



# Library Architecture

Recommendations for a comprehensive research project

Santi Romero



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This book was a success when it first came out seven years ago, and its second edition in 2004 was confirmation not only of that earlier success, but also of a renewed interest in library architecture. Now this English translation ratifies both these observations, while at the same time providing further proof of the *Col·legi d'Arquitectes de Catalunya*'s desire to get its publications out to the highest number of readers possible.

This English version could also be seen as a third edition, given that the first appendix, covering guidelines, is totally new; the numerical data in the second appendix has been revised, and the section dedicated to projects now includes the *Jaume Fuster*, *Josep Llinàs* and *Joan Vera* libraries. Information dealing with the legal and regulatory framework now has an international focus.

In essence, *Library Architecture* is a compilation of all kinds of data about libraries in one single book. Not just information for those architects wanting to build libraries, but for all those professionals – particularly library workers – clients and users who wish to know everything about libraries. For this reason it would not be inappropriate to describe this book as unique, in terms of features. Apart from any other possible considerations, this is a practical book which accurately and thoroughly summarizes all the aspects of interest which crop up during project completion, in such a way that can be understood on first reading. Moreover, the 21 works which have been selected in the Project Completions – mostly from Catalonia and other places in the Iberian Peninsula – are presented as examples of a variety of solutions and high architectural quality.

Though there are more than enough good reasons for translating this book, two are of particular importance: to expand the international influence of an eminently practical book, and to help spread information about Catalan architects' personal contributions to forms which are increasingly in demand around the world. Whatever the reason, this is a small contribution, which shows both the COAC's desire to offer a service, and its commitment to spreading Catalan architecture beyond our national territories.

And finally, we must express our gratitude for the institutional contributions which have made this publishing venture possible, and congratulate the author of the book – architect Santi Romero. Those congratulations extend to the other authors of the 18 volumes which make up *Papers Sert*, a collection which was born in the classrooms of COAC's *Josep Lluís Sert* School, in order to serve the practice of professional architecture.

**Jordi Ludevid**  
*President*  
*Col·legi d'Arquitectes de Catalunya*



*The national library*  
*The public library*  
*The university library*  
*The school library*  
*The specialist library*

## The library

By “library” we mean any organized group of books, periodicals, engravings, maps, sound recordings, graphic documentation and other bibliographic material, manuscripts, printed matter or matter reproduced in any other format, whose aim is to preserve the documents and to enable them to be used, with technical means and qualified staff, for information, investigation, education or leisure.

## Basic missions

- To have books and other collections available, and to protect them and enable users to have access to them.
- To have a catalogue available to find information.
- To have workspaces for users which are comfortable, economical, efficient and safe.

## The library system

The organized group of library services existing in one region.

## Types of library

- National.
- Public.
- University.
- School.
- Specialist.

## THE NATIONAL LIBRARY

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This is the public library which receives a copy of every new book published



**01.01**  
*Public Library*  
*(Vildecans, Barcelona).*  
*Architects:*  
*Artigues & Sanabria*  
*arquitectes.*

within the boundaries of a state or recognised culture in legal deposit, having the role of keeper and coordinator of the library system existent in the region. In some countries it is known as the Central National Library or Royal Library.

### Functions

- The coordination of national library services and bibliographic activities.
- The collecting, preservation and sharing of all bibliographic output produced in or connected to the region, including printed, visual and sound output. This is the aim of its role as collector of the legal deposit.
- The preservation and sharing of all bibliographic heritage of relevant historical and cultural value.
- The acquisition and preservation of general multidisciplinary collections suitable for research into the diverse branches of knowledge, and the assurance of their availability to everyone.
- The creation, management and sharing of the national bibliography and the collective catalogue of bibliographic heritage.

National Libraries have grown out of all proportion, their organization becoming overly complex. Their catalogues hold millions of data, and the storage facilities require huge buildings and mechanized interior transportation systems.

Some sectors are questioning whether these facilities should exist:

- The main functions of a national library revolve around the legal deposit and the national bibliography, but differences in legislation and methods of running national libraries means that there are no two in the world following the same criteria. In some countries the legal deposit is the responsibility of the university libraries. There are also cases where the national bibliography is in the hands of a private organization.
- Building more than one national library in a single territory goes against their centralizing mission in

terms of material output and the territory's bibliographic heritage.

- There are other ways to achieve any of the missions which characterize a national library without having to build one.
- New systems for accessing information are making the specialist function which researchers used to attribute to these libraries less clear.

Even so, new national libraries are appearing, and the existing ones are growing. Some countries, in the midst of catastrophic, tragic episodes in their history, still find a surprising amount of energy to dedicate to the building or rebuilding of these structures.

There are also luckier countries, such as France or the United Kingdom whose opening of national libraries has caused a great deal of discussion which goes beyond solely technical questions.

The critical sectors see these structures as an attempt at an assertion of cultural identity – a national symbol.

Basically, the outlook for national libraries is as hopeful, depressing or exciting as the political or economic situation of the country in question.

### THE PUBLIC LIBRARY

---

This is the library created and financed by some kind of local or central public body, or by some institution authorized to act in this area, which is open to everybody without discrimination.

In 1949, UNESCO published its first manifesto about the public library, which was to serve, for over twenty years, as a blueprint for the definition and expansion of library services.

In 1994, a new "Public Library Manifesto" was published, with the aim of getting national and local governments to give active support and commitment to the development of public libraries.

The basic principals of the manifesto make it possible to evaluate the myriad functions and services of a structure with the following characteristics:

- *"The Public Library is the local centre of information, making all kinds of*

*knowledge and information readily available to its users.”*

- *“The services of the public library are provided on the basis of equality of access for all, regardless of age, race, sex, religion, nationality, language or social status. Specific services and materials must be provided for those who cannot, for whatever reason, use the regular services and materials, for example linguistic minorities, people with disabilities or people in hospital or prison.”*
- *“All age groups must find material relevant to their needs. Collections and services have to include all types of appropriate media and modern technologies as well as traditional materials. High quality and relevance to local needs and conditions are fundamental. Material must reflect current trends and the evolution of society, as well as the memory of human endeavour and imagination.”*
- *“Collections and services should not be subject to any form of ideological, political or religious censorship, nor commercial pressure.”*
- *“The Public Library shall in principle be free of charge.”*
- *“The public library is the responsibility of local and national authorities. It must be supported by specific legislation and financed by governments. Legislation must define a national library network based on agreed standards of service, and must be designed in relation to other types of libraries.”*

The new outline presents public libraries as documentation centres, with a particular emphasis on spreading and promoting culture.

## **Functions**

The public library's functions make it an institution with the following missions:

- A centre guaranteeing the democratization of culture and knowledge.
- An information centre:  
The public library is a local information centre making available all kinds of knowledge of resources

and activities both within and outside the local area.

- Permanent training and self-education centre:  
It must guarantee and support access to the resources necessary for self-education and distance training, initiating conventional literacy and computer courses.
- Reading promotion centre:  
The public library must be a dynamic organisation initiating campaigns to encourage good reading habits and other complementary cultural activities.
- A centre for collaboration and support for education and research:  
As a fundamental support for the education infrastructure, it must offer resources for academic training needs as well as facilitating and encouraging scientific research.
- A cultural meeting space:  
The public library must be the most important public social information centre in the region, a first-class centre of cultural activity, a space open to cultural initiatives promoting values of interculturalism and participation, an open door to the information which new technologies are making available to us, and a multi-space open to all social sectors.
- Leisure space:  
There is a direct connection between the free time the population has and the use of cultural benefits. Through the new concept of the library, this institution becomes the place for participation in and exchange of cultural and recreational activities.

## **Services**

The public library, as the region's cultural reference point, must offer the following services:

- A general and local information service, consisting of its own collections and outside collections, all accessible through catalogues and other telematics systems.
- A welcome area, for information and delivery of information material.
- Consultation and reading of the documentary collection on any

medium, for both adults and children, covering information, training and leisure needs.

- Lending of the library's documentary material.
- Inter-library lending, home-lending as well as lending to public and private institutions.
- Mobile or extramural services for those areas without adequate facilities or with difficult physical access.
- Services specifically for children and younger readers, businesses and collectives connected with disabilities.
- Selective information service, such as online access to databases and the internet.
- Office management service, with computers on which users can produce materials.
- Audio visual service.
- User training. The specific needs of various types within the population will be taken into account, with particular attention paid to schools.
- Support for self-education and working groups.
- Activities to encourage reading: story-telling, book presentations, dramatized readings, concerts and so on.
- Activities to bring culture to life: presentations of records, discussions, workshops and so on.
- Public telephone, fax, photocopier and other means of reproduction.

This variety of functions and services presents a number of problems:

- Public use and private use.  
Public use of the library makes it difficult for the readers to get the (occasionally complete) privacy they need.
- Preservation of heritage along with availability of the contemporary.  
Our heritage must be protected, yet current information must be exhibited.

A balance must be found both in the spaces and in technical solutions. What may be good for heritage records - darkness, safety and exact thermal control, for instance - is unnecessary for open-access records.

- General and special collection.  
The collection must satisfy the demands of children and young people, students and researchers, adults and senior citizens. Thus it must include general collections, a specific local collection about the area and private collections through donations or other specific documental acts.

The library space must achieve these aims. Each reader has to be able to find his/her space close to the document s/he wishes to consult, without impeding the movement of the various users wandering around the various collections.

### **Activity areas**

For the services to function smoothly, it is best that libraries be divided into the following functional zones:

- Reception/Promotion lobby:
  - Foyer – entrance.
  - Promotional and activity spaces.
- General library area:
  - Information and reference area.
  - General collection area.
  - Special collection area.
  - Newspaper and magazine area.
  - Film and music area.
  - Support spaces.
- Children's zone:
  - Reference collection.
  - Fiction collection.
  - Preschoolers' area.
  - Support spaces.
- Non public areas:
  - Internal working area.
  - Documentary material storage.
  - Staff rest area.
- Logistics areas:
  - Supplies storage.
  - Cleaning staff areas.
  - Installation rooms.
  - Parking and loading/unloading area.

### **The collection**

Public library collections are normally made up of, on the one hand, a constantly changing open-access collection at each branch library and, on the other, a reserve collection stored

at the central library or shared out between the larger branch libraries. The open-access collection contains all records for individual consultation, plus all works on subjects of permanent or current interest.

The reserve collections consist of old documental records which are still requested from time to time.

Public libraries must contain:

- **Loan collections:**  
Lending is the public library's main activity, not only because it spreads reading, but also because of the space that the loan collection takes up on the library premises. Its effectiveness depends on the availability of a large and varied collection of documents, and its frequent renewal. It includes the usual books on any subject, key classics and equally important works in other major languages. The degree to which each theme is covered depends on the potential demand in that area. When the collection is limited, regular exchange with other libraries must be organized in order to renew the selection available to the reader.
- **Reference works:**  
Works which are referred to so frequently that they may not be taken out. They include encyclopaedias, dictionaries, atlases and directories of all kinds. As well as these quick-reference works, large libraries must offer a collection of typical information and research works.
- **Local studies:**  
Research collections and documentation published locally, from both the past and the present, covering all formats and media.
- **Heritage collections:**  
Some libraries have documents which have a certain heritage value, from donations, bequests or occasional acquisitions. Conservation requirements and special treatment means there is a need for a policy focused on centralizing these collections in special libraries, leaving only those subjects connected to the local area in public libraries.
- **Periodicals and newspapers:**

Periodicals contain all sorts of current opinion and up-to-date news and information which generally serves to complement the book collection. As for newspapers, they give access to a wide range of opinions.

Types of periodicals:

- Publications designed to be read once and thrown away. When they contain quality articles on subjects of current interest, data should be collected and the information kept in the library.
- A second group contains material with more permanent contents and value, which usually makes up a large proportion of the acquisitions which the public library must make. Back issues containing useful collections of information are kept, as are those which are still requested by users.
- The third group basically consists of journals from learned associations or research organisations, which have a permanent value.

Basic subjects for the adult collection:

Non-Fiction, fiction, fundamental works in the major languages, music collection covering the major branches of music, maps and guides, special collections on the local area, official national and international publications, travel guides, theatrical scripts, musical scores and documents for ethnic minorities, immigrants and for the vision or hearing impaired.

Basic subjects for the children's collection:

The subjects are the same as for adults, but special emphasis is put on picture books and simple stories, suitable fiction for each age-group, books with a straightforward style covering all the subjects and reference works written specifically for children. The contents of children's collections must offer:

- Fiction books in different formats, which will have an influence on the child's future attitude to reading.
- Reference and text books which can help both as a study aid for work done at school and as information on subjects which interest them.

- Reliable up-to-date information connected to their own interests.

### **The public**

The crisis in reading has been a favourite subject for information experts for a number of years. However, the number of library users is constantly increasing.

Results from studies carried out have several points in common:

- There is a direct connection between amount of reading and socio-cultural situation. Thus, graduates read more than those with a low level of education.
- Choice of subject is directly connected to the level of education and social situation. Graduates have a wider range of interests.
- As far as the age pyramid is concerned, the school-age population reads more than senior citizens. However, between 15-19 years old, and 65 years old, there seem to be no tendencies connected to age.
- Females do not read more than males. However, the subjects chosen do differ. Males show a more marked interest in science fiction, history and the sciences, often connected to professional activities.
- The rise in the level of education over the last few years has contributed towards an increase in the reading habits of the less privileged sectors of society. On the other hand, those with diplomas in higher education read the same amount as before.

