



### *Furniture and Equipment: Sizes, Spacing, and Arrangement*

The latter takes more than the former. Six square feet may be generous for a working surface for one person, and a good-sized chair occupies less than four square feet, but to provide one suitable accommodation in a reading area may take twenty-five square feet, over sixty per cent of it for access purposes. Book shelves rarely take more than thirty per cent of the total stack area. The same is true for catalog cases in the catalog room.

This article will confine itself to three types of library equipment: seating accommodations, shelving, and card catalog cases. Between them they present an opportunity to discuss basic layout principles:

1. The size of the equipment to be used must be determined.
  2. Aisles, as already stated, are the greatest users of square footage. They should be considered with the same care as the equipment. Most access aisles should be used on both sides in order to obtain full value from them. An aisle along a wall used from one side only is generally wasteful. The width of an aisle should depend on appearance and on the amount of use it will receive. Aisles and corridors with solid walls on both sides, feel and look narrower than those of the same width which are completely or partially open on one or both sides at table top level, or even anywhere below eye level. A cross stack aisle with book stack ranges at right angles, seems wider than one of the same width between two parallel stack ranges.
  3. In planning layouts watch for visual and auditory distractions. Acoustic protection is as important as visual protection. Seating accommodations adjacent to heavily travelled traffic arteries are generally unsatisfactory in both of these connections.
  4. Long and much used corridors should generally be kept straight, although many architects very properly like to introduce visual barriers in them. Often this can be done with light as well as by equipment, walls, or doors.
- Long rows of regimented tables and chairs in a large reading area tend to make the room look like a railroad station. One possible exception may be the use of carrels along a wall. This arrangement will seem like part of the structure, rather than equipment, but even here it may be desirable to break up the rows by the occasional use of a small lounge chair in place of a carrel.
6. Wall shelving around a reading area is not economical in space use because of the wide adjacent aisle that is required. Moreover, if the books are heavily used, consulting them will disturb unnecessarily the readers within the area.

7. Curved walls and acute or obtuse angles waste between ten and twenty-five per cent of the floor area, even with the most careful layout.

### *Seating Accommodations*

These basic principles for equipment layout apply to seating accommodations in a library. The problem has become more complicated than it was a generation ago, because seating is no longer confined almost entirely to standard library chairs at long tables placed in parallel rows. Academic libraries are being planned today with up to eighty-five per cent individual seating at tables for one, in carrels in a wide variety of positions so arranged that the user has no one sitting immediately beside him, or in lounge chairs—sometimes with tablet arms—separated from each other by an aisle or a small low table. This change has stemmed primarily from two facts.

1. Most readers today come to academic libraries primarily to read and study, and prefer a reasonable amount of visual and acoustic privacy.

2. Methods have been developed in the past ten years that make it possible to provide adequate individual quarters which use little if any more square footage than was formerly involved in multiple seating at long tables, and thus individual seating has become economically feasible.

This article cannot go into detail in regard to all possible types of seating, but will outline some of the requirements that make them satisfactory for academic readers. These involve adequate working surfaces, space for comfortable access without interfering with or disturbing others, a comfortable chair, of course, and a desirable amount of visual and acoustic privacy.

At a table for two or more persons without partitions between the different accommodations, at least six square feet for each reader is desirable, preferably a surface three feet wide by two feet deep. These dimensions can be reduced in a reserve book room or in an undergraduate library for women to 33 inches by 21 inches if necessary, but the smaller size is not recommended. The shorter dimensions, that is, 33 inches by 21 inches, are as adequate, however, for individual quarters which are cut off from others as the larger ones are at multiple seating tables, because no other reader can overlap onto the space. For advanced and graduate students a table 3 feet, 6 inches wide is preferred, and for one writing a doctoral dissertation, four feet in width

