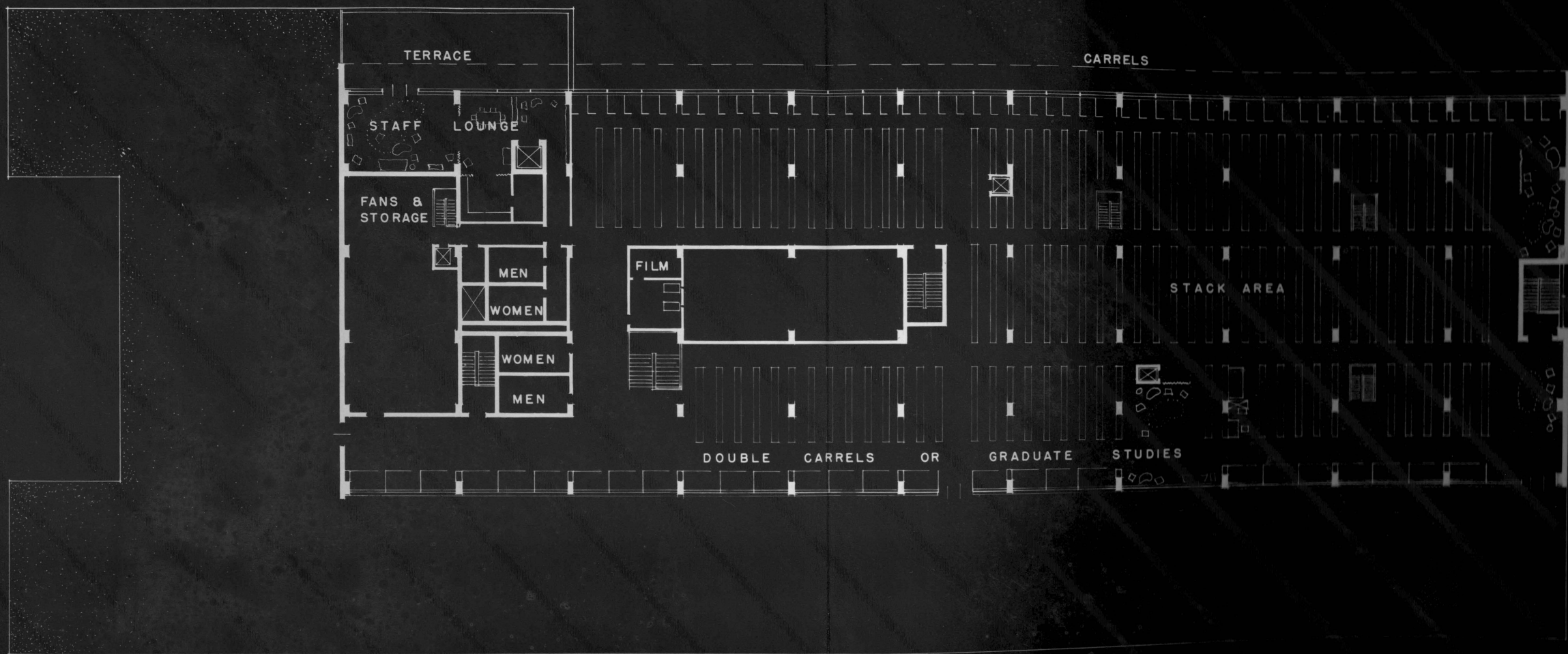




PLAN ■ PLUS ONE LEVEL

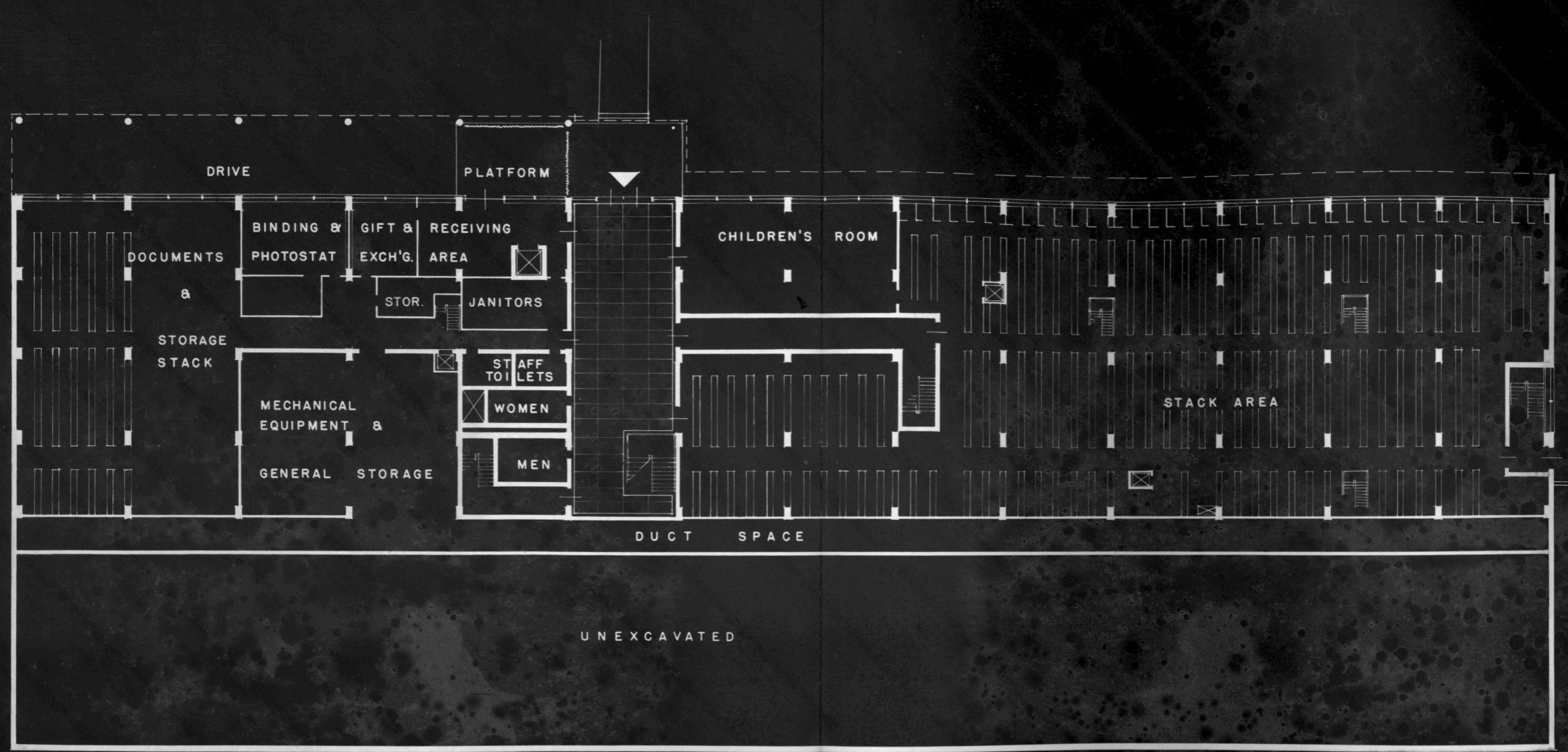
SCALE 0 4 8 12 16 32

53,624



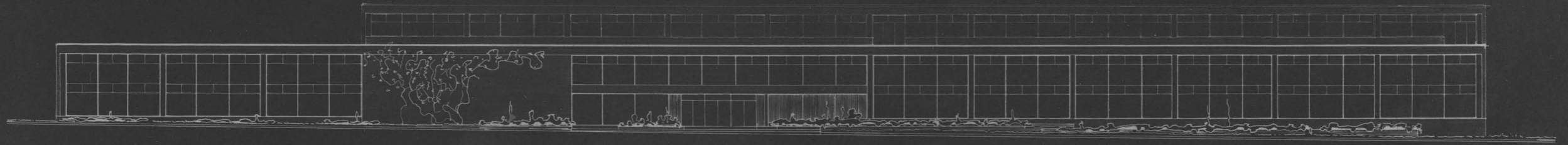
PLAN ■ PLUS TWO LEVEL

SCALE 0.4 9 12 16' 32'