Observation of public habits will lead to an understanding of what the service is lacking and to ideas for strategies to improve what is available. An increase can be seen in connection to several different factors:

- Higher level of training.
- Construction of new buildings which are better equipped and cover a wider area.
- Range of services tailored to the needs of the users, with advanced technology, accessible information and complementary cultural activities.

- Diversification in what is available, with information aimed at the widest sectors of the population, both in terms of the age pyramid and the cultural level.

This range will mean that each user can have several different facets. The same person can come with his/her children one day, use the service as a professional on another and read the papers or listen to music on another.

### **THE UNIVERSITY LIBRARY**

---

A service which covers the bibliographic, documental and audiovisual collections of universities and ensures that scientific and technical information is available for teaching, study, research and all university-connected use.

University libraries are currently undergoing expansion: Changes which came in during the 1960s and 1970s in the sphere of education have brought about a progressive increase in the number of users, and greater recognition for research and connected activities.

These premises must be built up as an indispensable aid to university study and also to permanent training, aiming at a wider ranging group of users.

#### **Functions**

- To facilitate study and research.
- To produce and share scientific and technological information.
- To train users in information access in new technologies.
- To cooperate with the other library networks.

#### **Services**

- Free access to document collection.
- Bibliographic information service.
- Scientific documentation information service.
- Documentary material loans.
- Inter-library loans.

- User training.
- Reading rooms with spaces for different kinds of study.
- Long opening hours throughout the year.
- Reprography.

The functions and services, which are based around study and research, are comparable from country to country, but organizational characteristics can differ considerably. For this reason, the following specifics are necessary:

- Positioning is multidisciplinary or by speciality.
- Grouping together of subjects, or division based on academic year.
- Standards of service which must be offered.

### Functional areas

- Spaces for public use:
  - Welcome and Information area.
  - Open-access collections.
  - Reference and study area with spaces for individual and group work.
  - User training rooms.
  - Spaces for computerized documentary research, thesis reference and inter-library loans.
  - Meeting rooms for presentations, exhibitions and other activities.
  - Reprography.
- Internal working areas:
  - Administration.
  - Documentary material storage.
  - Staff rest area.
- Logistics areas:
  - Supplies storage.
  - Cleaning staff areas.
  - Installation rooms.
  - Parking and loading dock area.

### The collection

Variety, choice and accessibility of collections continue to be the main qualities of a university library.

Beginning and building up the collection is a priority mission, and assessment of the maximum size depends directly on the specific characteristics of the university in question. There is a dual requirement:

- To offer an extensive collection of books.
- To have several copies available, so that they can be lent out and consulted in the library itself at the same time.

Like public libraries, the whole collection can be borrowed, with the exception of manuscripts, incunabula, particularly valuable works, reference works, those for which there is a high demand but few copies, and those which are not available to buy.

### The public

Types of users:

- First cycle students:
 

They are a little disorientated, technologically experienced and mainly consult the basic bibliography.
- Second cycle students:
 

They use all information resources, and bibliographic consultation becomes more specialized.
- Third cycle students:
 

Being more specialist users, they make intensive use of computer resources, which means they have to be able to use them expertly.
- Teaching staff:
 

They tend to view the library as a tool for the students, without seeing it as necessary for their work. Their computer skills depend on the subject they are teaching.
- Research staff:
 

They have a high level of computer skills, and usually have their own information channels. They do not find the library a comfortable daily working space. This is not the typical university library user.
- Non-University users:
 

This group includes users doing continued training and those resuming studies after retiring.

### THE SCHOOL LIBRARY

---

A service providing the necessary material for educational needs, giving access to culture, teaching pupils how to use document collections, and enabling them to broaden and enhance both their education and free time.

The library users of the future are today's school pupils, and the ease with which they enter into the world of information is in the hands of school libraries. This is why the libraries should contain collections specific to the completion and support of teaching programmes.

They should also be spaces where pupils and teachers can increase their capacity to think, to research, to be independent and to learn how to learn.

Also known as "school media centres or learning resource centres" most of these facilities do not fulfil the conditions needed to carry out the task which the new education system demands of them. The main reason is the lack of any specific regulation about the minimum requirements for their running, in terms of premises, facilities, collections or staff.

At UNESCO's 30<sup>th</sup> General Conference a new IFLA (International Federation of Library Associations and Institutions) Manifesto was ratified, urging all local, regional and national authorities to develop policies and plans for the proper running of these libraries.

- Because of the type of document: specializing in one particular kind of document, such as musical scores, cartography and so on.

How the collection is made up can present more problems. Apart from the specialist subject, the readers also need a basic collection, and a collection covering related subjects, where it can sometimes be difficult to know where to draw a line.

## **THE SPECIALIST LIBRARY**

---

A service which contains a collection focussing mainly on one specific area of knowledge.

Because of the objective and function of such libraries, they present numerous variations on the theme, from those set up by governmental bodies and scientific or cultural institutions, to those backed by commercial business and industry.

The particular features of special libraries, each with a different aim or "raison d'être", cause specific problems in the question of collection policy and organization of the service.

A library might be specialist for various reasons:

- Because of its collection: according to particular branches of knowledge.
- Because of the public: different types of users, such as technical college libraries.

Over the last three decades there have been major changes in the world of culture: the evolution of a technologically modernized society, a predominance of the middle class in the consumption of culture, the growth and broadening of the role of education, together with more widespread compulsory schooling, and the vision of continued training as personal improvement and as an added value in an increasingly specialized society.

The latest designs for living seem to present a somewhat contradictory reality: an increase in leisure time, but also in unemployment and migration; an increase in the amount of information available, but also in functional illiteracy; the need for constant updating of knowledge coupled with a noticeable imbalance regarding the training at schools and universities; joining a society where social differences are also manifest in the lack of equal access to information (this in a democratic society in which free access to information is supposed to be a founding principle); and an increase in potentially available information together with a lack of knowledge about its use.

With the paper medium, texts were mostly accessed sequentially. Only in very few cases, for example dictionaries, was information used in a “fragmented” way. Digital technology, however, brings with it an increase in the possibility of non-sequential information access. Interactive documents are creating a different way of “reading” a document, which has implications for the way we acquire knowledge which are not yet absolutely clear.



02.01

The information is there, but it has to be found and organized for it to be any use. What is relevant has to be distinguished from what is not, and turned into something beneficial for the life of each and every person.

We are moving into the “information society”, where anybody can effortlessly access any information. It will become possible to consult any book from any place, and to take part in the most exciting events on the planet from the comfort of one’s own home.

The effects of this revolution, comparable in magnitude to the advent of the railway or the invention of electricity, will actually be more immediate since technology is progressing faster than it did in the last century.

Yet visions of universal welfare might actually be hiding some trends which are not quite as optimistic, and some interests which are not absolutely clear. According to UNESCO, there are six billion people on the planet, four and a half billion of whom have no access to these new information technologies. In fact, the process of transition towards a knowledge based society, and a global economy is characterized by a deterioration in the living conditions of the working class. Access to information might be easier, but it will not necessarily be cheaper - and it certainly will not be free. These days, the most valuable information – for example research results or processed information – has to be paid for, and this will probably continue to be the case in the future. Access to information on the net needs the right equipment which becomes obsolete within a very short time. What this means is that the age-group, social and cultural profile of today’s typical user will not change.

One also has to look at the possibility that this enormous ease which individualized choice of intellectual and leisure consumer products guarantees us, actually reinforces the two basic features of the new lifestyle: activities which until now took place outside the home now being concentrated within the home, and individualism.

## **The library and its users**

Planning to construct better buildings and to offer a qualified library service requires a lot of thought about the running of the existent facilities.

Some sectors of the public still have an archaic view of libraries:

- The “library” as a solemn place of monastic austerity, where all the people sitting in silence before their books give it a religious atmosphere.
- The “university library” seen as the “real library” because of its specialist collections, quantities of data transmission information and long opening hours.
- The “school library” as an ill-equipped service in terms of both space and collections, marked by opening hours and strict discipline which do nothing for its image.

With “public libraries”, there are aspects which limit their use:

- Timetable restrictions mean that most adults see them as places for schoolchildren and senior citizens.
- Insufficient computerization and the limited specialist range mean they cannot be considered as consultation services.
- The limited lending period becomes a serious obstacle to reading for pleasure.
- Today’s culture of convenience and modernity demands larger and more comfortable spaces, more proximity to the home or workplace and instant information.

## **The library and public administration**

Assessment studies on performance have made it possible to identify some errors in certain facilities’ approaches. Library planning by public administrative bodies, as patrons of most libraries, will have to consider the following shortfalls:

- In certain cases, the lack of any library tradition has meant importing models from outside areas which do not always coincide with the performance and services which the library service itself ends up offering.
- Programmes of needs have not been specific enough, and the lack of

dialogue between architects and libraries has led to functional disasters.

- The high investment and maintenance costs of libraries and the difficulty in measuring the social benefits have meant that for many years it has been seen politically as a fairly unprofitable venture.
- Library management has not always adapted technology or contents-wise to the needs of a rapidly changing society.
- Sometimes the administration has not explained the services offered by the library clearly enough. It has failed to create an image which really shows the positive role which it already plays.

### **The library in the 21st century**

The library is changing. From being a terminus, a warehouse or a depository where, basically, the product was kept and processed, it has become a way in or an aid to surfing a sea of information which goes beyond the covers of a book or the presentation of a record and in fact, beyond the walls of the building.

So the task of defining a new library model has now become essential. It is the library service's responsibility to answer to current needs and to face up to new challenges. That is why a whole new dimension must be given to library policy:

- Directing it towards cooperation with other institutions. Interconnecting with other kinds of libraries, and working in conjunction with other public services and sectors of culture will mean it can economize effort and globalize its activities.
- Increasing the number of school libraries. Although the library acts as an important branch of the educational infrastructure, the shortage of school libraries means that public libraries become substitute spaces, distancing them from their specific objectives.
- Revise the network structures. The traditional parallel decentralization method, with collections of the same kind at various connected points, might be replaced or enhanced by other types of possible set-ups.

The intensive concentration option should be considered, wherein the centralized collection can only be queried remotely through virtual systems, as should the selective specialization option, wherein each of the network's points has a distinct collection with its own unique features.

- Increase the budget for purchase of bibliographic material and digital information, for broadening the range of information media, and for the acquisition of new information access technology.
- Redefine the profile of professional librarians, increasing the area and specification of their responsibilities: from librarian to documentalist or information specialist.
- Offer the community enough information, support self-education and train and advise users in access and use of information. A person's computer skills are not regulated in today's training, and are mainly dependent on an individual's learning.
- Offer special services to different user-groups, from business information to those users who may need individual attention, whether they are ethnic minorities, people with disabilities or any other situation.
- Direct the various services available towards user needs. This means a revision of timetable, calendar, conditions of access and lending systems.
- Offer comfortable premises for collection, study, learning and leisure. The library must be an active, living space where cultural activities are central, not just an additional aspect.
- Define communication strategies and apply cultural marketing techniques in order to bring the services that they offer to people's attention.

### **Questions for the future**

Why do the most developed countries continue building and renovating libraries when the library today is itself an unknown quantity?

Specialists the world over are asking

themselves this and other questions. Despite the unknowns, there is some consensus in certain areas:

- In this time of supposed cultural globalization, there is no indication of the disappearance of the book. More books than ever are being published, although their shelf-life is getting shorter and shorter.
- Needs in the future will be different in form, but similar in content: to supply information, to empower the individual and to build a community. The modern library is presented as the solution to the weak points of the new “information society”. It is a space for interrelations, reinforcing social cohesion and preventing the fragmentation of society, guaranteeing equal access to information, training in how to get the best out of it, and a solution to the matter of its high cost.
- The library building is a reflection of the importance a society gives to books, culture and knowledge. The library cannot be solely virtual. Its very essence is that it is a part of physical space. The library, the tool of memory, the practice of freedom, is a place which is bound to space and time. As Norman Foster says, it creates a synergy which cannot be accessed remotely.

So what will the libraries of the future be like?

- There may be a huge growth in the area of high-tech multi-media libraries, with well qualified staff who can guide us along the new highways of information and knowledge. The location of these (somewhat smaller) spaces, will be a decisive factor when choosing where to live or work.
- Perhaps these “public terminals”, where the book-format will be the computer screen and printer, will result in the building of libraries as “closed boxes”. They will be depositories – like the Rare Book and Manuscript Library at Yale University – to store all the material which could get damaged, the bibliographic treasures, as heritage for generations to come.

The ideal library of Jorge Luis Borges’

dreams had to be like the universe itself; limitless, containing all the books possible. Today this library does exist, but through a communication network which covers the whole planet, via a computer screen waiting to be accessed.

There used to be collections, now there are connections, and tomorrow, who knows?