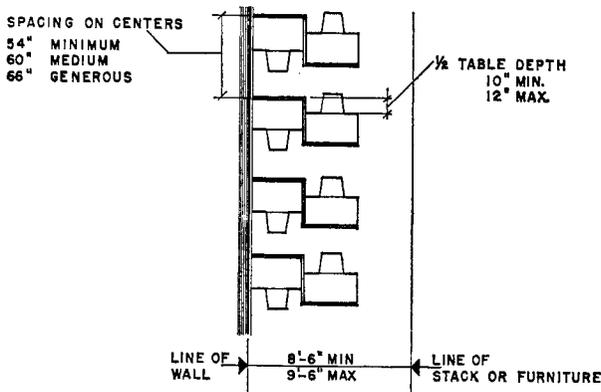
*Furniture and Equipment: Sizes, Spacing, and Arrangement*

is not excessive but is not necessary. If there is even a narrow shelf over the back of the working surface, a depth of 27 inches is recommended, because the shelf tends to interfere with overhead lighting. (Fluorescent tubes placed under a shelf tend to result in unpleasant reflection and glare because of the angle at which the light reaches the book page. It is sometimes preferable to place shelves over one end of the table instead of at the rear, or to assign a shelf in an adjacent stack section for books wanted for use later.

Access to seating accommodations involves two problems: space for cross aisles and that for direct access to the chairs. Twenty-six inches would seem to be the minimum width for the latter if no other chair is in a position to back into the same space and no other reader needs to pass. This gives 18 inches beyond the front of the table for the chair itself, and 8 additional inches to push the chair back in getting into it. With only 26 inches available, the chair itself should not be overly large, should not have arms, and the corner leg of the table should be set back some 6 inches.

Twenty-six inches of access space is inadequate, however, if one has to pass another's chair to reach his own; here, thirty-two inches should be the minimum, and even then the tables or carrels can well be staggered as shown in Figure 1. Thirty-six inches of access space is generous for carrels staggered in this way.

If carrels or tables for multiple seating have chairs backing into an aisle from both sides, five feet in the clear should be available between the tables; and if the tables are long and passing is frequent, an aisle of six feet is preferable.



*Figure 1. Double Staggered Carrels*

KEYES D. METCALF

Cross aisles, which are not used for seating and are at right angles to tables, should preferably be not less than three feet wide, and a wider one is desirable if long tables are on one or both sides. Main cross aisles in a large reading room can well be up to as much as five or six feet in width.

A third requirement for seating is suitable privacy, both visual and acoustic. Partial visual privacy can be obtained by not placing readers so that they face each other over a table; tables with readers on one side only and all facing the same direction will help. A table with chairs on both sides should be four feet across, if possible.

If a table for one can have a partition at its back, it becomes a carrel, but the back should be high enough so that when a reader sits up straight he cannot see the top of the head of the person in front of him bob up from time to time, as that is more distracting than seeing the full torso continuously. An intermittent appearance is as distracting as an intermittent sound. A partition to be adequate should be at least fifty inches high for women and at least fifty-two to fifty-four inches for men.

Partitions can also be placed on either side of a reader, as well as in front, but preferably not at both sides. Many readers shut off on both sides feel like a horse with blinders. If partitions are used on both sides, it is suggested that they be omitted in front or held down to ten inches above the table top, as in the triple staggered carrels shown in Figure 2.