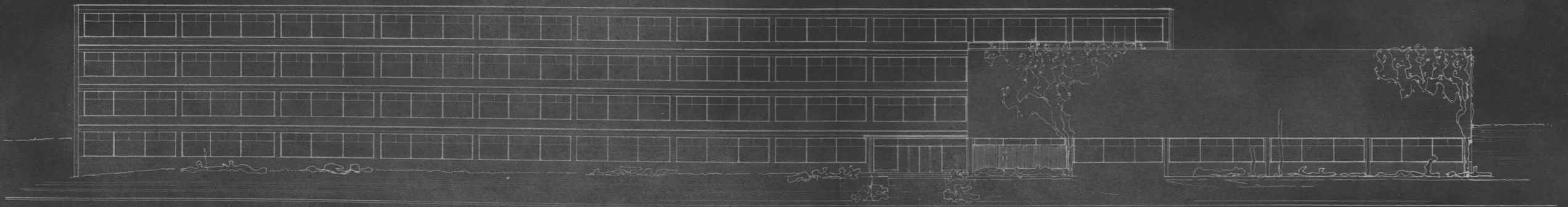
PLAN - MINUS ONE LEVEL

SCALE 0 4 8 12 16' 32'



N O R T H W E S T

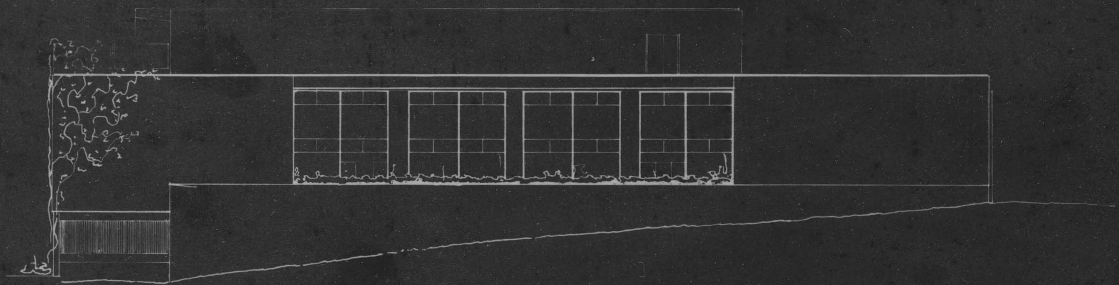
E L E V A T I O N



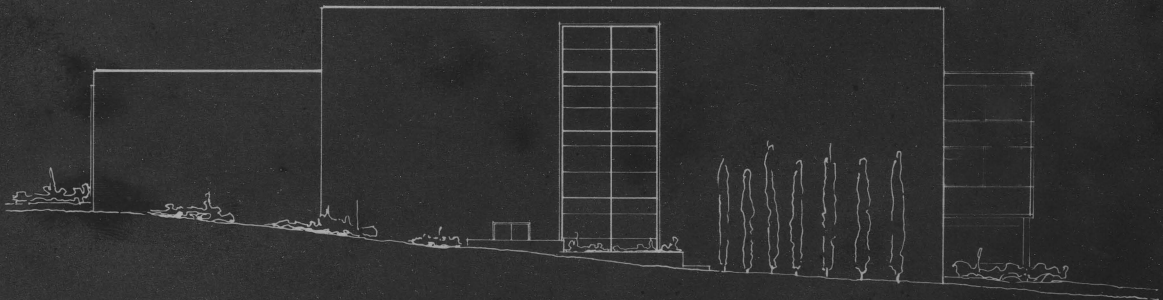
S O U T H E A S T

E L E V A T I O N

SCALE 0 4 8 12 16' 32'