## Author's Note

*The following sources were of particular use during the writing of this chapter:*

- *“Colecciones y conexiones. El espacio de la biblioteca a través de la historia”. Article by Alfonso Muñoz Cosme, doctor of architecture, in the magazine Arquitectura Viva, num. 63 (November – December 1998). This source is cited in the bibliography.*
- *“La biblioteca en la ciudad”. A lecture given by Lluís Cantallops, doctor of architecture, in the two library architecture courses run by myself, and put on at the Demarcación de Barcelona del Colegio de Arquitectos de Catalunya (September 1999 and November 2000).*

In the past, libraries were built purely for the accumulation and safekeeping of knowledge, with no intention of encouraging the populace to read. These were libraries belonging to a lord, a bishop, or the king. Access was limited to those born to privilege, whose status would open the library's doors and allow them to use it. Many centuries had to pass before libraries became the paradigm of public service, the cultural facility open to all citizens, which they are today.

Ancient libraries were like secret places where a collection of books was built up and kept. They were usually built as an



**03.01**  
Stockholm Public  
Library (Sweden).  
Architect:  
Eric Gunar Asplund,  
1921/1928.

annex to a sanctuary, a temple or some nobleman's tomb, and were monumental structures, ornamented with statues, crests and paintings.

- The oldest known library is in Ebla, in Syria, where clay tablets with cuneiform writing were collected and classified.
- Later on, in Egypt, libraries were normally found inside temples, and were called "houses of life". The Ptolemy dynasty created a museum in Alexandria, also functioning as a centre for higher education, which housed a library. Its layout remains a mystery, but it grew in size until it was the largest in the ancient world. In the time of Cleopatra VII, it was partially destroyed during the Alexandrian wars.

When the libraries needed more space, an architectural model was introduced which consisted of rooms to store the volumes, and porticoes for reading.

- This trend is illustrated by the discovery in Pergamon of the remains of some large rooms giving on to a huge portico. This library, founded at least a hundred years later, is believed to rival the one in Alexandria in terms of the size of the collections.

From descriptions in literary works, excavations and the remains of ancient libraries, we can suppose that from Pergamon onwards, the layout of the building consisted of one room facing East, with a portico or colonnade leading into it.

- In ancient Greece, the first definite mention of the existence of libraries is a reference to the great schools of philosophy of the Fourth Century BC in Athens, such as Plato's Academy and Epicurus' school.
- In Rome, the first libraries were private and the founding principles came from the libraries of Greece and the kingdoms of Asia Minor. Rome's first public library was established in the year 39 BC. Later on, emperors such as Augustus, Tiberius and Trajan gave the city buildings dedicated to reading and the safekeeping of documents. These were temple annexes, based on the Pergamon model.

Nordic invasions in the Western Empire, beginning early in the Fifth Century, brought about the destruction of the imperial libraries spread across much of Italy.

- In the Arab world, which gave the West part of its Classical Culture through remains found in the library of Alexandria, the caliphs had their libraries with patios and porticoes which were also reminiscent of the Roman library model.

In the Middle Ages, the book was hugely important. In many monasteries, reading formed part of monastic life, and the copying of books was a common task. Western European libraries were exclusively ecclesiastical, belonging to monasteries, cathedrals, and later, from the Thirteenth Century on, to universities. To begin with, books were housed in various different places: books of worship were kept in outbuildings close to the vestry; study textbooks were kept in school rooms, and those which were simply for reading were kept close to the refectory or dormitory. In the cloister, there was the general library, in corresponding "armaria".

Around the Twelfth Century there was a major change in libraries, for several reasons:

- The expansion of culture beyond the walls of monasteries and religious institutions.
- Royal and Noble interest in getting private libraries built.
- The progressive replacement of parchment with paper, making books less expensive.
- The beginning of humanism, leading to the modern library.

So the first storage areas came into being, aimed at conserving documents, where the reader could sit alone and apart in a small area near the light from the window, surrounded by books. During the Low Middle Ages, cathedrals and universities were the first institutions to create libraries. Outstanding examples of cathedral libraries were those at Canterbury and Toledo. Of the university libraries, those at the Sorbonne and Salamanca are of particular note.

The Renaissance brought with it what can be termed a true library architecture. The invention of the printing press meant large-scale distribution of books and, consequently, a change in both the function and the size of these buildings.

The re-emergence of culture – hidden away for so many centuries – began. Libraries took on a prominent social role, bringing about a typological architectural evolution. Even so, they continued to be placed in buildings intended for other uses such as palaces, convents, monasteries and universities.

The facility's physical location within the city was of secondary importance, and it was simply built wherever the owner desired. Although some of these libraries occupy places of major importance in the city, their location was never based on any studies in urban integration, aimed at meeting the needs of the greatest number of people.

- The first Renaissance library, dated 1438, was that built by Michelozzo in the San Marco convent in Florence. It is a room with three columned aisles. There are windows down two sides, and lecterns with books chained to them, to prevent theft. The colonnaded area is reminiscent of ancient libraries, but is now an enclosed nave.
- In 1523, Michelangelo began work on the Bibliotheca Laurenziana, also in Florence. Pope Clement VII wanted to construct a building which, as well as increasing the city's prestige and creating a certain idea of reading, would unite the finest architectural qualities and symbolic expressions. The general idea was to see the library as a series of three clearly differentiated spaces: the entrance, whose main element was a staircase; a reading room like a huge parallelepiped, punctuated by a series of windows and simple pilasters, and one final room for the most valuable manuscripts. This last space was never built. If we compare the reading room with the one in the San Marco convent, we notice that the columns have disappeared, that a more central role

is given to space, the dimensions are larger and that the bench desks remain.

- Between 1567 and 1584, Juan de Herrera took a step forward with the El Escorial library. This is one long barrel-vaulted hall, with large bookcases along its walls.

The layout of the bookcases means that the volumes can be organized by theme, a method which was followed until the beginning of the nineteenth century.

The Escorial typology became the blueprint for the architectural type prevalent in the seventeenth and much of the eighteenth centuries.

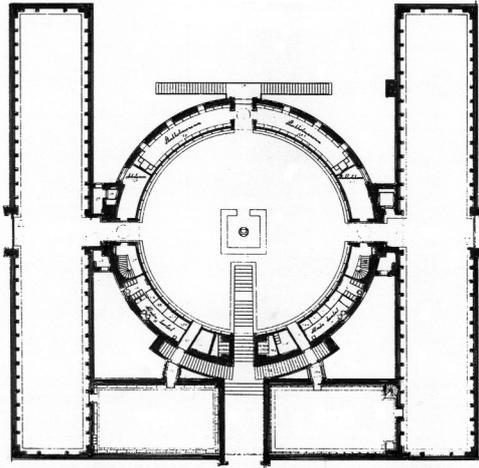
- This was the inspiration in 1784 for Étienne-Louis Boullée's dreams of a utopian library, which was to influence all later developments. Boullée, who dedicated part of his life to making plans for buildings which were impossible to build, combined geometrical purity of monumental form and immensity of vision.

In this particular case, his aim was to give knowledge, and the accumulation of knowledge, symbolic meaning, and to invest it with a feeling of holiness. The space becomes one enormous area in which the reader can concentrate through the contrast with the hugeness of the scale.

With the idea of building Rafael's "School of Athens", he covered the patio of the existing library with a huge apse, as a metaphoric reference to a cathedral. This immense top-lit basilica houses an amphitheatre for books, with bookcases at varying levels. This tunnel of books could go on forever. Boullée suggested a wall at the end, ornamented by a group statue, reminiscent of the apses of basilicas, overseen and protected by tutelary divinities.

Boullée's proposal is now a major reference for discussion of modern library culture.

The Age of Enlightenment, which favoured access to knowledge for all citizens, and the Industrial Revolution, which caused a huge increase in the



**03.02**  
*Stockholm Public Library (Sweden).*  
 Architect:  
*Eric Gunar Asplund,*  
 1921/1928.

number of books published, meant that the traditional system of putting the collections and the reading rooms together in one place became unworkable.

So new libraries needed specially-designed areas for storage, reading and administration.

The positioning within the city of the first major contemporary libraries, and the architecture of the buildings housing them, reflected both the neoclassical models of urban institutions of the day, and the dominant architectural eclecticism.

The place itself had to be as central and as imposing as possible, and the architecture as representative as possible of the economic and cultural capacity of the community.

From this point on, library architecture

would be based on various proposals for interconnecting spaces which could also function independently.

- In 1921, Erik Gunar Asplund used cylinders and blocks to house the Stockholm library. The great hall, with its circular floor surrounded by bookcases, is reminiscent of Boullée's vision.

The plan of the building is a strictly neoclassical composition. The reading rooms are situated around the perimeter area, forming an open, square patio. The interior of the patio is occupied by the central hall, which houses the books. Access to this room, which is cylindrical, is at the tangential points. (Fig. 03.02).

In the early sketches, Asplund gave the central hall a domed roof, with the lower part having three separate levels of bookshelves. A cross-section would look like a spherical space, symbolizing the inside of a cranium - a metaphor for the mind. For reasons of both structure and form, the cupola was replaced with a tall cylinder. With the cupola, the ceiling lighting would have been complicated and expensive. Apart from that, it would have been difficult to see from the outside.

The cylindrical structure lends a certain grandeur to the exterior image of the whole, while at the same time letting light in through the windows in the outer walls. The

**03.03 and 03.04**  
*Stockholm Public Library (Sweden).*  
 Architect:  
*Eric Gunar Asplund,*  
 1921/1928.



03.04

sudden surge of red protruding from the square building makes an impressive image in the cityscape. (Fig. 03.04).

As for the interiors, the counterbalance must be pointed out between the elemental treatment of the upper part which is light-coloured, retaining the feeling of fabric, and the delicate way the materials in the lower part have been used, with the characteristic opulence of the 19<sup>th</sup> Century, stylised by the art deco sensitivity of the 1920s. (Fig. 03.03).

- Alvar Aalto also opened up new possibilities when, in 1927, he won the design competition for the Viipuri library.

Due to circumstances after the competition, the building did not actually open until 1935. The evolution of the project during this time is documentary testimony to the stylistic and formal evolution of Finnish architecture.

The library was supposed to be a very simple structure with a rectangular base and one long narrow wing connecting the entrance to the street. It ended up being two juxtaposed blocks, the larger of which housed the reading room, with shadowless light falling from skylights on to three different levels of bookshelves around the sides.

The glass-walled foyer allows one to see the building's potential: the

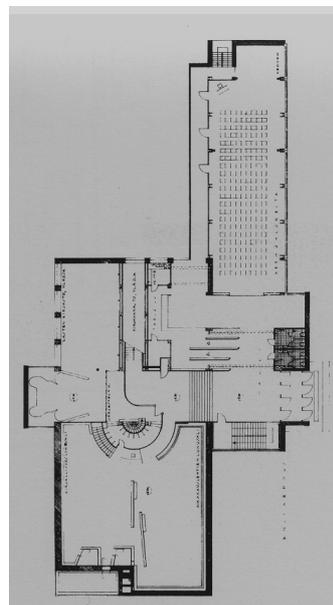
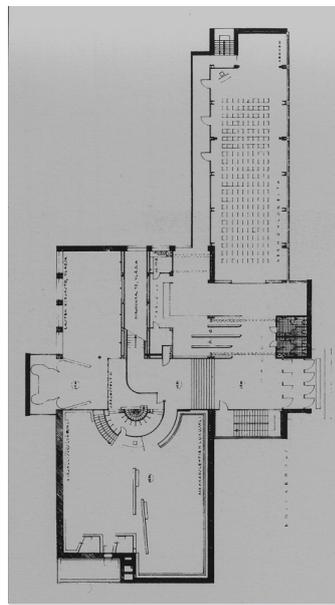
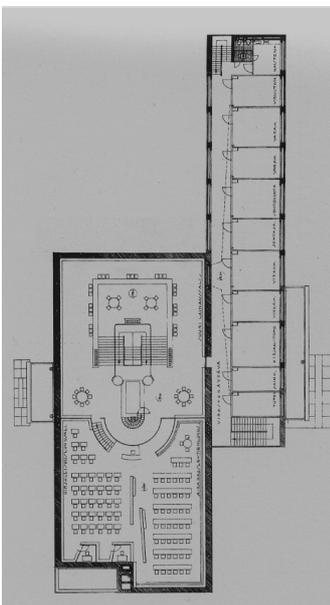
conference room, the library and the staircase leading to the administration area.

The walk up to the main hall reveals a surprising space which, as the staircase winds back on itself, leads you to the lending counter. The room has no main level, but rather there is one level for books, another for administration, and another for reading.

The way the entrance areas lead to the main hall, the huge lending and reading areas on different levels, the conference room with its undulating acoustic ceiling, the newspaper archive and children's library, the built-in fittings and air-conditioning, the care taken over structural detail, the specially-designed furniture and so many other things make this library one of the most representative examples of the modern movement.

In contrast to what can happen in other libraries whose size is completely disconnected from the reader, the spaces and movement in the Viipuri library flow along different perceived and actual levels, without ever losing that sense of centralized control that a library needs.

Aalto's preoccupation with light was behind his creation of a space where no direct sunlight enters the room, but instead is reflected off the conical surfaces of the skylights, rendering the use of opaque panes of glass



**03.05**  
*Viipuri Library*  
*(Russia).*  
*Architect:*  
*Alvar Aalto,*  
*1927/1935.*

**03.06**  
*Beinecke Library,*  
*Yale University*  
*(USA).*  
*Architects:*  
*Gordon Bunshaft,*  
*SOM, 1960/1963.*



unnecessary. This diffuse lighting is especially pleasant for the reader, who can sit anywhere without finding either shadows or reflections. Some of the typological elements seem to have come from Asplund's project. Aalto created an asymmetrical building, and Asplund an axial plan, but the horizontal divisions are similar, as is the massiveness of the plinth, broken only by the huge gap for the entrance. (Fig. 03.05).