Acoustic distraction is increased by hard surfaces, floors, table tops,

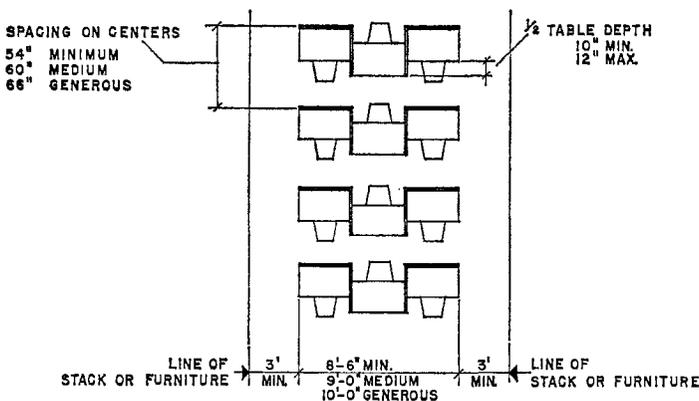


Figure 2. Triple Staggered Carrels

### *Furniture and Equipment: Sizes, Spacing, and Arrangement*

ceilings, and walls which reflect undesirable noise. Breaking up hard surfaces by projections or indentations helps. Resilient floor coverings, such as cork or rubber tile, will be beneficial also. Carpeted floors and acoustic tile on ceilings are the most useful in this regard. Watch out for noise from wood, vinyl asbestos, and asphalt tile on floors, or from formica on table tops. Occasionally, acoustically treated walls are indicated and one should remember that books themselves have acoustical properties. Heavy traffic in a reading area increases the chances of both visual and acoustic distraction.

Lounge chairs have been increasingly popular in libraries in recent years, and some have used them for twenty-five per cent of all the seating. Others find that lounge chairs are not occupied as much as those in carrels or even those at tables for multiple seating. It depends somewhat on the seriousness of the students. Lounge chairs are most useful in browsing and in periodical rooms; they may desirably constitute five to ten per cent of the total seating in a library, and very rarely over fifteen per cent. Properly placed and selected, they should not increase equipment costs or square footage used.

Many different varieties of carrels have been devised in recent years. They can be in single rows along walls, screens or partitions of any kind. Double rows that are staggered can be very satisfactory with the

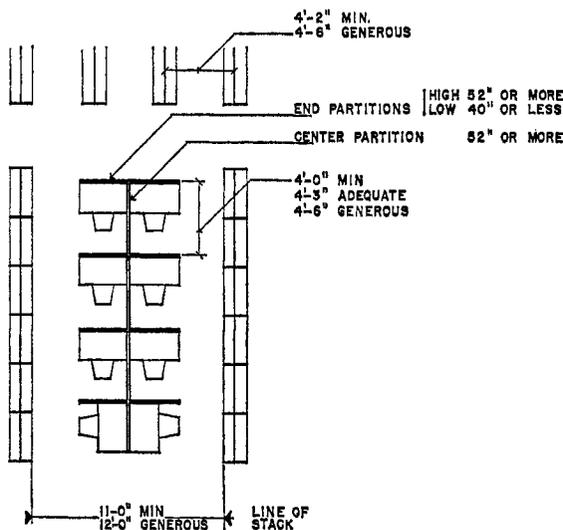


Figure 3. Double Carrels in Stack Area

KEYES D. METCALF

readers sitting in opposite directions, as shown in Figure 1. Triple rows of staggered carrels can be used in a large reading area with fairly good-sized aisles on each side as shown in Figure 2. Double rows of carrels all facing the same way, with the partitions at the back of each table and on one side, can be placed in a reading area or substituted for two stack ranges (see Figure 3). Tables for four with partitions running in both directions can be used in a reading room or a reading alcove, as shown in Figure 4. In an alcove the clear space for this arrangement should be at least 10 feet, 6 inches wide and 9 feet deep. If it is 12 feet deep, a pinwheel or swastika arrangement can be used, as in Figure 5. Double carrels 5 feet wide are sometimes used in co-

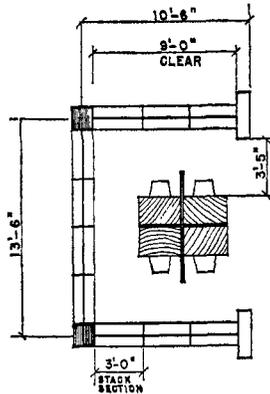


Figure 4. Reading Alcove, with Table for Four

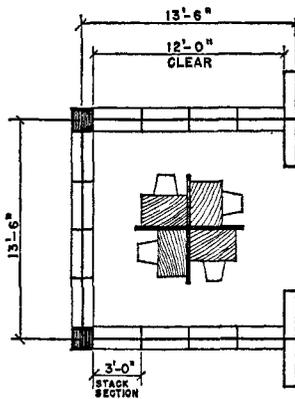


Figure 5. Reading Alcove, with Pinwheel Carrels

### *Furniture and Equipment: Sizes, Spacing, and Arrangement*

educational institutions for couples, and this may help to make the areas quieter, rather than otherwise.

