



# Transportation Equipment

CARL VITZ

THE MEASURE OF ACCOMPLISHMENT of the machine age is the efficiency of the logistics by which product meets consumer. Efficiency, in this sense, is evaluated in terms of moving man and material with the least effort, at the least cost, in the least time. Too seldom has the library been designed with proper consideration to its potential measured by this standard. Yet to user and staff alike, the measure of success or failure, of pleasure or pain, of every existing library is exactly its original logistic efficiency combined with its flexibility to meet the further demands of growth, change, and expansion.

The library, as a monument, hardly recognized this approach, nor could it be expected to. Before electricity the very seeking of natural light and ventilation seemed more important goals. Heavy walls combined the functions of structure and enclosure. Accelerated rate of acquisitions, demands of new media, increased costs of staffing all have hastened the obsolescence of existing structures. The pretty monument, enveloping the complete library conception in its inflexible shell of one or another appropriate style of architectural treatment, with its arbitrary subdivision of space, denies internal growth in crowded inefficiency, confounds rearrangement and defies enlargement. Imaginative librarianship may mask the effort to the uninitiated, but wasted space, awkward arrangements, extra steps, the useless expenditure of human energy, daily strangle the desired service. The problem is not so much the lack of storage facilities, though these are seldom adequate, it is the frustration of access and internal transportation that causes the log-jam.

Logistics, then, is the problem. To design a practical library it is necessary to consider the things to be transported, and keep in mind that the future will only extend this list. Here are some of the basic requirements:

---

Mr. Vitz, Director *Emeritus*, Cincinnati Public Library, prepared this article with the collaboration of Woodie Garber and John Burquist, architects and interior designers for the new central building for the Cincinnati Public Library.

## *Transportation Equipment*

In any sound solution easy access of reader to book is a prime consideration. The catalog and staff should be placed to be of the greatest assistance, the user's route should be well marked and require the minimum of time and effort to traverse. The patron should find readily quiet pleasant surroundings for browsing, reading, or study as he desires. His activities should be supervised without hindrance and his means of departure should be direct and with the minimum sense of control.

The staff should be accessible to serve him when help is desired, and should be able to do so promptly, pleasantly and with the minimum of unnecessary effort. Each staff member should be strategically located in comfortable surroundings to be most effective in applying his best skills and should be relieved of wasted time-consuming effort in the accomplishment of his task. All material should move directly and quickly to its destination and with the minimum of error, confusion, and effort. The structure should be comfortable, clean, orderly, quiet, cheerful, and pleasant for all occupants. It should be economical to maintain and operate, and flexible to adapt to changing demands.

The key to the proper functioning of the above is the plan relationship of all the various activity areas, one to another, and the provision of means for the movement of many things, each to its proper destination, without interference, confusion or undue effort. Circulation, in the architectural sense of the word, is the complex of paths by which things move.

The types of things to be moved in libraries cover a wide range of sizes and shapes as follows: people (public and library staff); library materials (books and other printed materials, large and small, bound and unbound; periodicals; newspapers; maps; documents; manuscripts; films; microfilms and microprints; recordings); messages (written and verbal); equipment; furnishings; supplies; waste and scrap materials; fuel; air (warm and cold); water (hot and cold); heat; light and power (in the form of electricity).

The moving of fuel, heat, water, air, and electricity fall in the realm of plumbing, heating, ventilating, air conditioning, and electrical installations, and although the efficient distribution of these elements is of increasing importance, this paper will deal primarily with the circulation of people, messages, and media for the diffusion of knowledge.

The basic circulation problem in libraries has not changed since man began to collect and catalog information. It has always been, simply, to bring the user to the information or the information to the

user. Obviously, the first means of transporting information in the form of scrolls, tablets, and later books, was by leg and arm power. People carried things and moved vertically by means of stairs, ramps, and even ladders. No significant change in this system occurred from the beginning of time until the introduction of mechanical devices in relatively recent times. Consequently the physical design of libraries was determined by the necessity of keeping the books close to the readers. In the early libraries, as for example in the monastery, the collections were small enough to be shelved in one or two rooms in which the readers also worked. As both readers and collections grew in number the problems of storage and access multiplied. The stack in its more recent growth developed many forms and arrangements, assisted by, and resultant from, increased use of developing mechanical equipment. The central core stack, the higher core or tower stack, the stack on a side, in an adjacent wing, etc. and now the underfloor stack, have all developed in the search for a better arrangement.