With Aalto's Viipuri proposal as a starting point, two very different positions on any library project could be taken:

- The first, which Alvar Aalto developed in later projects, is based on a linear sector for administration and customer service, and a sector based on a polygonal, fan-shaped plan for the reading rooms.
- In the second, Jascobsen, Kahn and other architects would attempt to fit all the various functions of a library into one rigid unit. In this alternative experiment, lighting and flow would be the elements giving a sense of organization to areas set out within a pure geometrical containing space.

The first option proposes a more rational layout, as opposed to the pure, enclosed sections of the second, where the unity is exterior, which offer fewer possibilities for economy of movement and the diversification of services.

- Between 1960 and 1963, Gordon Bunshaft and the SOM team created the Beinecke Rare Book and Manuscript Library at Yale University. It is a huge floating container, with a glass-walled tower inside, where the books are stacked.

The windowless façade is composed of Vermont marble panes letting the sunlight through. The temperature-controlled interior space has magnificent filtered light which protects the glass box from ultraviolet rays. (Fig. 03.06).

- This attempt at geometrical regularity can also be found in Exeter library, built by Louis Kahn between 1967 and 1972.

The tendency towards geometrically determined abstract monumentalism can be seen in the main cube, where the outer spaces are for reading, and the inner zone for book storage.

The main hall – a recurrent theme in libraries – is a huge hollow in Kahn's project, a wall-less space which all the floors look on to. Behind concrete screen walls with their giant circular openings, the book storeys look like huge wooden drawers.

The brick facades are of a very austere design, so that the building can merge more easily into its Neo-Georgian surroundings. The windows illuminate the small carrels, designed as self-contained work stations.

The lighting creates the feeling of ceremonial movement. From the foyer in semi-darkness, with its diffuse top-lighting filtered by the impressive concrete structure which crosses the atrium, down to the perimeter lighting at the end.

- In 1984, Norman Foster won a design competition for the Nimes Mediatheque. This was to be a building that would stand in the middle of the historical town centre, opposite the Roman Temple known as the Maison Carrée. (Fig. 03.07). Despite the power of Foster's architectural language, this building is actually one of the finest examples of diachronic dialogue between two high quality architectures, separated by nearly two thousand years of building.

The building's proportioning fits in with the neighbouring structures, trying to keep in harmony with its urban context and the environment. Foster came up with a huge glass box to house a wide ranging programme. On the ground floor, there is a real link between the Roman monuments and the 18th

Century Fountain Garden. The main public spaces are placed around the central patio, a vast green space open to the sky, with wide stone steps connecting the levels.

The centre's range of functions cover nine storeys, four of which are above ground level. The galleries for the art collections are situated in the upper part of the building so as to make the best possible use of the natural light, the bar gives onto a shaded terrace which overlooks the Maison Carrée, and the mediatheque facilities are grouped together near street level.

The exterior of the building is all glass and has exceptional transparency and luminosity. A system of blinds protects it from getting too much Mediterranean sunlight.

The main façade faces the Maison Carrée and is built to the same proportions. The great canopy, as wide as the building itself, is a contemporary take on a temple portico.

- We can find one example of a library built around interconnecting sections in the Hague's City Hall and Central Library, built by Richard Meier between 1986 and 1995.

The imposed special coexistence of the library and the City Hall made the architect opt for the look of an administrative type of building, rather than the specific idea of a public-access library.

Looking at the whole, you see a single vast building, but in fact there are four sections, joined in two pairs forming 'L' shapes, with a large central space.

The City offices are in the two longer sections, with an immense central patio where people walk as if it were a street. One of the short arms is occupied by commercial spaces, and the other by the library.

The way that this programme - so complex, so difficult to fit into a single body - has been resolved has had a negative effect on the library, which has had to organize its spaces on six different levels.

To bring this journey through the history of library architecture to an end, it is worth mentioning two major projects



**03.07**  
*Nîmes Mediatheque*  
*(France).*  
*Architect:*  
*Norman Foster,*  
*1984.*

which have written the latest chapter in the history of libraries: the new British Library in London, and the National Library in Paris.

Opened in 1996, both the French and the British National Libraries can be considered reflections of the image these two great European countries give, at this point in history.

As opposed to the way that library funds are spread around in countries like Germany, Italy and Northern European countries, these two libraries have opted for a more centralized model, thus creating two projects of huge scope.

They also represent two very different attitudes regarding the decision of where to place public buildings, which are supposed to bring value to the urban spaces where they are built. However, these two recent libraries, have been classified as funereal monuments in older libraries.

- The British Library, which stands on a fairly small piece of ground near St. Pancras, was supposed to be the main force behind an urban regeneration policy of spreading major cultural institutions across London.

The building, by architect Colin St. John Wilson, took a long time to become reality because of a series of political and economic obstacles. Almost all Colin Wilson's professional life has been marked by the project and the construction of a building which has always maintained its coherence of form.

The first approved project was in 1976, and the library was opened to the public in 1996. The building itself bears witness to its long and troubled gestation, and looks like something from another age, not only because of the architecture, but because of its very concept of what a library is.

The group of red brick structures consists of an accumulation of independent elements connected by long walkways. Two wings of unequal size house, respectively, the humanities reading rooms and the science reading rooms, which is an unusual separation in this time of interdisciplinary work and cross-reference knowledge.

The foyer, which forms the hinge of the two wings, affords a clear view of the main public spaces. In the centre, a huge glass tower, 17 metres high, contains the "King's Library"; George III's collection, the origin and the heart of the British Library.

The end result is a building which merges in well with the neighbourhood, almost disappearing into the urban landscape. A building designed from the inside out, where the main considerations are design, lighting and the order of the interior spaces.

- The National Library of France, which also opened in 1996, was completed in a shorter time and did not have to go through any of the controversy surrounding the British Library.

The building, by Dominique Perrault, stands in an arid industrial zone next to the Seine, in an area where wide horizons stretch off into the distance, making the library a most imposing feature.

Atop a large rectangular platform with wooden decking, hiding a sunken area where the reading rooms are, four glass skyscrapers rise up, one at each corner like open books. This is where the books are kept.

To all appearances, the approach seems totally illogical. Books, which get damaged by light and heat, are stored in a glass building. Readers, who want natural light, are in a

basement which has to be lit artificially.

Once the platform comes into view, the building becomes something of a puzzle, because there appears to be no means of access. It is only when one is actually on the platform, walking towards the centre, that the tree tops and the beginnings of the moving walkways can be seen.

The reading rooms, on two levels, are organized in concentric circles spaced out around a large central tree-lined patio. The layout means long walks from place to place are obligatory, since the patio is not accessible. So there is no North-South or East-West connection, and you have to walk around the garden.

On a lower level, there are the research areas, where you have the closest and best views of the trees. Inevitably, the building gives out messages. The most obvious is that the acquisition of knowledge is a process of excavation, a privilege reserved for researchers.

The building has turned out to be ungovernable and full of contradictions. In the digital communication age, a traditional library model has been chosen which, because of its excessive size, has become unworkable.

Unlike the British Library, the building is designed from the outside in. The power of the exterior sectors and the visual impact of the huge scale give the whole a spectacular, monumental atmosphere, making this an imposing landmark on the Paris waterway.

In the same way that the catalogue of a library attempts to classify and give order to knowledge, the various different architectural approaches reflect a need to camouflage, behind geometrical order, the irregularity of the collections, organized into different media, and aimed at a hugely varied public. This can be seen from the parallelepipeds to the geometrical sectors joined to other shapes, and also in buildings which had once been hospitals, factories and palaces. This relative freedom of architectural shapes used comes from the variety and

flexibility of current building materials and methods.

Architecture has a lot to say, and the influence of the architect over the building is fundamental. Projects are based on functional requirements, but also on an architectural choice, which may come from two very different approaches:

- In the first, the starting points are coherence, unity and indivisibility, making a building with its own strength, without thinking about the surroundings, and with no visual dialogue with the outside. The idea of movement predominates, transfixing the building, giving it structure from the outside in, from below to above, from noise to silence. The book is the principal element here, the receiver of special treatment.
- The second approach is based around transparency, the interior-exterior relationship, big entrance spaces. The inside is dominated by a view of the various different areas, and the positioning of the collections depends more on the available surfaces than any sequential movement through different types of information. The library must be a social space, attracting the largest possible number of users. That option being the case, some libraries now have the spatial forms of commercial buildings, where a huge foyer with escalators leads you to the different areas. This architectural form begs the question: "Does the library really have so much in common with commercial business that it should be housed in the same kind of space?"

A blurred line appears between the functional building, and the monumental building. Any and all of these options could form the basis of a discussion concerning public architecture, revolving around the character of the building.

### **New libraries**

Although at the moment there is a huge number of unknowns as far as envisaging a library goes, the final result

must always be a building in which the organization of the spaces corresponds to needs that are in a constant state of change. That is why such concepts must be developed according to a series of considerations:

- The presence of different types of users, all demanding different types of information, means that the reading areas need more distinct organization than before.
- Speed of use demands a layout which is easier to get around, with clearer routes and better signposting.
- Demands for flexibility – brought about by the possible variations both in the number of users and in their needs – call for a typology of a less rigid structure, adapted to pre-decided functional hypotheses.
- These functional methods, which apply as much to small libraries as they do to large ones, would require more doubling-up and alternating of uses in smaller libraries.

The architectural missions for libraries are many and contradictory. A library has to attract a varied public while at the same time ensuring that the collections can be safeguarded and updated. It is also a space for memory, yet open to the present and the future with all their technical resources. Lastly, it has to function as a kind of garden of knowledge which can be walked through.

The future is pointing us towards a concept of the library as a functional space always dependent on the demands of new needs.

Can architecture translate and reflect the variety of missions given to a library?

Can it accept the contradiction between being a public space dedicated to the private and individual act of reading? Should the same treatment be given to the heritage base of the collection as to the ephemeral documents?

Does a library contain, or does it transmit?

Is there a library model which answers all these questions?

Despite the danger of presenting solutions that are repetitive or

depersonalized, here is a plan for a library typology:

- A building like a huge container, able to absorb any changes which occur. Projects based on programmes which are too specific produce models which are themselves too rigid.
- Organization of horizontal and vertical movement, freeing up easily adapted spaces for different library uses.
- Work and study areas conceived as transparent alcoves with a network of large, easily accessible installations. They should not be designed with any particular purpose in mind, but should be able to be added to and divided. In these places, creative effort must be applied to the space, in the way that light and shade are used, without losing the symbolic character that a public space needs to have.
- The entrance areas, such as the foyer, the staircases and the multi-function rooms constitute the door to the library. As such, they have to be given the size and symbolism which these public buildings demand.

The UNESCO Manifesto of 1994 states that the library must be supported by specific legislation defining a national library network based on agreed standards of service, as well as cooperation between all kinds of libraries so that the entire collection of national resources can be used by any reader.

### LEGISLATION IN SPAIN

- *Spanish Constitution (1978).*

Article 44:

*“The public authorities shall promote and watch over access to culture, to which all are entitled.”*

*“The public authorities shall promote science and scientific and technical research for the benefit of the general interest.”*

- *Law No. 7/1985, on the regulation of local government rules.*

It is acknowledged that public libraries form part of the obligatory competencies of City Councils of populations over 5000.

As for the technical and financial advice needed for a council to set up a facility of such characteristics, the Law gives a fundamental role to provincial councils, whose job it is to give assistance and cooperation to the councils.

- *Law on Spanish Historical Heritage (1985).*



**04.01**  
*Excommunication Decree. Salamanca University Library.*

Article 60:  
“Any buildings devoted to the installation of state-owned archives, libraries and museums shall be subject to the rules established by this Law for property of cultural interest, as shall any movable property forming part of the Spanish Historical Heritage that is held in them.”

“At the suggestion of the appropriate administrations, the Government may extend the rules mentioned in the above section to other archives, libraries and museums.”

- *Regulations for State Public Libraries and Spain’s Library System (1989).*

Article 1:  
“State Public Libraries are those attached to the Ministry of Culture through the Archives and Libraries General Directorate, the aim of which is the sharing and promotion of reading in public rooms or through temporary loan, as well as the preservation of bibliographic collections of exceptional importance which form part of Spanish Historical Heritage.”

The regulations state that these libraries are governed by the provisions of the Spanish Historical Heritage Law, and that the Ministry of Culture can come to agreements with autonomous communities about their management.

State public libraries’ collections include state-owned collections and works, or those belonging to the administration running the library, and the depository may also include collections from outside ownership.

Article 22:  
The Spanish Library System is made up of:

- The National Library, as head of the system.
- State Public Libraries.
- Libraries dependent on ministries and the State Administration’s autonomous organisations, excepting academic ones.
- Public University Libraries.
- Networks or systems of libraries

of public or private institutions, as well as libraries of exceptional interest which are included through agreement with the Minister of Culture.

The Ministry of Culture will promote cooperation between the institutions which make up the system, for the categorization and classification of collections, bibliographic information and inter-library lending, as well as for cultural activities and staff training.

In Spain, responsibility for culture is left to the Autonomous Communities, so each of these must produce their own legal framework for regulation of the Library System within their territory.

Legislation concerning the Autonomous Community of Catalonia follows.