Small areas in a book stack called oases have been used in Princeton University and elsewhere, but unless individual seating with partitions is arranged, they may become trouble spots. Large stack oases, occupying the space of the full module or perhaps more, can be used to advantage in a very large stack to break the monotony. Individual seating, special lighting, and perhaps a carpeted floor may be indicated.

### *Shelving*

The volume capacity for a book stack can be estimated only roughly because of irregular volume sizes. Leaving that factor out of consideration, it depends on the square footage required for the average single-faced standard size section three feet wide overall and 7 feet, 6 inches high. (This height will give space for a protective base four inches high and seven shelves twelve inches on centers, plus an extra two inches at the top to make it easier to withdraw and replace books there.) The square footage required depends on these several factors.

1. The non-assignable space for stairs, lifts, and entrances should not exceed more than ten per cent of the total area, except in a very small stack, and in a large one less than that. It is not considered further in this statement.

2. Section or shelf depths with the commonly used bracket shelves are generally seven or nine inches "actual" or eight or ten inches "nominal." With the two inches left vacant in the center of a double-faced range, this means sixteen inches or twenty inches overall depth. The writer prefers in most cases to use eight-inch "actual" shelves with eighteen inches overall depth, and with the bottom shelves no wider than the upper ones. The bottom shelf is the critical point for light, for book trucks, and for squatting or kneeling users. Each additional inch depth of shelves, including that for the base, reduces the capacity by two per cent. A twenty-four inch base in a double-faced section reduces capacity by approximately twelve per cent below that for an eighteen-inch base, if aisle widths are uniform. The narrow base requires safety precautions to insure stability, but these are relatively inexpensive.

3. The stack aisle width should depend on the amount of traffic and the length of the ranges. The longer the range, the more often two persons will have to pass each other. A twenty-six inch aisle width is possible for closed access storage, and one of thirty inches is generous

even with very long ranges with closed access. Thirty-three inches with thirty foot long ranges will be adequate in a university library with large collections and access restricted to advanced students and faculty. Thirty-six inches can be called standard for a heavily used stack.

Range length is also of importance, and like aisle widths should vary according to use. Nine to fifteen feet may be long enough for ranges in a heavily used reference collection, and fifteen for an undergraduate collection. Thirty feet in length has generally been considered the maximum for university libraries but, with limited access and collections of one million volumes or more, can be extended to as much as forty-two feet. Great national libraries with closed access stacks have used ranges up to sixty feet in length satisfactorily when proper labeling is provided. Remember that range spacing with long ranges in a modular stack must be based on column spacing.

4. The final factor to be considered is the frequency and the width of the cross aisles at right angles to the ranges. Three feet (minus two inches for the uprights on each side) should ordinarily be considered a minimum; if the stack is large, a main cross aisle should be not less than four or four and a half feet. An aisle of five or six feet is generous, and the latter may be extravagant in space use. Remember that three feet is ten per cent of thirty feet, and an extra three-foot aisle cutting a thirty-foot range in two reduces capacity by ten per cent, and a six-foot wide aisle where a four-foot one will do is a factor worth keeping in mind.

In a modular stack the distance between column centers should be an exact multiple of the distance between the range centers. Of less but still of considerable importance, the clear distance between columns in the direction of the ranges should be a multiple of three feet, plus four inches to allow for any irregularity in the building columns and for the adjacent stack uprights.

In laying out a stack, remember to provide a simple arrangement for the books and the traffic. Avoid what might be called blind areas that interfere with the regular order of book shelving, and if small areas behind stairs or in corners are necessary, use them for special collections rather than for parts of the main collection.

Avoid odd-length sections as far as possible, as they will always be a nuisance. If, because of columns, odd length sections seem to be required from time to time, it may be preferable to use lecterns or consultation tables in their place.