There is no one right answer. Depending on the type and size of library, the validity of arrangement is dependent upon the simplicity of arrangement of circulation patterns, the flexibility for change and growth and the selection of applicable means of transport. The goal is always improved service, reduced cost of operation and increased usefulness of staff. The trend is from the purely physical activity of the page boy carrying a book, or a patron walking up stairs, to the automatic operation of the elevator, electric lift, or moving stairway.

It seems remote that library operations will become completely mechanized, but with the technical knowledge at hand it would be possible to devise a system by which the patron activating a push button on an "electronic catalog" could have any book delivered to him by conveyor and charged out without a library attendant having touched it. The cost would be prohibitive and the practicability of such a system doubtful, but the coming years are sure to bring remarkable advances in transportation equipment. It is also conceivable that the very form of books may change. The sudden surge in the use of audio-visual materials, microfilm and microprint in the last few years has already forced new techniques in library administration and changes in library space allocation. The library described as a "department store of knowledge" focuses attention on the importance of moving people and "merchandise" with smoothness and speed.

Mechanical equipment and transportation can be evaluated only in terms of its ability to justify its cost and the purpose it serves. Automation in manufacture is only possible because of the reduction in

## *Transportation Equipment*

labor cost spread over repetitive operations in producing in quantity a profitable end product. In library use no such profits exist. Expensive mechanical devices must meet the tests of: 1) reduced cost on the basis of long term operation, 2) improved service within reasonable limitations of justified expenditure, or 3) reduced space resulting in lower initial capital outlay.

As the demand of library use seldom is profitable enough to enlist inventive genius or to encourage venture capital to manufacture complicated equipment for its use alone, most forms of transport involve adoption of means already developed for more general application. The librarian and architect jointly must clearly evaluate each available device and the arrangement of space required to make it effective.

A check list of transportation equipment for libraries includes the following: stairs (public, staff, emergency exit); ramps; elevators (public, staff, freight); escalators; lifts or dumb-waiters; book and message conveyors (vertical, horizontal, combination); book trucks; handling and maintenance equipment. A discussion of each item will point out considerations in selection and arrangement.

The monumental stairs, opening a large well between floors, is rapidly disappearing. It is wasteful of space and makes fire-control between floors difficult. Today's patrons do not find stairs inviting but look, rather, for easier means of transport.

Fire exit stairs, required by law and safety, should be well-marked yet controlled against improper access to non-public areas of the building. All stairs should be placed to prevent patrons from leaving the building without passing check-out desks or other controls.

There should be, if possible, no changes of level requiring ramps in new structures. Their major justification in the past has been to make handling of book-trucks possible where stairs only were provided. Where slight changes of level are imperative the grade should be held below the normal legal minimum and non-slip surfaces used.

Placement of elevators is of prime importance. Public elevators should be as centrally located as possible to shorten lines of public travel to all departments. They must land at the entrance level at a location such that the charging desk, or control desk, lies between them and the exit.

Staff elevators should be centrally located, large enough for book trucks, and preferably should not be accessible to the public. Lines of travel by staff to this elevator should conflict as little as possible with public circulation.

The freight elevator should be placed so as to cause a minimum of disturbance, yet be readily accessible. It must connect all floors with the service and maintenance areas of the building. It should open into a closed vestibule at each level where objects may be accumulated awaiting movement. It should be large enough to handle all furniture and fixtures on upper levels. Its location, so often determined by the service entrance to the building, must be carefully studied at each floor in its relation to the areas it must serve with the minimum of disturbance during hours of library operation.

Where possible all elevators should have stops at all levels. This allows all elevators to be used in speeding the initial move, and gives flexibility for changing use of all levels. Where elevator use is contemplated, the provision of a pair insures uninterrupted use during servicing, maintenance, and breakdown.

Automatic push-button elevators are rapidly replacing operators. The increased initial cost has justified itself in the reduction of long-term wages. A helpful person acting as starter can do a great deal to instruct the uninitiated in the operation of the elevator and to encourage and assist the timid. In the sandwich type structure of public floors separated by stack levels, public elevators may by means of key control of stack floor push buttons, restrict unauthorized access to non-public areas.