N O R T H E A S T E L E V A T I O N



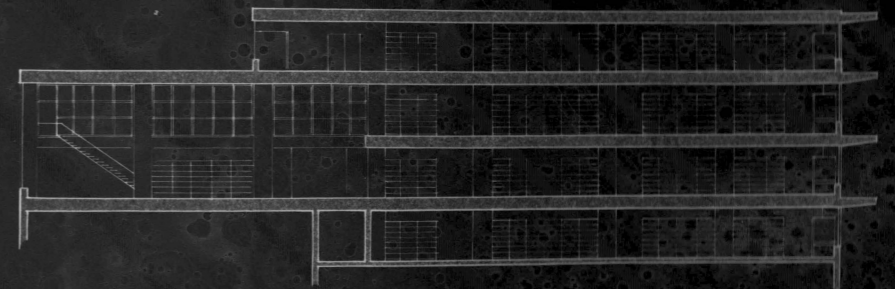
S O U T H W E S T E L E V A T I O N

CONSTRUCTION OUTLINE:

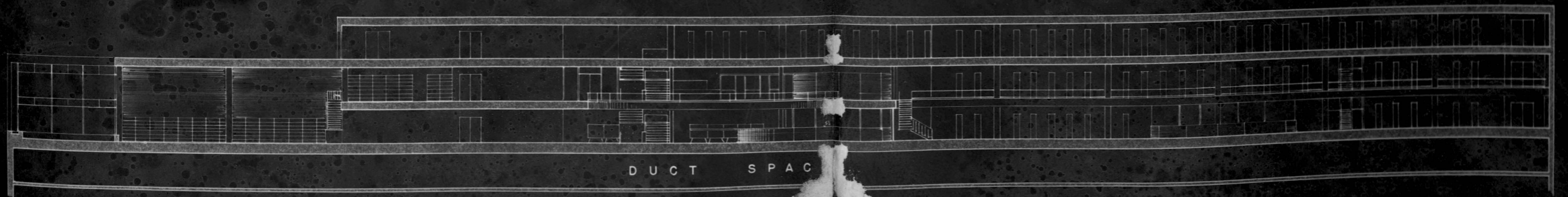
FRAME: STRUCTURAL STEEL WITH VERMICULITE FIREPROOFING.
 PARTITIONS: PREFABRICATED STEEL.
 FIRE PARTITIONS: GYPSUM BLOCK.
 FLOORS: STEEL JOISTS, CONCRETE DECK, RUBBER TILE.
 CEILINGS: VERMICULITE PLASTER.
 EXTERIOR: WALLS, BRICK; LIMESTONE FACIA ON COLUMNS.
 WINDOWS: ALUMINUM SASH, DOUBLE-GLAZED FIXED UNITS, SINGLE-GLAZED VENTILATORS.
 ROOFING: FIVE-PLY BUILT-UP.
 MECHANICAL EQUIPMENT: WARM AIR HEATING, FORCED VENTILATION, STACK ELEVATORS, BOOK CARRIER, PNEUMATIC TUBES, FIRE ALARM SYSTEM; FLUSH LENS LIGHT FIXTURES IN READING AREAS, EGGRATE FLUORESCENT FIXTURES IN STACK AREAS. FLOOR OUTLETS.

CONSTRUCTION MODULE:

COLUMNS 19' 6" X 27' 0" ON CENTERS - 8' 6" ON CEILINGS.



SECTION A - A



SECTION THROUGH LOBBY B - B



DESIGN PROCEDURE

GENERAL: The preceding drawings present the results of a planning study, based on the research and analysis in Parts One and Two. The scheme shown is intended to be merely a preliminary design study. A major part of the effort was concentrated upon the solution of the many intricate planning problems, with merely a complementary study of the structure and the mechanical equipment. No attempt has been made to detail the construction, although careful consideration has been given to that phase of the design throughout the study. It is important to note that present trends in the design of modular libraries have influenced the design.

In general, two major aims have been the determining factors in all decisions affecting the design. Primary consideration has been given to the desire for flexibility in the planning. Second, but equally important, has been the need for achieving quiet in the building. The success of the design, in terms of service to the readers, is felt to be dependent upon the flexibility and the use of acoustic materials in the building.

The discussion in this section covers only the basic concept and theory of the scheme. Only the major decisions have been presented. Particular discussion has been devoted to the

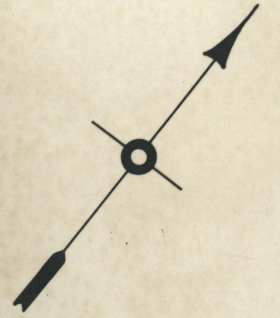
problems that are considered to require further study for better solutions. It is hoped, therefore, that the defects of the design will have as constructive value as the virtues in the future planning of a library for V. P. I.