### *Furniture and Equipment: Sizes, Spacing, and Arrangement*

Narrow aisles reduce the available light on the backs of the books on the lower shelves. If fluorescent tubes are used and the ceiling height permits it, the intensity on the lower shelves can be increased by placing the light tubes at right angles to the ranges.

Watch out for places used to house oversize books; they may require deeper shelves and the aisles will be unduly narrowed. Suitable locations can often be found along walls, stairs, or elevators.

Remember that carrels, placed along a wall adjacent to a three-foot cross aisle, or used in place of the last stack section, are space savers.

With the above in mind, it should be repeated that the square footage required per single-faced stack section depends, if non-assignable space is omitted, on the depth of the shelves, the width of stack aisles and of the cross aisles, and the length of ranges. Figures 6 and 7 show examples and indicate also the effect of carrel seating along walls. Changes in square footage requirements result from a change in any of the dimensions. But it is fair to state that if non-assignable space is left out of consideration,  $8\frac{1}{2}$  square feet per single-faced section is adequate with what can be called standard university library spacing, but it is better to use between that figure and ten square feet for smaller libraries with heavy stack use. In figuring volume capacity per single-faced standard section, 125 books should be considered as working capacity, but that is another story which cannot be dealt with here.

### *Card Catalog Cases*

In most libraries, the primary problem in arranging catalog cabinets or cases is the provision of adequate space for the readers at the time of peak load, rather than space for the cards, although this is too seldom realized. It is possible, in a very large library with millions of cards, to provide for 4,000 of them for each square foot of floor space in the catalog room. On the other hand, in a large university with a small collection 1,000 cards to a square foot is often all that should be installed. There are three space users to be kept in mind in connection with catalog case layout: the cases themselves, the consultation tables, and the aisles for access required by those who consult the cards. These will be considered in that order.

The cases vary widely in overall dimensions. The Widener Library Building at Harvard University has catalog cases holding over 500 trays, but these can be called "white elephants." In order to obtain flexibility, cases today are generally constructed in units 5 or 6 trays

KEYES D. METCALF

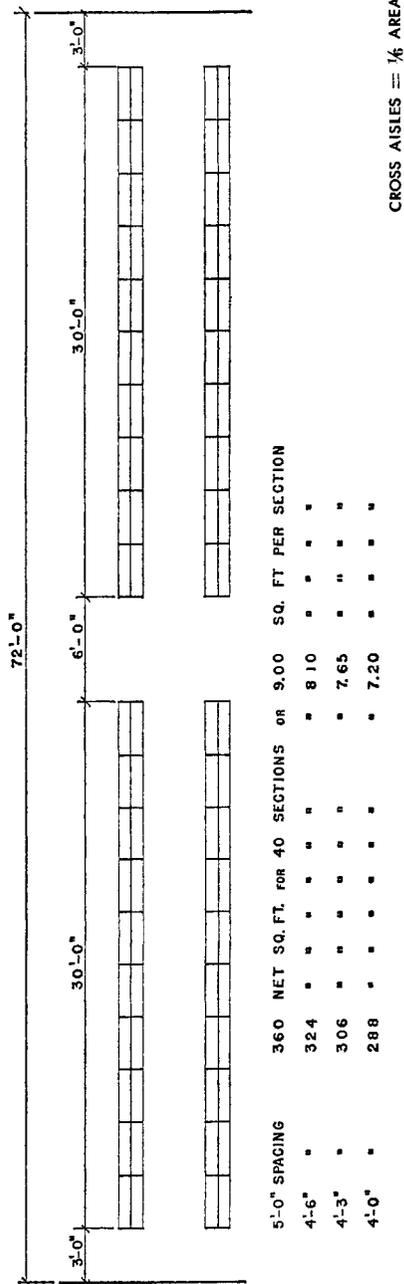
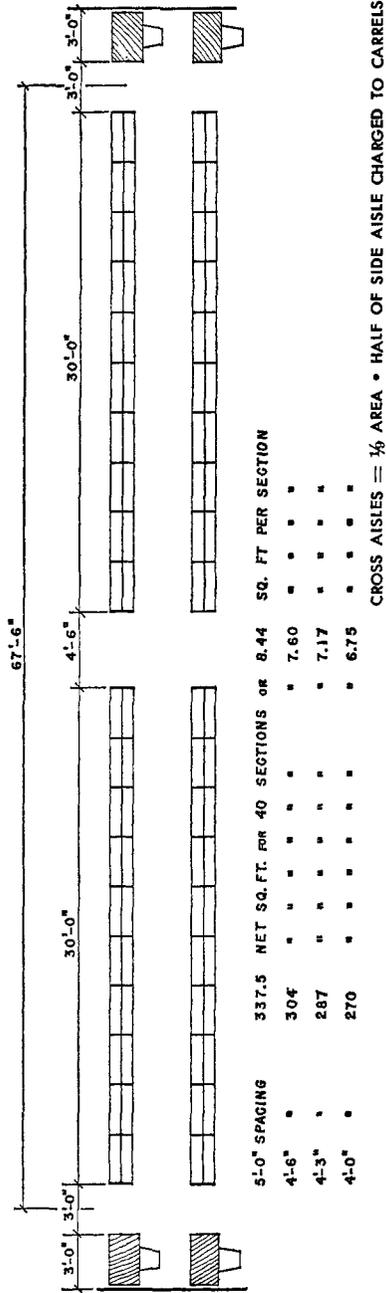