## **LEGISLATION IN CATALONIA**

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- *Catalan Parliament’s Library Law (1981).*

Establishes the guidelines and organisations which should make up the Catalan Library System.

- *Law No. 8/1987, municipal and local government of Catalonia (1987).*

Ratifies the Central Government Law No. 7/1895, on the regulation of local government rules.

- *Law No. 4/1993, on the Catalan Library System (1993).*

Sets out that the library services consist of:

- National Library.
- Public Reading System.
- University Libraries.
- Non-University Teaching Centre Libraries.
- Specialist Libraries.

It establishes the Library of Catalonia

as the national library, and the centre of bibliographic heritage, with the “Generalitat” responsible for its management.

It provides that coordination with the rest of the library system be through the Library of Catalonia, both in cataloguing and in inter-library lending, as well as in the protection of collections of relevance.

All centres with heritage collections must be connected to the National Library. These include provincial public libraries, as depositories for collections which mainly come from the sale of church lands in 1835, university libraries as basic elements of the country’s bibliographic wealth, specialist libraries and newspaper head offices.

It defines the Public Reading System as “*the organized assembly of public library services in Catalonia, made up of all publicly owned public libraries, all those privately owned public libraries which form part of it (if they have signed the agreement with the appropriate city council), state-owned libraries run by the Generalitat and, in exceptional circumstances, if required by the needs of the Public Reading System, non-university teaching centre libraries can become part of it.*”

The Law sets out the unification of library networks dependent on various different administrative bodies into one single Public Reading System, structured in four regional networks. It puts public reading into the municipality’s hands, while leaving regional functions to each region. The Law also delegates management responsibility among various administrative bodies, and regulates the support services which the city councils will receive from the Generalitat de Catalunya or from provincial councils.

The structure of the Public Reading System is the following:

- Regional central libraries.
- Central city libraries.
- Local libraries.
- Affiliated libraries.
- Mobile Library services.
- Support services.
- Public Reading Committees.

- *Regional central libraries.*  
As well as providing the usual library services in the city where they are based, they coordinate the rest of the region’s libraries, apart from the central city libraries and libraries connected to them, giving them advice and support.
- *Central city libraries.*  
They have the same function, at a municipal level.
- *Local libraries.*  
These provide public reading service in a specific area, they coordinate the activities with the appropriate regional or urban central branch, and can lend support to the affiliated libraries.
- *Affiliated libraries.*  
These provide public reading services with the support of a local library, an urban central library or a regional central library.
- *Mobile library services.*  
Their objective is to provide the public reading service in areas where there is no fixed point of service. They are connected to a regional central library or a central city library.  
These mobile services are provided by the “Bookmobile” or library bus, which means that they can get to any part of the countryside, or to small populated areas. It carries a reduced collection because of limitations of space, which must be attractive enough to arouse interest and to be a take-off point in the reader’s life.
- *Support services.*  
These provide support in technical/computer areas, the acquisition and treatment of collections, the development of the public reading Collective Catalogue and staff training.  
The Law draws a distinction between national services, run by the Generalitat’s Department of Culture, and regional services, which are currently under the auspices of the Department of Culture and the county councils.

- *Public Reading Committees.*  
In every region and municipality with an urban central library, there is a committee whose members and working regulations are determined by the regional council or the appropriate city council. Their function is to analyse what facilities or services are needed by the region or municipality in question, to programme promotional activities to encourage use of libraries, and to coordinate the actions of public and school libraries.

Among the responsibilities which fall to the Generalitat, the Law provides establishes the production and updating of the "Public Reading Map", which covers public reading needs and sets out what kind of service is appropriate for each population.

It is a regional planning tool based on cooperation between various administrations.

This document, which was produced by the Generalitat's Library and Bibliographic Heritage Service, was not approved until June 23<sup>rd</sup> 2003.

The Law delegates responsibility between all the different administrations, but does not directly address the the question of financing. However, it does determine that the Generalitat's Department of Culture must set up a programme annually to help libraries, specifically to ensure that they have infrastructures, that new ones are built and that the existing ones are enlarged.

The division of responsibilities of provincial councils is laid out in the first supplementary provision:

- *"Those libraries and library services dependent on the provincial councils of Barcelona, Tarragona and Lerida are transferred to the Generalitat or to the regional councils of the territory where they are based."*
- *"Excluded from the transfer are those services which form the core of the provincial autonomy and those arising from powers concerning legal, economic or*

*technical aid and cooperation applying to provincial councils in accordance with Law No. 8/1987, municipal and local government of Catalonia."*

- As for university libraries, the Law states that *"they will work in coordination with the rest of the Library System, through the Library of Catalonia, as far as cataloguing, inter-library lending and protecting historically valuable or culturally important collections ids concerned, without affecting other kinds of coordination which they might establish with libraries to provide services in common."*
- It establishes that *"in non-university learning centres, an academic library must be built as an essential part of education, and in collaboration with the Public Reading System."*
- As for specialized libraries, whether publicly or privately-owned, they provide public service with any appropriate restrictions and work in coordination with the Library System on the same terms as the university libraries.

- *Decree 124/1999 on services and staff of the Public Reading System of Catalonia (1999).*

The Decree specifies the functions corresponding to each administration in the running of support services and public libraries, with the aim of creating a legal situation whereby public reading has to be directed through one single system, basically managed by the municipalities.

Creating a library means getting through a whole series of technical, administrative and financial stages. Even though each project has its own specific process, the following stages can be supposed:

- Decision to build.
- Programming.
- Site selection.
- Appointing the architect.
- Project preparation.
- Awarding of building contracts.
- Engaging the construction company.
- Construction of the building.
- Project acceptance.
- Furniture project.
- Awarding of furniture contracts.
- Making of furniture.
- Start-up of library facility.
- Opening the library.

The completion of each stage needs the work of specialists from various areas, each of whom is responsible for a specific technical function. The sheer variety demands the creation of an interdisciplinary team to coordinate the whole process.

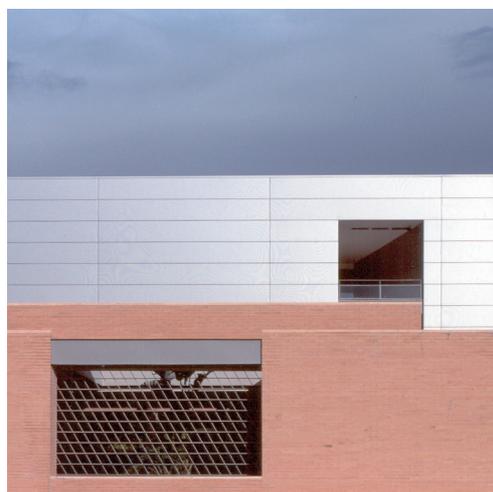
The monitoring team should at least be made up of representatives of the property and the library.

Below is a brief description of the main features of some phases, and the following chapters will look at the stages most closely connected with library architecture.

## THE DECISION TO BUILD

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The decision to build a library is linked to library policies and projects of the region, and has to be done in



**05.01**  
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coordination with the appropriate library services. The input of these services at the various stages of the process provide technical and financial advice essential to the realization of the facility.

## **APPOINTMENT OF THE ARCHITECT**

Once the programme has been set out, and the site chosen, the project's design team has to be decided.

It is advisable for the developer to choose a team including representatives from the various disciplines of the worlds of architecture and libraries. Contractual law provides for several systems:

- Direct designation:  
The law usually permits the direct placement of contracts for a job when the fees do not exceed a certain amount.  
The actual construction budget for most library projects entails costs that go over that amount.
- Public bidding:  
For public bidding, there have to be sufficient methods in place for an accurate assessment of the candidates.  
To ensure a satisfactory result, the following recommendations should be kept in mind:
  - Have a selection process and some assessment criteria which facilitate the right choice of candidate.
  - Set up a panel of judges who are sure to be objective. The make-up of this panel plays an important role in guaranteeing that public bidding in the area of architecture functions effectively.
  - Make sure the documentation is available which clearly explains the objectives of the project.

There are several different types:

- Merit-based selection or project competition.  
Merit-based selection is a relatively straightforward process, the only drawback being that the choice of architect is not based on an architectural project for the library.  
The project competition means that the jury is looking at a

specific idea. The process, however, is more complex than the merit-based selection process: the deadlines have to be extended because the candidates need time to produce their proposals and the panel needs time to assess each one. Nevertheless, it is a good idea that it be an *ideas* competition, not one of basic projects. The first option is a more streamlined process, avoiding any possibly unnecessary work on the part of the candidates.

- Open request for tenders or selective tendering.  
The chosen option must take into account the financial means and the time at the disposal of the competition organisers.  
The open system gives all professionals a chance, but is not advised unless the panel is willing to thoroughly assess every proposal.

## **PROJECT PREPARATION**

The logic of the project's evolution consists of stringing together the various phases, from the general overall concept through to the specific details.

Regulating these stages has the following advantages:

- Overseeing of the evolution of the project by the representatives of the various organisations involved in the future library.
- Analysis of the working of the building at every stage to ensure that it is being tailored to the actual needs of the functional programme.
- Incorporation of any changes at every stage without jeopardising those aspects agreed on at previous stages.

Phases of the Project:

- Initial brief:  
This represents the first architectural option of the programme given to the architect, and contains the following information:
  - Volumetric analysis in the urban context.
  - General organization of the

building and the implementation of the programme's basic functions, and their connections and interdependence.

- Total floor space area and number of floors.
- Situation of the entrance area and the building's interior-exterior relationship.
- Generic construction system.

It is an as-yet fairly undeveloped proposal which allows for any necessary modifications to the basic aspects of the project.

The best thing is for the group in charge of monitoring to carry out an in-depth analysis and interpretation of the basic ideas. Agreement on the initial outline allows the architect to work on more specific aspects.

- Pre-project:

The pre-project planning is a study which takes place alongside the initial plan, but which may differ considerably, whether through modifications in the programme or because of the introduction of some limitations which had not been considered at the previous stage. The information it gives helps complete some aspects connected with the viability of the project:

- Function of the building, with the situation and the floor area of each of the spaces defined within the programme.
- Exterior image, interior traffic patterns, and listing of main finishing materials.
- Major technical questions such as type of cement, structural procedure and air conditioning.
- Estimated schedule and construction costs.

The monitoring team can suggest amendments with no negative effect on the basic concept of the proposal.

- Final design:

This is the technical expression of the building, with all the information needed to actually complete the work.

Basic documentation:

- Plans needed for location, on-site layout and building.
- Specifications sheet with land characteristics, solution

justification, standards compliance, list of floor areas and budget.

- Specifications sheet with explanation of the various building certificates, the deadlines for completion and the contractor's classification proposal by the project's design technician.
- Measurements.
- Unit prices.
- Itemized prices.
- Material Execution Budget (MEB) and Execution by Contract Budget (ECB).
- Technical conditions specifications including properties of the materials and any necessary tests, conditions of execution of each material, precautions which need to be taken on the site and the conditions and tests which need to be carried out for project acceptance.
- Management conditions specifications including licensed works and financial terms.

The final project design cannot always be understood by those who do not work in architecture or engineering.

The level of information means it is impossible to make any changes, and emphasises the need to run the project according to the phases of evolution above. Final Project Designs are valid indefinitely so it is a good idea to go over them long before the awarding of the building contract.

The final project design enables you to get permission to begin the construction of the building.

When it is a matter of building a library in which the developer is the government itself, the project procedure follows these steps, with deadlines set down by law:

- Initial approval.
- Public Information:  
When required by local legislation, it is submitted for approval to the other relevant bodies.  
Pleadings can be lodged.
- Final approval:  
By the appropriate body.

This approval supposes the declaration of public use of the building.

- Publishing of the final approval agreement.
- Building Licence:  
The relevant administrative body grants this document when it has been proven that town-planning laws have been complied with.

## **AWARDING OF BUILDING CONTRACTS**

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The final project design is an administrative document containing the information needed by construction firms to be able to assess the building costs and to take part in the contract bidding.

Through analysis of the bids and references connected to the participating firms, the developer will award the building contracts using the selection process laid down by law. In many cases, the bid estimate differs from the contract bidding listing price. The reason for this is generally connected to the building market situation. When the bid is much higher or much lower, it is advisable to monitor the quality of materials and systems proposed in the original project. If the contracts are being awarded long after the date of project implementation approval, it is a good idea to analyze the project implementation using the functional criteria current at the time of the awarding. If this is not done, there is the danger of building a library which is unsuited to the actual needs.

## **ENGAGING THE CONSTRUCTION COMPANY**

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The construction of a building is subject to a contract which applies to the project documentation. The project is therefore categorized as a public document, whose principles and specifications are extremely important because they create financial obligation for the party carrying out the work. Caution is advised in any modifications made to the project after contracting.

These variations will put the price of the work up because they involve further contracts which are normally best awarded to the same firm. This situation emphasises the need to analyse the project in the phases leading up to the project implementation document. Once the contract has been executed and the appropriate guarantees have been given by the awarding firm, this document contains agreement on the following conditions:

- Generating accruals:
  - For certified work (the usual method).
  - For completed phase (concrete, structure, etc.).
  - For specific work programmes.
- Settling amounts owed:  
Generally dependent upon the negotiating ability and financial credibility of the developer and the construction company.
- Withholding payments:  
In most cases, the owners withhold part of each payment as a guarantee, in accordance with the administrative specifications or with some modification in the contract.
- Deadlines for completion of work:
  - Penalties are also set for failure to meet deadlines.
  - In some cases, a bonus payment may be stipulated for completing the work before the agreed date.