SITE SELECTION: The site plan of the campus on page 56 shows the two sites compared for possible use as a library site. Several items have been considered in the selection of the general location. The first consideration was given to the relation to the dormitories and to the town of Blacksburg. This relation is important in order that the new library may be located where it will attract the students from the major traffic flow on the campus. In addition, it is desirable that a library for V. P. I. be near the town, where it can be easily reached by town students, and where it can offer convenient service to the town. The desire to use a simple modern treatment for the exterior of the building also influenced the selection of the general area. It is felt that a building of this kind would be more suitable near the Student Activities Building and Faculty Apartments than in any other location.

The slope of site "B" offered an opportunity to use a two level scheme in which one side of the basement would have outside light. The slope was found to be suitable for a one level

change from the Northwest to the Southeast side, without extensive grading. Site "A" presented difficult problems, because of its steep slope. A building on this site would have required the use of a number of steps, or a poorly located entrance. Although contour maps of the two sites were not available, present plans indicate that site "B" will be changed somewhat by the construction of the Mall, which offered even greater freedom in planning a building for that site.

Consideration was also given to the fact that site "B" is much larger than site "A". This was an important factor in the selection, since the designer desired to restrict the height of the building to a reasonable walk-up height. An important disadvantage attributed to Site "A" was its poor orientation for suitable reading room planning, and the nearness of the Academic Buildings on the Northeast side of the site. Neither site seemed to offer sufficient space for parking facilities, or freedom from traffic noise.



LEGEND

PRESENT BUILDINGS

1-12 MENS DORMITORIES
 41 WOMENS DORMITORY
 51-57 AGRICULTURE BUILDINGS
 76-80 ENGINEERING BUILDINGS
 101-105 ACADEMIC SCIENCE BUILDINGS
 125-133, 151-154, 251-252 ADMINISTRATION & SERVICE BUILDINGS