Figure 6. Stack Layout

*Furniture and Equipment: Sizes, Spacing, and Arrangement*



*Figure 7. Stack Layout*

wide and measuring from just over 33 inches to approximately 40 inches in width. The depths may vary from 12 inches up to just over 19 inches, although 24 inches is used occasionally, but the generally considered standard length is 17 inches. Whatever the overall depth of a tray, approximately 3 inches should be subtracted from it, because of the unusable space at the front and back, and then between 70 and 75 per cent of the remaining space will represent that available for storing cards before the drawers become so full as to be more or less unmanageable. One hundred cards to an inch of usable filing space is a safe figure to use. This will mean that a tray 17 inches long will house comfortably 1,000 cards ( $17'' - 3'' = 14''$  and  $14'' \times 72\% = 1008$ ), and one 19 inches long will house 1,150 cards ( $19'' - 3'' = 16''$  and  $16'' \times 72\% = 1152$ ).

The height of the case does not affect the floor space it occupies, but is an important factor in the amount of floor space required to house a given number of cards. Standard cases in the United States have generally been 10 to 12 trays high, but many colleges and universities have used and are using successfully cases 14 or 15 trays high. One with 15 trays will give 50 per cent greater capacity in the same area than one with ten. It is possible to buy cases in units, and those 10 trays high can be installed to start with and a 5-tray high case placed on top of it later. This may not look as well and will cost more per tray, but with careful design should not be too unsatisfactory.

One decision that must be made in connection with catalog case arrangements is whether or not there should be a sliding reference shelf in them at a suitable height for consultation. This is rarely to be recommended because its use will block the access to a good many trays above and below and at each side, and it will tend to be a space user, rather than a space saver.

Consultation tables on which the user of the catalog places the tray that he wishes to consult are almost always desirable. Again, there is the problem of their height, width, and length. Tables should rarely be more than 6 to 8 feet long, because it will make it too difficult to go around them to reach the trays on the other side. The width can be anywhere from 20 inches (or even less) up to 3 feet. Tables 3 feet wide can be used to better advantage from both sides at the same time than narrower ones, and sometimes should be selected if the use anticipated is very heavy. Thirty-nine inches used to be the standard height for consultation tables, but many libraries have found that 41 inches or 42 inches is preferable, as it prevents a tall person from leaning over the

*Furniture and Equipment: Sizes, Spacing, and Arrangement*

table or having his feet stick out behind him so far as to cause trouble. Experience indicates that persons no less than 5 feet tall can use a table 42 inches high with little inconvenience.