## **CONSTRUCTION OF THE BUILDING**

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After the owners and the construction firm have signed the contract, work begins following a plan set out in the contract.

The official starting point consists of the signing of an “acta de replanteo”, (a variation order for the on-site layout) in which it is stated that there is no legal or physical impediment for building to begin. The project manager will be in charge of the completion of the project with the help of those technicians responsible for different aspects of the construction process.

It is essential that the chief architect is present throughout the process, since it is the only way to ensure continuity between the planned building and the actual construction.

The number of decisions which have to be made during the work – even when the implementation plan is as thorough as possible – means it is advisable to have representatives of the library sector on hand. As the building's future clients, they can make suggestions in aspects will contribute to the most effective functioning of the installation.

Changes in the budget:

The complexity of the construction process means that things might need to be done which can affect the project and, consequently, the budget agreed in the contract. There are two possible reasons:

- Differences in measurements:  
Many construction firms do not wish to give a fixed price for certain items such as cement or containment walls. Boreholes in the ground are insufficient guarantee as the results are from the analysis of specific places.  
Certifications for differences in measurements must be agreed by the licensed works management.
- Contingent costs:  
These are generally caused by the appearance of unforeseen circumstances or by the execution of parts of the work using different systems to those planned.  
The change in the price of the item must be agreed between the architect and the construction company. A document is written up which is then added to the original estimate.

## **PROJECT ACCEPTANCE**

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After the conclusion of the works comes the project acceptance, when the project manager certifies the completion of the works in compliance with the contractual documentation. This is a legal act which marks the beginning of all legal obligations on the part of the project management and the building firm. Once the "final certificate" is signed by the management, it is certified that the building complies with all requirements and it is given the legal go-ahead.

The property is then granted a

"Maintenance programme". This document, which will be discussed in another chapter, includes the actual plans of the building and all the information necessary to its upkeep. The programme is legally binding dependent on current legislation. If it is not prescribed by law, it is advisable to include it as a requirement when the contracts are signed by the architect and the building firm.

## **START-UP OF LIBRARY FACILITIES**

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This phase includes all the steps needed to provide the space with the contents it was built for. The installation of all the elements necessary for the facility to function as well as possible is a process which begins with the decision to build a library and which continues in step with the building process.

There are three main ways in which it must be equipped:

- Documentary collection:
  - Choice from existent collection (if it is the enlargement of a service).
  - Buying the collection.
  - Processing and cataloguing of documentation.
  - Organization of the documentary collection in the library.
- Specific installations:
  - Preliminary voice and data installation plus installation of audiovisuals and anti-theft system.
  - Installation of machinery and programming.
- Library staff:
  - Selection.
  - Training.

The time taken for the execution of all stages necessary to complete a library depends on different kinds of steps:

- There are phases such as the "Decision to build" or "Site selection" which cannot be measured as they are the result of decisions based on policy and planning of the area.
- Others have a duration which is fixed by law, and are connected to administrative acts which are

contingent upon set procedural steps and approval.

- Finally, there are those stages wherein a particular job is done. Thus the carrying out of the programme requires a certain time for reflection, execution and consensus with the monitoring team.

The completion of the whole process therefore needs a long time. Although it is advisable not to make any hasty decisions, or to subordinate such a significant investment to a plan which is too inflexible, a certain rhythm must be kept up in the materialization of the various stages of the cycle.

with the results anticipated. For example:

- User / inhabitant.
- Loan / inhabitant.
- Loan / user, etc.

## **ASSESSMENT OF SERVICES**

From the opening of the facility, “the systematic assessment of library service management” will supply useful information for any future endeavours. The use of management indicators can help to plan, to justify the delegation of resources, to solve problems before they arise and to check on progress. The most popular management indicators for the assessment of objective achievement are:

- Economic indicators:  
These supply information with regard to service costs: they relate services available to resources utilized. For example:
  - Cost of service / inhabitant.
  - Cost / user.
  - Cost / loan.
  - Cost / hour, etc.
- Efficiency indicators:  
These supply information with regard to service productivity: they relate resources utilized (benefits and services used) to results obtained (benefits and services produced). For example:
  - User / professional.
  - User / square metre.
  - Library collections / square metre.
  - Library collection loans.
  - User / hour, etc.
- Effectiveness indicators:  
These supply information with regard to the extent to which service objectives have been achieved. That is to say, how and to what extent the results obtained coincide

# PROGRAMMING AND PLANNING

- Library programme: Methodology*
  - Creation of the working team*
  - Initial studies*
  - Producing the programme*
- Ratios*
  - Ratios in a public library*
  - Ratios for university library*
- Standards - Regulation framework*
  - Regulation framework for public libraries*
  - Regulation framework for university libraries*

The creation of a facility is, as well as being a challenge for the future, a road full of obstacles and a major financial burden as far as investment and maintenance are concerned.

The need for good results means that the developer has to find and use more rational and streamlined working and monitoring methods right from the project's initial planning stages up to its future maintenance.

Planning studies constitute a working method which responds to two distinct challenges: improving the quality of the project and the works, and maximizing the investment.

On the other hand, not doing a certain amount of planning, not anticipating certain difficulties and being in too much of a hurry to get started can have the following negative results:

- Incorrect placement of equipment.
- Unsatisfactory conditions for dialogue between promoter and other interested parties.
- Transference of essential responsibilities from the developer to the project leader.
- Lack of control over both the objectives and the costs.
- Completion of a facility which corresponds neither to the needs nor the demands, because they were not set out at the beginning.

## Programming

This is the area which, when needed, identifies needs, determines solutions, studies feasibility and, lastly, sets out the objectives, demands and conditions which will govern the drafting and management of the architecture project.



**06.01**  
*Pere Gual i Pujadas*  
*Public Library (Canet de Mar, Barcelona).*  
*Architect:*  
*Pere Armadàs Bosch.*

Programming studies need to have the developer and all participants in one working group, plus time, financial resources, and materials, unity and discipline.

This initial investment is justified by the results obtained, the knowledge acquired, time saved for the project report, maximization of costs, superior quality of the resulting facility and the satisfaction of the users.

## **LIBRARY PROGRAMME: METHODOLOGY**

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The programme is a complex document which can be presented in various ways. Although a number of standardizations – both technical and library-science based – must be set, a balance must be struck between the “prescribed”, which is unavoidable, and the “recommended” which will help to complete the project.

Basic methodology:

- Creation of the working team.
- Initial studies.
- Producing the programme.

## **CREATION OF THE WORKING TEAM**

The reflection group and driving force behind the study has to be a multidisciplinary team representing all the project’s interested parties.

- Project leader:  
Assigned by the facility’s promoter, this is the head of the project.  
Depending on ownership and type of library, it could be the city mayor or an institutional department head.
- The user:  
The future managers of the facility usually assume this role, as they are the ones who know best how the library should function.  
Studies of the population and analysis of similar experiences will also help to find out the public’s needs.
- Technical team:  
Specialists in different areas: Chief architect on the project, representatives of the city or the institution, library consultants and

technicians who specialize in library architecture.

Other working groups may be created to study other specific aspects.

- The programmer:  
The programmer’s function is the management and coordination of the study and the drafting of the documents. Professional experience will allow the possibility of setting out the criteria for the work, and will bring an outsider’s perspective to any problems.

## **INITIAL STUDIES**

Initial feasibility studies make it possible for demand to be analysed and the most realistic solution to be decided upon. For the developer, it is the moment to analyse the present situation and set out the needs, and the connections between the project and the surroundings, the population and the uses.

The result determines feasibility from the architectural, urban, functional, financial and technical point of view.

These studies mean that the developer can decide on the execution of the operation and define the size and overall cost, as well as the site and the deadlines.

Structure of the initial studies:

- Basic objectives.
- Analysis of local environment.
- Choice of site.
- Initial estimates.

### **Basic objectives**

- Types of libraries and main characteristics of the service.
- Requirements to be met.
- Territorial area served.  
The catchment area of a university library is not the same as for a national library or a public library. And in the latter case, there is a very different relationship with the surroundings if it is a regional library or if it is a local or branch library.

### **Analysis of local environment**

During the initial studies stage, it is

essential to identify any urban, social, cultural or financial problems, to assess the current and future demand and to determine how urgent the project is. An analysis of the surrounding situation means that the siting of the new facility can be in tune with other local policies, such as the city's layout, territorial rebalancing, urban regeneration or social cohesion. What is needed is a study based on demographic and urban data to facilitate the adaptation of a project to the space.

#### Population data

To get an approximate idea of the importance of having this information, let us look at the case of a "public library". As it is a facility which must fit in with the educational and cultural system of a community, the study of the local situation will provide knowledge of the area and will make it possible to focus on all the aspects of the future service.

#### Demographic data:

- Number of inhabitants:  
Within the area of influence, it is important to know the overall population and the distribution by neighbourhood or other territorial areas.
- Age pyramid:  
The existence of a high number of young people might mean an increase in the floor area dedicated to music and other youth-oriented activities.
- Population's origins:  
A large immigrant population or the presence of specific ethnic groups might affect the structure of the collection.
- Growth perspectives:  
Both the regeneration of the social fabric and the establishment of new population groups have a determining affect on the siting and the size of the library.
- Education level:  
The number of inhabitants educated to high school or university level will determine the space needed for study stations.

#### Socio-economic data:

- Unemployment/employment
- Local Economic activity.
- Income per capita.

- Mobility of the workforce.
- Social relations.

#### Educational facilities:

- Type and number of facilities.
- Situation in the area.
- Number of students.

#### Cultural facilities and library facilities:

- Type and number of facilities.
- Situation in the city.

#### Socio-cultural services:

- For information.
- For assistance.
- Health.
- Other.

#### Information about the council:

A facility such as this cannot be solely dependent on a city council's ability to invest. Political will takes precedence over any other consideration, but financial information will make it possible to have an idea of its own resources and to map out a system of subsidies needed to complete the operation. Therefore, the following information is needed:

- Economic-financial situation.
- City council's budget and the percentage available for investment in culture.

#### Town-planning information

The kind of library planned will determine the extent of the area of influence and, therefore, establishes the maximum extent of its implementation.

Analyses of the geographical situation and any town planning projects are useful tools for the choice of site, as well as enabling the project to be placed within a more generalized framework of the council's urban development and town planning policies.

For this work to be done, it is absolutely essential to work jointly with local technical services who also – apart from this information – have knowledge of any regulations and necessary graphic documentation.

- Current town planning and projections.
- Urban structure.

To make access to the library easier, the siting must fit in with the layout of the city and its relation to the area. A circular city has different traffic patterns to one of elongated structure

or one divided into various independent nuclei.

- Physical geography.  
For a city which is quite mountainous and whose population is grouped into different nuclei, or a town with a river running through it, the library plans need to be approached from a very specific viewpoint, which might even involve the breaking up of the facilities.
- Systems of ground occupation.  
The siting of the library will differ between a homogeneous city and one where the city's different activities are very localized, with commercial, business and commuter zones. By the same token, there needs to be a different approach to the library if the town's population fluctuates depending on the season, or is very busy at the weekend.
- Road structure.
- Public transport systems.
- Architectural typology.

### **Choice of site**

Regulations, accessibility and the siting within the surroundings, as well as the floor area, topography, and the subsoil are all essential when it comes to evaluating the project's feasibility. In the chapter "Placement. Criteria for location" we look at the problems which the choice of site creates.

### **Initial estimates**

The existence of certain library norms means we can get an idea of the total floor area from the model which we wish to build and the territory it is going to serve.

The combination of floor area needed and information gleaned from previous experiments will give us the following information:

- Objectives and challenges of the project.
- Basic programme of activities including an estimated "gross floor area".
- Investment costs.
- Maintenance costs for the building and the service.
- Length of operation.

These estimates make it possible for the project manager to plan the operative phase of the project:

- Determining the work's finance plan and future maintenance.
- Predicting the timetable for completion.
- Selecting the project's chief architect.
- Organizing the functioning of the future service.
- Naming a management team.

### **PRODUCING THE PROGRAMME**

The final draft of the programme is the decisive moment when all the objectives and needs connected with the project are defined clearly and concisely.

- For the promoter, this is a tool which will enable him to define and keep checks on the project before it is carried out and as the whole project develops.
- For the users, it means they can check that their particular and specific needs in usage and function have been considered.
- For the architect, it provides a basis for work and discussion which is explicit, precise and coherent. This means that the quality of the programme has a direct effect on the project itself.

It is important that the programme presents the project's central idea, clarifies the challenges, specifies the various spaces and determines the desired level of quality, but the information provided should not represent an architectural solution. That is exclusively the architect's area.

Programme structure:

- Basic city council information.
- Facility objectives.
- Siting characteristics.
- Library's functional programme.
- Technical requirements.
- Estimate of costs.

### **Facility objectives**

Description of the role the library will have in the community, or the organization which it will belong to.

- Functions.
- Services.

## Siting characteristics

- Place.
- Floor space area.
- Development potential.
- Town planning.
- Town planning regulations.
- Topography survey.
- Geotechnical characteristics.