The selection of elevator speed requires careful consideration of the number of floors, number of people, size and load capacity of the car. Elevators too slow, are annoying and wasteful of time; high speed elevators are costly and ineffective in low structures. A good compromise can usually be found between speed and cost. There should be at each elevator door up and down call buttons and an indicator showing direction of travel of car. Each car should have easily read push-buttons and a floor indicator. Passenger and staff elevators should be self-leveling and have all doors automatic.

Although at first glance escalators may appear unnecessary for library use there are occasions where they may be amply justified. For large libraries with many patrons an escalator makes a second floor psychologically as accessible as the entry level, with no pause required for vertical transportation. The main objections are high initial cost and the added space requirement. Where by installation of escalators the required elevators can be reduced in number, the net cost is correspondingly reduced. Department stores have found escalators necessary in the hard world of competition. Banks and office buildings are coming to use them more and more. Libraries

## *Transportation Equipment*

may find them an added inducement to a fuller use of their buildings.

The book lift is a miniature elevator, and has many of the same advantages and disadvantages. It can connect adjacent levels vertically and can continue through the building to connect all levels for inter-departmental use. The placing of book lifts in building plans must be carefully thought out. With the trend in organization toward subject departmentalization it is necessary for each subject department control desk to have immediate access to a book lift connecting it with its stack area. On the stack level, the optimum location for the lift is the center of the subject department book collection, and the location of control desks, lifts, stack stairs, work areas, etc. must be balanced to achieve the best possible circulation pattern. It is possible to make a single book lift serve more than one department.

In the accomplishment of automatic operation the book lift has certain obstacles to overcome. It is not as yet an automatically unloading device, which means that a delivery to a point must be unloaded manually before the cage is called to another stop. This interruption is not serious when the lift is used between one department and its stack, but as an interdepartmental connection this can cause confusion and delay. The lift should be set up to signal the control desk with a light and/or buzzer that the cab has arrived. The lift has the further planning disadvantage of operating only vertically. Perhaps the future will bring a device which will combine the best features of the various book conveying mechanisms. The main advantage of the book lift is its ability to carry a variety of sizes, shapes, and weights, from a single sheet or pamphlet to a bulky bound newspaper. No other vertical system has this flexibility.

Conveying equipment may be used in many places to advantage in the modern library. Continuous automatically unloading book conveyors can connect all levels vertically; belt type conveyors can serve to transport books horizontally or diagonally up or down from the return desk, night return, or automobile book return station. Roller or belt conveyor systems may speed the sorting and distribution of incoming books and supplies and, in a central library, of material and books for distribution to branches. Gravity conveying systems utilizing chutes, drops or rollers probably have limited usage. Unless placed in protective containers, books may be easily damaged in a chute or slide, and for messages a gravity drop must operate almost vertically.

The continuous vertical book conveyor is a device which usually connects all working levels. A chain moves continuously over wheels

or sheaves at the top and bottom of the shaft, and carries forked baskets on which the book is placed. The operator selects by push button the level at which the book is to be discharged, the book dropping off the conveyor into a canvas sling or a box with a depressible bottom. A book may be sent from any station to any other, but as it unloads only as it descends, a book traveling from a lower level to a higher one must rise the entire height of the building, and come back down before being discharged, resulting in some delay in the delivery. The standard vertical book conveyor will not carry books larger than quarto size and is expensive to install.

Pneumatic tube systems using small cylindrical cartridges provide a convenient, rapid, and sure method of transporting call slips and other written messages from the control desk to the stack areas and reverse. The TelAutograph is sometimes substituted for this purpose. While the pneumatic tube carries the borrower's call slip to the stack and it returns with the book, the TelAutograph requires staff copying. The pneumatic tube, thus, tends to reduce time and error. A telephone or other device for verbal communication increases staff time and chance of error to the point of being impractical for anything but the most occasional use.

Large flat pouches capable of carrying octavo-size books with considerable speed can be used in a pneumatic system where the volumes are predominantly of this size, but the pouches are heavy and women are reluctant to use them. The pneumatic systems have the advantage of being able to turn corners, and are more flexible in plan than belt or chain types of conveyors. Their use for books, however, is not generally advantageous.

Good planning of building circulation, in short, should reflect direct conveyor runs, resulting in lower initial and maintenance costs.