The third and greatest user of space in a catalog room is that for the aisles, those between the cases and the consultation tables, and also the cross aisles at right angles to the case ranges. The former can be as narrow as 2 feet, 6 inches where the cases are available only to the staff. Aisles up to 5 feet, 6 inches wide are not uncommon, but are unfortunate as they result in unused space and, of equal importance, the reader and the filer often object to carrying the tray to the consultation table and will often try to use it at the catalog where they will get in the way of others. For such aisles, 4 feet, 6 inches is generous, 4 feet, 3 inches is adequate, and 4 feet will not cause congestion if the consultation tables are not over 6 feet or 8 feet long.

In trying to arrange spacing for a large catalog in a modular building, note that two full ranges of catalog cases will fit in a 25 feet, 6 inch column spacing, giving 12 feet, 9 inches on centers for the cases. Thirteen feet, six inches, or two to a 27-foot column spacing, is generous; but two ranges of cases in a 22 foot, 6 inch bay will result in congestion, and it may be better to place three double-faced ranges in two bays of this size, giving 15 feet each. Twelve feet and nine inches will provide for the two cases that are each 18 inches deep, two aisles,

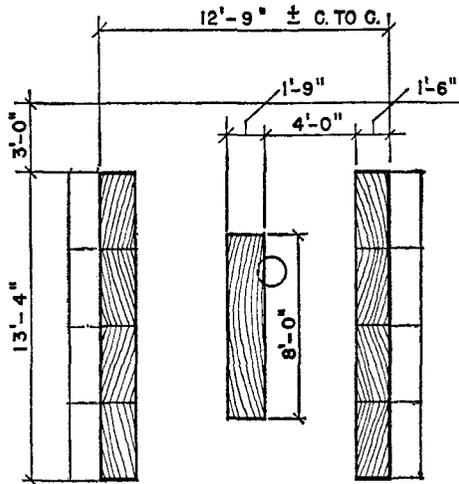


Figure 8. Catalog Case Layout

KEYES D. METCALF

each 4 feet wide, and a 21 inch-wide consultation table (see Figure 8).

There is still the problem of cross aisles to be considered. There must, of course, be an adequate cross aisle at at least one end of the case ranges and preferably at both, if space is available. To two parallel ranges, it is possible to add a third range at right angles, making a three-sided alcove which will give larger capacity. Double rows of alcoves with cases on three sides and with one cross aisle are possible and provide the greatest space utilization (see Figure 9). However, this is recommended only with very large collections which have limited use.

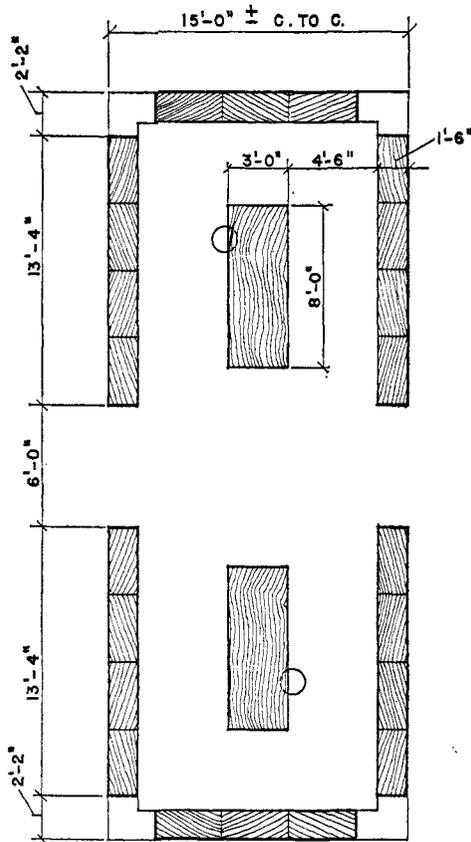


Figure 9. Catalog Case Layout for a Large Library