## Library's functional programme

- Definition of type of user:
  - Main characteristics.
  - Frequency of library use.
  - Maximum number of users and most popular times.
- Description of documentary collection:
  - Initial collection and growth forecast for a specified time period.
  - Number and types of documents in each area.
  - Systems of document organization and consultation.
- Description of the various spaces:
  - Detailed list of activities and the function's features.
  - Position within the building and in relation to other zones.
  - Minimum programmed floor area in square metres.
  - Number and features of study stations.
  - Growth forecasts.
  - Environmental requirements.
- Basic furniture.
- Functional organigram:  
As a transitional element between the functional organization and its translation into spatial terms, this application allows a clear expression of how the various activities interrelate.
- Staff and anticipated timetables.
- Summary of the "programme floor space" by area, and approximate value of the total "built area".

## Technical requirements

- Building requirements including recommendations on most suitable materials.
- Environmental requirements.
- Description of the service's specific facilities.

## Budget for investment and maintenance costs of the building and service

- Investment costs:
  - Civil works:

---

### *Material Execution*

<b>Budget</b> .....	<b>.MEB</b>
- General expenses .....	.GE
- Business Profit .....	.BP
- Taxes .....	% of MEB+GE+BP

---

### *Execution by Contract Budget*

**(MEB+GE+BP+Taxes) .....** **.ECB**

- Quality Control
  - Security and Hygiene Control
- 
- Technical team fees:
    - ▶ Drafting of project and other studies.
    - ▶ Management of works.
  - Furniture.
  - Computer, audio-visual and anti-theft systems.
  - Initial document collection.
  - Maintenance costs:
    - Building maintenance:
      - ▶ Maintenance operations and inspections.
      - ▶ Energy consumption.
      - ▶ Cleaning.
      - ▶ Insurance (premises, contents and civil liability).
    - Service maintenance:
      - ▶ Document collection.
      - ▶ Activities connected to service.
      - ▶ Material (placing of furniture and systems, consumables, etc.).
      - ▶ Staff.
      - ▶ System maintenance.

## QUALITATIVE AND QUANTITATIVE PROGRAMMING

The structure of the programme can differ according to the various techniques in programming, but the information given to the architect is based on a series of qualitative and quantitative data.

### Qualitative programming

Covers the organic and functional aspects of the building:

- Global functions of the library.
- Characteristics of each of the designated activity areas.
- Relationship to the exterior.
- Interrelations between the various spaces.
- Technical requirements.

### Quantitative programming

Based on standards defined by sections of the populace which adapt to the local reality and to a growth forecast which can vary between ten and fifteen years.

It is recommended that the various areas be grouped according to the following classifications:

- Spaces for public use.
- Internal work (non public) areas.
- Logistics areas.

For each activity, the following data is highlighted:

- “Programme floor space” in square metres:  
In the functional programme the spaces connected to library service are measured out.  
Therefore, no value is given to the toilets and logistics areas as they are closely connected to architectural solution.
- Reception capacity:  
Number of fixed points for the public and the staff in the various consultation systems.
- Document collection:  
Number of documents planned on various media which the library must have, with a fixed growth forecast.

### PROGRAMME FLOOR SPACE – USEABLE SURFACE AREA – BUILT SURFACE AREA

The figures given to define the area of a library are confusing when the type of surface being discussed is not specified. Although the “built surface area” is the actual figure which enables us to obtain all the economic data derived from a project, it is helpful to define the vocabulary being used about the buildings’ floor areas in the context of libraries.

### Programme floor space

The floor space area indicated in the “functional programme” by the phrase “programme floor space” refers to the net usable floor space for each activity’s area, excluding circulation spaces or any other architectural consideration.

### Useable surface area

In library terms, this means the final floor space of the library.

To the “programme floor space” we must add:

- Spaces for circulating between the different areas.
- Toilets.
- Spaces for cleaning equipment.
- Installations rooms.
- Space occupation of stairwells and lift shafts.
- Ventilation shafts, cantilevers, terraces, arcades and concourses.

### Built surface area

This can be obtained by adding together the “useable surface area” and the space occupied by the construction elements. The direct relationship between the built area and the works budget means it needs an estimated value in the functional programme.

Although a definite value is difficult without knowing the architectural solution, various studies recommend adding 35% to the “programme area”. An additional increase should also be applied when the architect proposes a building with curved floor space, or areas with tight angles which will make the positioning of furniture more difficult.

### RATIOS

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The ratio is what enables us to reflect the needs of a library as a floor space area.

Broadly speaking, quantification is based on a number of inhabitants. From this figure, we can get some ratios which provide the following information:

- Number of users, documents which the library needs, number of study stations and internal staff.
- Unit of floor space that each element occupies.

By simple arithmetic, and adapting each situation to the study of local reality, we can obtain the floor space which each activity's area should have.

For the programmer, the measurement of the spaces is the result of translating the objectives onto measured, organized spaces.

There are two types of ratio:

- **Theoretical ratio:**  
This includes the space occupied by the furniture and the immediate access circulation, known as secondary circulation. This ratio cannot vary even if the distribution of the furniture is changed. (Fig. 06.02a, 06.02b and 06.02c).
- **Implementation ratio:**  
This is the sum of the theoretical ratio plus the supplementary elements to consider when estimating the zones, such as primary circulation areas and the effect of the furniture distribution and the architectural solution.

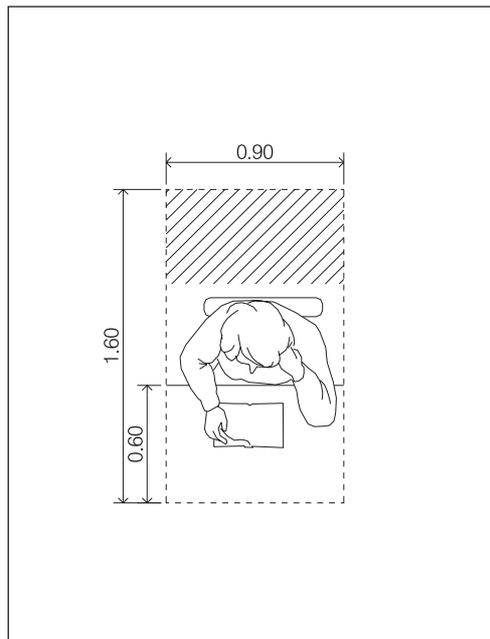
Some international bodies have published ratios of the elements that can be quantified in a library. Ratios cannot have a fixed regulated value. They must be carefully interpreted, like a reference point which the programmer can adapt to each different situation.

## RATIOS IN A PUBLIC LIBRARY

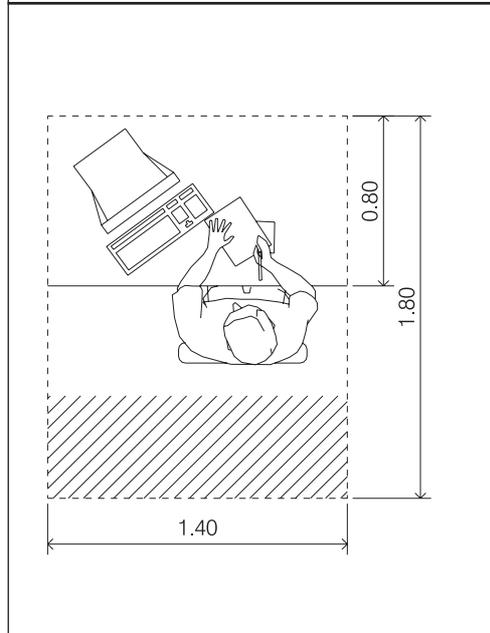
The quantification of functions in documents, reception capacity and floor spaces corresponds to a series of basic indicators. For a public library, the boundaries to bear in mind are:

- The public.
- Study stations.
- Collections.
- Staff.

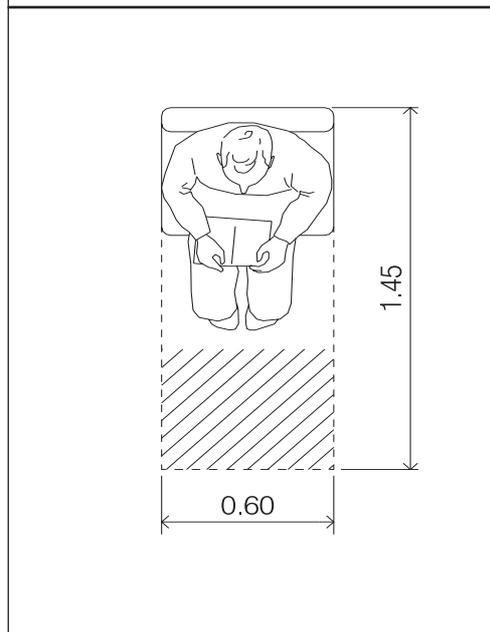
The proposed ratios are aimed at establishing an initial estimate of the overall dimensions of a public library, but



**06.02a**  
*Theoretical ratio for basic study station.*



**06.02b**  
*Theoretical ratio for study station with computer.*



**06.02c**  
*Theoretical ratio for armchair.*

are not enough in themselves to implement a project. These values, based on the populace of the area of influence, do not follow an arithmetical progression. Therefore, the ratios have to be increased per inhabitant in smaller populaces.

### The public

This is the most difficult parameter to define, and the best thing is to base it on comparable experiences. Apart from the urban features mentioned earlier, it is calculated that a public library must have a catchment area of some 700 metres' radius.

To establish a projection of the traffic flow which will make estimation of the spaces possible, three pieces of information should be kept in mind:

- The library's general public.
- Cycles of use.
- Maximum frequency.

The resulting figures should be adjusted according to the specific aspects of the locality, such as the existence of university or academic buildings, weekly markets which create regular crowds, or those areas with seasonal fluctuations in population.

<i>Number of users</i>	
▶ Municipalities of over 10,000 inhabitants	25% users
▶ Municipalities of up to 10,000 inhabitants	20% users
▶ Population of children (up to 14)	From 25 to 30% inhabitants

### Study stations

- Projection of study stations

<i>Number of reading stations</i>	
▶ Periodicals zone	0.5 to 2 stations / 1,000 inhabitants
▶ Adult zone	1.5 to 5 stations / 1,000 inhabitants
▶ Children's zone	0.5 to 2.5 stations / 1,000 inhabitants

- Floor space occupied by study stations

The variety of formats means various types of study. Apart from studying at a table, there is the consultation of various audiovisual and multimedia documents. New working habits mean it is advisable to think about complete study stations, with space and facilities for writing and looking at a screen.

<i>Average floor space</i>
3 m <sup>2</sup> / study station
Referring to the "implementation ratio"

### The collections

- Measuring the collections  
Obtaining values:
  - Volume of lending of libraries in similar territorial contexts.
  - Dimension of the "final collection" over the next ten or fifteen years. This value is obtained by adding together the initial collection and the difference between the new acquisitions and the number of documents removed as unusable.

Usual titles for different media:

▶ Bibliographic document in any format	Item
▶ Bibliography	Volumes
▶ Reference works	Works
▶ Audiovisual media	Documents
▶ Periodicals	Titles

<i>Number of items</i>	
From 0.75 to 2.5 items / inhabitant (0.75 items for larger populations) (the percentage increases the smaller the population)	
▶ Periodicals	From 3 to 20 titles / 1,000 inhabitants
▶ Collections for loan	From 50 to 70% of stock
▶ Reference works	From 5 to 10% of stock
▶ Children's collection	From 20 to 30% of stock
▶ Annual growth	From 15 to 25% of stock
▶ Items removed	10% of stock

- Floor space occupied by collection  
This value depends on the following aspects:

- Collection organization system.
- Organization of open-access collection.
- Organization of storage.
  
- Collection organization system. This will be based on the interrelation of the following systems:
  - ▶ By discipline, or by document format.
  - ▶ By zones (periodicals zone, loans etc.).
  - ▶ By Dewey Classification or by “areas of knowledge”.
  
- Organization of open-access collection.
  - ▶ Open-plan storage system: This allows for flexible organization by discipline and a maximization of available space. On the other hand, the visual image is more rigid.
  - ▶ By discrete areas: This offers a more diverse range of spaces where the reader can work in private, and where thematically-defined areas can be created. On the other hand, the volume by subject of the collection needs to be known,

and any change in that area would require a new study of the space.

The following examples show how the capacity of the space can differ considerably using the same floor space and shelving system. (Fig. 06.03 and 06.04).

<b>ROOM WITH OPEN PLAN STORAGE</b>	
Floor space:	330 m <sup>2</sup> usable
Reading stations:	48
Number of volumes exhibited:	15,300 volumes

<b>ROOM IN DISCRETE AREAS</b>	
loor space:	330 m <sup>2</sup> usable
Reading stations:	38
Number of volumes exhibited:	15,000 volumes

- Organization of storage.
  - ▶ Conventional shelving with working aisles.
  - ▶ Compact shelving.
- Estimate of floor space occupied by collection (Table: 06.05).