PROPOSED BUILDINGS

A AGRICULTURE
 AS ACADEMIC SCIENCE
 D DORMITORIES & DINING HALLS
 E ENGINEERING

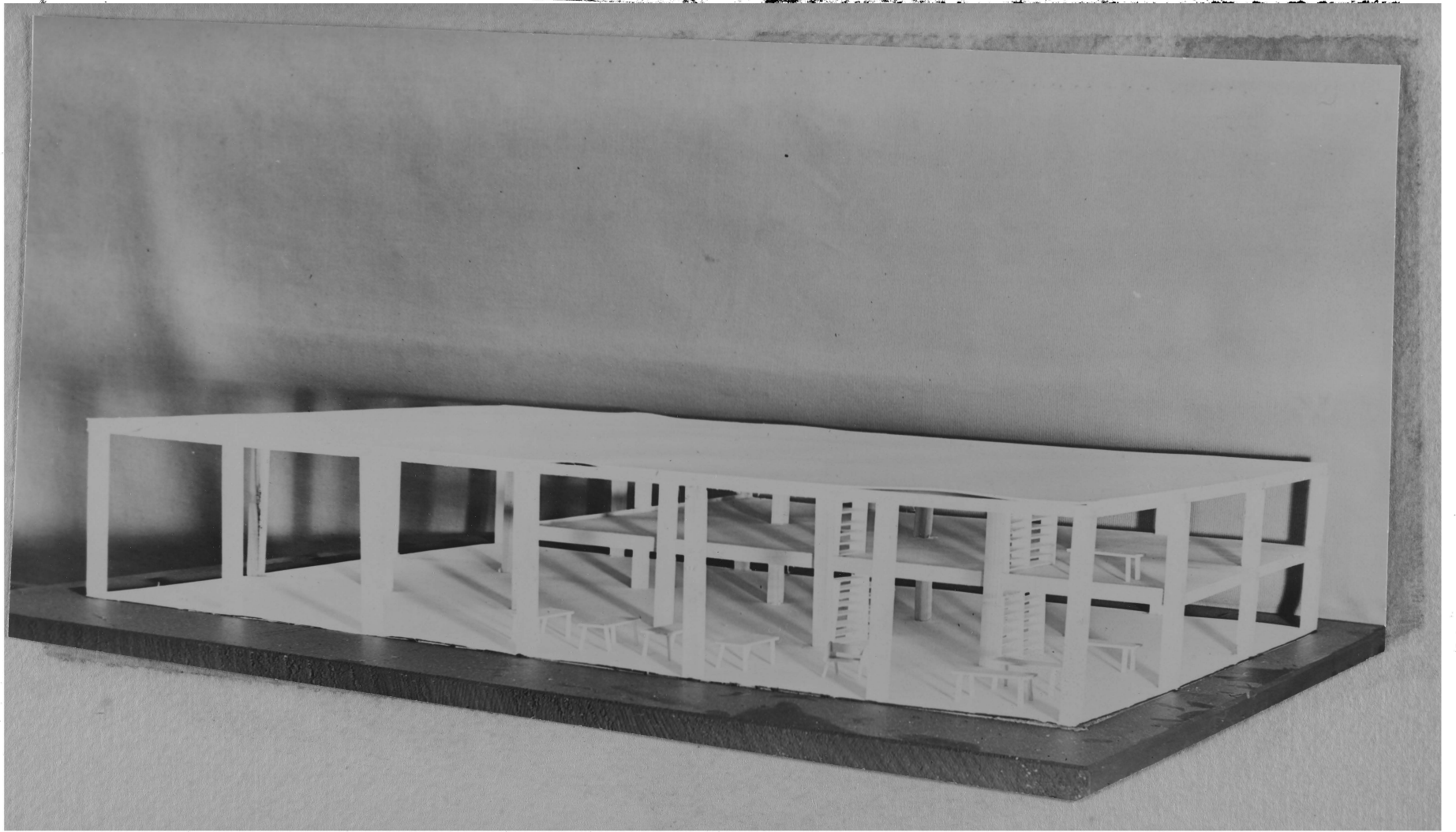
■ ACADEMIC FACILITIES
 ■ DORMITORY FACILITIES

REVISED HOPKINS SITE PLAN
 FOR
VIRGINIA POLYTECHNIC INSTITUTE
 BLACKSBURG VIRGINIA
 SCALE 200 100 0 200 400 FEBRUARY 1948

THE MODULE: A tentative planning module was selected on the basis of information on the modules used in recent library buildings. For the proposed library of the State University of Iowa, a module of 19' 6" by 27' 0" was selected as a medium between economy and planning efficiency.⁴⁰ The most economical module was determined to be 22' 0" square, and the most efficient planning module was found to be 13' 6" by 19' 6". The ceiling heights are to be 8' 4" in this building. All floors are designed for full stack load for the maximum of flexibility. Because of the complete flexibility of this plan, it was used as a prototype for the basic module for the scheme presented.

To determine the proportion and scale of such a module, a study model was constructed at a scale of $\frac{1}{4}$ " = 1' 0". The model comprises several typical bays of a modular library building. Eight of the bays are constructed with two story heights of 10' 0" and ceiling heights of 8' 6". The remainder of the bays have a ceiling height of 18' 6", with floor panels omitted in order to create larger spaces for some of the reading areas.

⁴⁰ "University Libraries", Building Types Study 119, Architectural Record, November, 1946.



THE STUDY MODEL * Typical bays of a modular library.

The results obtained are indicated by the photograph on the preceding page. The model was viewed by many students and members of the faculty. An attempt was made to get a cross-section of opinion on the psychological effects of the scale of the low-ceilinged areas. In general, the concensus of opinion indicated that the 8' 6" ceiling height would be satisfactory in areas of four modules or less. The double height ceiling in the large reading areas seemed satisfactory in scale and proportion.

As a result of the study, the "Iowa" module was selected as the planning module for the purposes of this thesis. It was hoped that this would offer an opportunity to approach the ideal suggested by Mr. MacDonald.⁴¹

⁴¹ See page 33 supra.