The all-purpose book truck, standard in size and design, needs careful examination. It is in fact a movable shelf and an expensive one at that. It should be small for easy movement and access to limited areas, high enough for easy consultation by persons when standing, and the shelves should tilt for better visibility. But why can it not take different forms for different uses? In order and cataloging it may well take the form of a movable shelf on wheels and may move the great majority of books through several stages without repeated removal to desks or fixed shelves. On the other hand book return carts with depressible bottoms would be better for collection and sorting. Likewise stacking bins and pallets would simplify sorting and shipment to branches.

## *Transportation Equipment*

The supermarket cart has been found economical and useful in libraries, the light, manual hydraulic fork lift, the dollie or the hand truck so effectively used in handling soft drinks, should suggest appropriate uses. The test is the extent of reduction of time and effort against the cost. The alert librarian and planner might well observe material handling methods and equipment used in business and industry, and find applicable uses within the library.

The normal processes of collecting waste, cleaning, polishing, mopping, and waxing all require equipment. Mop trucks greatly simplify cleaning by speeding the process and reducing the effort of the janitor. Light elevating roller scaffolding reduces cost of maintenance of lamps and cleaning of high ceilings and windows. Exterior roof-hung window washing devices reduce the danger and the cost of window washing and exterior maintenance. Carts for carpentry, electrical, plumbing, and heating maintenance increase efficiency and reduce the proverbial return trips.

Special Considerations. Clear, well placed signs, indicating his destination to the uninitiated, help reduce confusion and save staff time. Material and color selection used consistently throughout the public floors may indicate instantly the location of elevators, stairs, exits, the location of staff assistance, and many other areas or services, or, at least, simplify the giving of directions when requested. Placement of desks, displays, and bookcases can serve to guide traffic flow. Distinct identification of shelves, stacks, and catalogs guide the reader to his desired subject matter. Planned arrangement of repeatedly used material so that it may be readily found and used simplifies the search and encourages reader participation.

Many methods are used to encourage the return of books to the library. Certainly the normal book return function should be located adjacent to the entrance for the convenience of the borrower. An automobile return window will be very handy in congested areas, or where this is not possible, sidewalk devices have proved practical. Night book returns, open when the library is closed, are widely used. The design and arrangement of these devices to reduce damage to books and simplify collection for sorting requires thought and ingenuity.

Meeting rooms where large numbers of people will gather for lectures and other activities should be located at ground level if possible, to simplify the problem of required exits, ease strain on the vertical transportation, and reduce the noise problem. As ground space is usually at a premium, location elsewhere requires careful consideration.



Staff facilities such as lockers, toilets, vendors of coffee, soft drinks, etc., should be widely distributed for easy staff access to reduce travel time and staff elevator load.

Public toilets, if too near the entrance, often tend to become public comfort stations in effect, and encourage unwelcome traffic of non-library users. Public toilets should be located so as not to disturb nearby departments.

All shipping and receiving functions of the library should focus at one location, conveniently accessible to trucks of all sizes, sheltered from the elements and laid out for proper supervision and control. The more unpacking and sorting operations are located here the less inconvenience will result to the rest of the building. The entire area should be at truck level height and should be near the freight elevator. Where the platform height would require ramps or changes of levels elsewhere, thought should be given to hydraulic platforms to facilitate trucking operations.

True flexibility involves the very practicality of the entire building to adapt itself to changing demands, new media, and growth. Flexibility frees the building and its functions to meet future needs and stave off obsolescence. The minimum of fixed walls, simplification of all circulation patterns, ease of access to ample crawl space between floors for mechanical and electrical maintenance, changes and additions, even the construction of the exterior walls as curtain walls, independent of building support, so that they may be removed or altered, all are considerations that must not be overlooked. Careful thought for expansibility far in excess of normal planning, and a clear indication for the direction for such expansion, should not be forgotten. These factors may have little apparent relation to transportation at the outset, but as time creates its inevitable pattern of growth and change they are considerations which allow the building of today to enlarge, change and adapt itself to future patterns unknown.

The architect and librarian must design to the highest standard of known usefulness and project into the design the means for future improvement and extensibility. Buildings should not run down, they should run forward. It is to be hoped that not another library will be built which to a later generation will be as cramped, obsolete, hemmed in, and intolerable as those now being replaced. Newness is not necessarily goodness, nor vision. Imagination is limited by the foreseeable future, however far extended, but vision is the projection beyond that, providing opportunities for future hands to seize. Judge a building not by its age, but by the vision it contains to make it ageless.