THE PLAN: One of the basic assumptions that led to the development of this scheme was the need for very large reading rooms. The present trend, indicated by the plans for other new library buildings, is toward the use of small scattered areas of a more comfortable nature. However, most of these are for large privately endowed colleges and universities that have large library staffs available. At V. P. I., the need for effective control of the reading areas with a skeleton staff, for at least part of the day, will require the use of the large reading areas as presented in this scheme. The character of these rooms can be improved by having them open directly on two levels of stacks.

The placement and arrangement of the reading rooms was governed by the designers concept of library lighting and window treatment. That concept includes the use of large glass areas on the northerly exposure, and the use of blank walls for the least desirable exposures, that is east and west. The southwestern exposure provides satisfactory light with strip windows and the use of canopies. Therefore, the reading rooms were placed where good daylight for reading could be obtained by using glass walls on the northwest elevation. The expense of this treatment has been considered, and is felt to be justified for the desired results.

The first floor location for all of the main reading areas followed directly from the desire to keep access simple and direct, and to relate these elements to the main library functions. This arrangement also was used to effectuate control of entrances to the reading areas directly from the main desk. All other reading areas were placed on other levels, directly related to the stack areas.

The placement of the main circulation desk, the processing departments, the catalog, and the bibliographical material was determined by the necessity for the concentration of these facilities in order to minimize the circulation difficulties of the staff. This area was studied carefully, since the most efficient service to the reader results from the most efficient arrangement of the working areas. The scheme presented is felt to be satisfactory in this respect.

A problem of particular importance at V. P. I. is the very bad weather in the winter and the spring. This was the basis for the arrangement of the coatroom in direct relation to the vestibule. It will, therefore, be possible to prevent snow and water from being carried into the building on coats and overshoes. Effective matting of the lobby space will confine most of the mud to that area.

The exhibition space was placed next to the lobby area in order to make it an interesting and stimulating part of the library building. Exhibitions placed here will be seen by more students than would be likely in any other location. It is intended that small cases be used in the lobby for the continuous library exhibits. The use of the exhibition space would be limited to larger exhibits of such objects as sculpture, paintings, photographs, and models. This area will serve the college's need for exhibit space, since no suitable area of the sort is now provided on the campus.

The remainder of the library is occupied by stacks, carrels, and the smaller elements of library plan. The arrangement of these areas was dictated by rigid space requirements. Partitions are used as sparingly as possible, in order to keep the building open in concept and use. This is in agreement with the librarian's desire to have a completely open stack. It has been considered that the effectiveness of the concept in practice will depend upon the cooperation of the students.

The openness is particularly valuable for the flexibility that is the dominant feature of many new library buildings. All furniture and equipment are entirely free-standing and

can be moved with a minimum of trouble and expense. It should be pointed out that the main circulation areas, and the principle library work areas will remain relatively fixed in their present locations. This resulted in the use of a main service core to handle most of the services. The rest of the building is broken only by required fire stairs and stack elevators.

In the first scheme presented to Mr. Robb for his criticism, there was no direct relation between the General Reading Area and the reference stacks. Mr. Robb criticized the plan on this basis, and objected that the distance through other areas was too great. The designer felt that students would not often need to go from the General Reading Area to the reference stacks, since the materials located in the areas are entirely different in nature. However, an attempt was made to correct the relationship. The only close relationship that could be effected, involved placing one of the reading areas on the southwest side, exposed to low afternoon sunlight. The disadvantages of such an arrangement were too great to make this second scheme feasible. The resulting scheme has retained the original layout, and alleviated the condition somewhat by extending the reference stacks on the second level to join with the general stacks.

One other item of major importance in the planning of the building was the need for maintaining moderate control of the two entrances on different levels. This was accomplished by the use of an open main stair that can be easily seen from the main desk in the lobby. All fire stairs may be used for floor to floor travel, but the exits from them must be marked for emergency use only. Alarms on the exit doors have been assumed as an effective means of preventing their use at other times.

The probable growth of the book stock was felt to be a matter that could not be estimated accurately. Although Rider's statistics in 1938 showed that research libraries were doubling in size every sixteen years,⁴² it seems likely that the V. P. I. library must expand more rapidly than that if it is to catch up on its backlog of needed material. The growth of the library here has been retarded for many years by the lack of space in which to house a larger collection. This is the basis of the librarian's estimate of an ultimate capacity of approximately 600,000 volumes in about twenty years.

In developing the scheme, the designer has kept in mind the possibility that it may not be financially possible to construct

⁴² Planning the University Library Building, edited by John E. Burchard, Charles W. David, and Julian P. Boyd, Princeton University Press, Princeton, N. J., 1949, p. 15.

at one time as large a library as is needed. If such proves to be the case, it may be found desirable to have a design that can be completed in stages.

For that reason, the first three levels of the building have been planned to house all of the basic facilities for the readers and the staff. This portion of the building has a stack capacity of approximately 400,000 volumes. The upper story, as a consequence, is almost entirely stack space for 200,000 additional volumes, and could be omitted in the original construction.

STRUCTURE: The selection of the structure of the building was made on the basis of information discussed in Part Two. Dry construction is favored because of its flexibility. With smooth ceilings and movable steel partitions, the flexibility of a loft building can be obtained. In addition, it is deemed probable that the light weight of vermiculite fireproofing, and the prefabrication possible with dry construction would probably effect a large saving in total cost.

MATERIALS: The use of brick for the exterior of the building was felt to be necessary to obtain a reasonably close relationship with the Student Activities Building and the Faculty Apartments, since both are brick buildings. Stack bond has been used as an expression of the use of the brick as facia.

Aluminum windows have been used because of the long life with a minimum of maintenance. Although the cost of such windows is very high, it was felt that savings in maintenance over the long life of the building would justify their use. In addition, the appearance of aluminum windows seemed also to justify the additional cost.

The selection of the interior finishes was based primarily on the need for quiet and light in the library. Where possible, light color, sound-reducing materials were used.

MECHANICAL EQUIPMENT - LIGHTING: The use of fluorescent lights with flush egg-crate fixtures in the stack areas was based on observations of similar fixtures recently installed in the Engineering Library at V. P. I. These lights are very effective, even where the aisles are only two feet wide. The general appearance is bright and attractive, and is considered suitable for the main library stacks.

Lens fixtures were selected for the reading areas, since they have been shown to be effective and efficient in other installations.⁴³

Air conditioning has been considered not feasible for this building, since the climate is moderate in summer. Sufficient

⁴³ See supra (7), p. 393.

comfort can be provided for readers and staff by winter warm air heating and forced ventilation in summer. The amount of money required for air conditioning can be spent more effectively in equipping the library.

An examination of the library presented herein, shows a major fault that was unavoidable with the assumptions made. The designer assumed that the Hopkins Site Plan would not be changed materially. As a result of this, the site selection was limited by the small number of available sites for a library building. The site selected, however, is rather crowded by a walk-up building of the size required. The obvious conclusion is that re-study of the proposed campus plan might be wise, in an attempt to arrive at a more efficient use of the space remaining on the campus. Consideration might also be given to the possibility of expanding the campus, rather than crowding the present area with more buildings. If a further study of the expansion program could produce a more feasible solution, a much better site might be found for the library than is now available.

As a result of the work presented in this thesis, important factors in the design of a new library for V. P. I. can be noted. As stated in the original program, the primary criteria for the design of the building must be "service to the readers". Of first importance in effectuating this aim is the careful study of the functional relationships of the various technical library operations. This must be kept in mind to provide for the efficient function of the staff; and, therefore, the maximum service to the reader. However, the continuance of

that service requires that the building be designed for maximum flexibility, in order to meet the changing needs of an expanding college.

The flexibility of the library will depend largely on the integration of the structure, mechanical equipment, and the materials used. This is largely an engineering problem, involving considerations of economy. A successful library for V. P. I. can result only from coordination of the recommendations of specialists in these fields with the requirements of the planning and design for the particular situation.

Successful coordination of all the elements mentioned here will result in an efficient, quiet, and pleasant "laboratory" for the use of an expanded book collection by the faculty and students of V. P. I.

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