<b>Estimate of floor space occupied by collection</b>	
<i>Environment</i>	<i>Floor space occupied by the collection (referring to the “implementation ratio”)</i>
Public spaces with open-access collection	From 50 to 70 items / m <sup>2</sup> usable
Periodicals zones	From 1 to 2 titles / m <sup>2</sup> usable
Storage with conventional shelving	From 175 to 200 items / m <sup>2</sup> usable
Storage with compact shelving	From 250 to 450 items / m <sup>2</sup> usable

06.05

<b>Basic data used in calculations</b>		
Shelving dimensions	● Maximum shelf height:	2 m
	● Maximum vertical number of shelves:	5
	● Space for passage between shelves:	From 1.5 to 2 m
	● Depth of shelves:	30 cm
	● Height of shelves:	30 cm

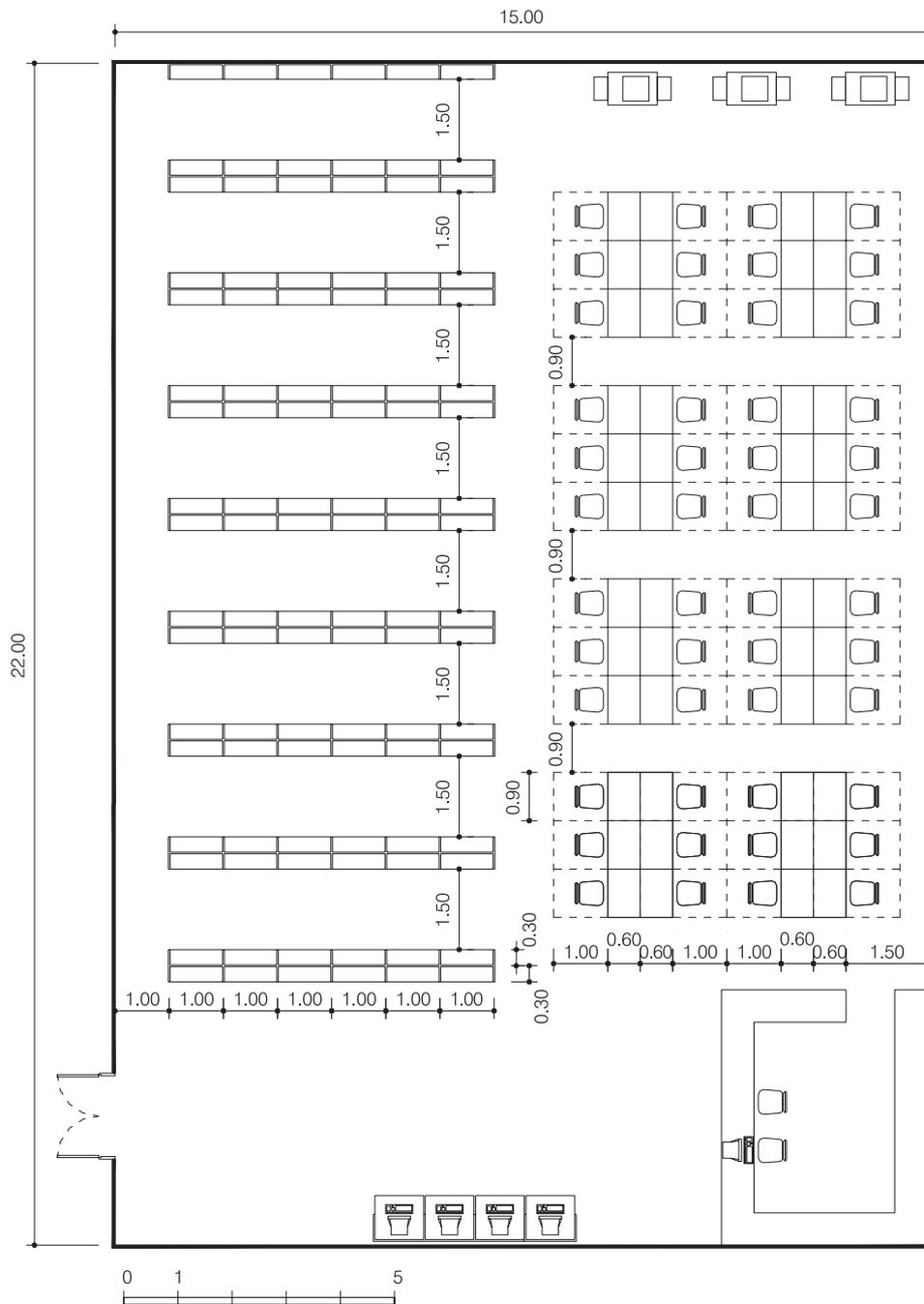
Density of Paper	From 600 to 1,000 kg / m <sup>3</sup>
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**Option A**  
 Room with open-plan layout  
 Floor space: 330 m<sup>2</sup> useable

- Shelving:**
- Height: 200 cm
  - 5 shelves
  - 30 volumes / linear metre

- Capacity:**
- 48 study stations
  - 102 x 5 = 510 linear metres of shelving
  - 15,300 volumes

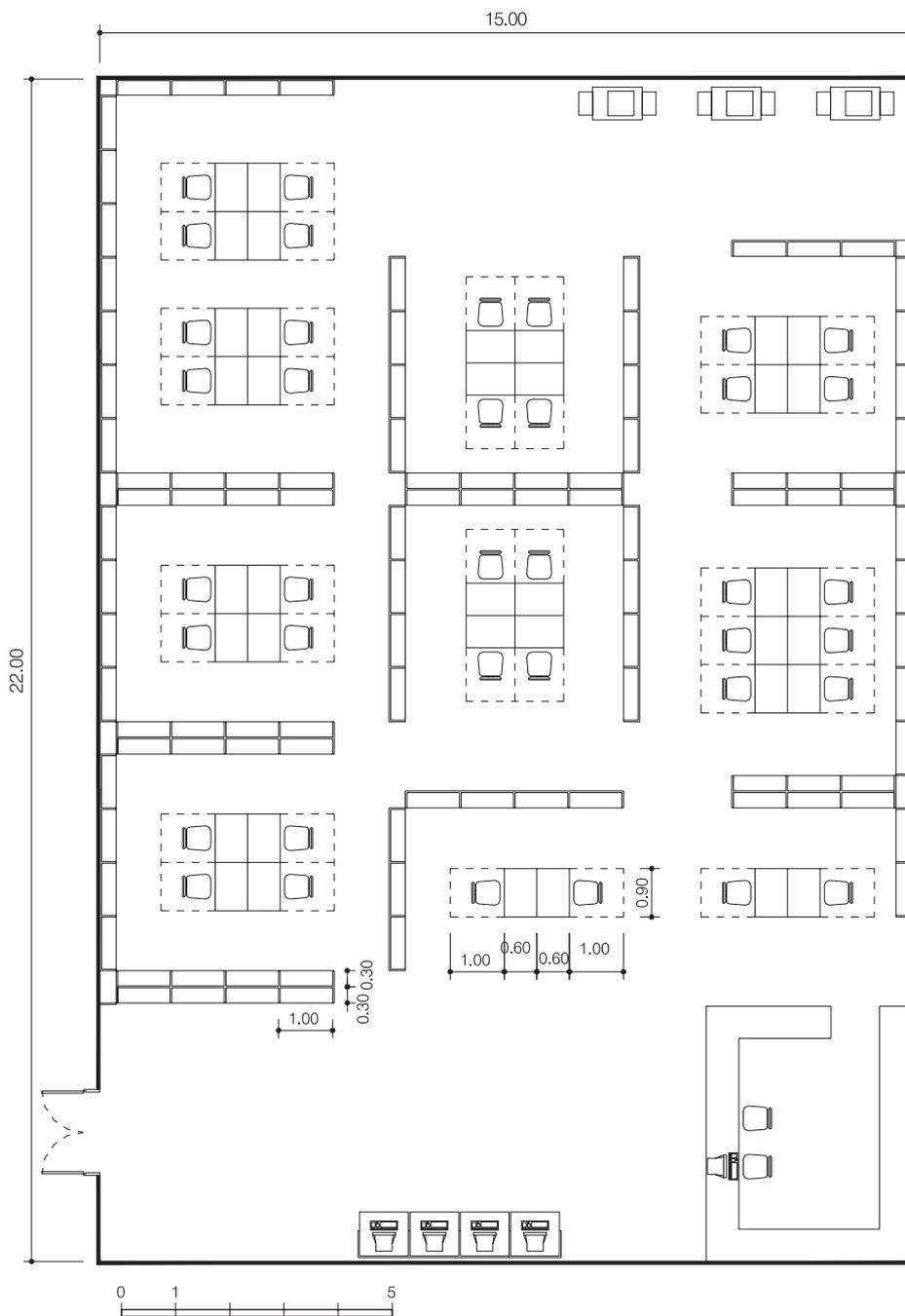
**06.03**  
**Option A**  
 Comparative study:  
 - Study station capacity: 126% of Option B.  
 - Capacity of volumes: 102% of Option B.



**Option B**  
 Room in discrete areas layout  
 Floor space: 330 m<sup>2</sup> useable

**Shelving:**  
 – Height: 200 cm  
 – 5 shelves  
 – 30 volumes / linear metre

**Capacity:**  
 – 38 study stations  
 – 100 x 5 = 500 linear metres of shelving  
 – 15,000 volumes



**06.04**  
**Option B**  
 Comparative study:  
 – Study station capacity: 79% of Option A.  
 – Capacity of volumes: 98% of Option A.

<i>Item exhibited in open-access</i>	<i>Dimensions of item</i>	<i>Capacity / linear metre of shelving</i>	<i>Weight / linear metre of shelving</i>
Book	Height: 24 cm Width: from 20 to 30 cm Thickness: 1.8 cm	Bibliography: from 30 to 35 volumes / lm Reference books: 20 books / lm Dictionaries: 12 works / lm	From 25 to 45 kg / lm
Periodical	—	From 3 to 4 titles / lm	—
VHS Video	Height: 20.5 cm Width: 12.5 cm Thickness: 3 cm	25 VHS videos / lm	15 kg / lm
CD	Height: 12.5 cm Width: 14 cm Thickness: 11 cm	90 CD / lm	13 kg / lm
Cassette	Height: 11 cm Width: 7 cm Thickness: 1.7 cm	55 cassettes / lm	4 kg / lm

## Staff

Full time staff	1 person / 2,000 to 4,000 inhabitants
Workplace	10 m <sup>2</sup> usable / employee
Staff rest room	2.5 m <sup>2</sup> usable / employee

## Other ratios of floor space area

▶ Loan desk	20 m <sup>2</sup> usable – Includes circulation and document storage areas
▶ Information desk	15 m <sup>2</sup> usable – Includes circulation space
▶ Presentation room Meeting room Multi-purpose room	1.5 m <sup>2</sup> usable / chair – Includes circulation and platform or stage
▶ Group study rooms	2 m <sup>2</sup> usable / chair – Includes circulation
▶ “Story time” space	40 m <sup>2</sup> usable / module – Module with capacity for 30 children – Includes platform or stage
▶ Photocopying space	7 m <sup>2</sup> usable / photocopier
▶ Toilets	3 m <sup>2</sup> usable / toilet

## RATIOS FOR UNIVERSITY LIBRARY

### Workstations

▶ Number of workstations	1 station / 5 university students
▶ Average floor space area	From 2.5 to 4.5 m <sup>2</sup> / workstation (referring to “implementation ratio”)

### Collections

▶ Items	130 items / student
▶ Periodicals	1 title / 100 students
▶ Annual growth	0.5 items / student

### Staff

▶ Assistant librarians	1 / 500 students
▶ Staff librarians	1 / 3 assistants
▶ Administrative assistant	1 / 2 assistants
▶ Auxiliary	1 / 1 assistant
▶ IT assistant	2 for each university

### Other ratios of floor space area

▶ Library floor space	From 1 to 1.5 m <sup>2</sup> / student
▶ Minimal floor space	1,000 m <sup>2</sup>
▶ Independent study rooms	15% of the total floor space area

## STANDARDS – REGULATORY FRAMEWORK

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The library is configured as an open functional hierarchy which has to be revised and updated, with functional programmes which may differ from one environmental territory to the next. In this variable situation, it is not advisable to set strict or across-the-board rules, but some specific indicators about minimum functional levels are very useful. The guidelines must consist of a flexible table of points which should be kept to during the spatial configuration.

Traditionally, studies of the state of libraries have made comparisons to guidelines in other more advanced countries where they have already been set down. These guidelines are basically quantitative and that produced some difficulty, since neither the context nor the objectives of each specific situation was taken into account.

Lately, the trend in guidelines has been towards the establishment of qualitative values, paying more attention to the existence of certain services than the acquisition of particular quantities or proportions.

Certain organisations have studied what features a library service should have, and have produced some standards for guidance during planning.

### International standards

- IFLA (International Federation of Library Associations and Institutions)

The Library Buildings and Equipment Section of the IFLA, an international body connected to UNESCO, published the following document:

- “IFLA Library Building Guidelines: Developments & Reflections” (2007).  
It provides information and guidelines for the planning process of a library building. These guidelines should not necessarily be followed to the letter, since we are dealing with a context of diversity and continuous change. Work is divided into two parts. The first, coming from a more theoretical angle, gathers together

various studies about such subjects as the qualities of a good library space, the role of the library as a physical space in our times, the perspective of marketing, and the new demands of the users. The second part – a more practical perspective – deals with subjects like the building process, estimates of the space’s needs, interior design, sustainability and maintenance, placement, the architect’s point of view of a library project and case studies related to the rehabilitation of historical buildings for library use.

## REGULATORY FRAMEWORK FOR PUBLIC LIBRARIES

### International standards

- IFLA (International Federation of Library Associations and Institutions)

The IFLA has published three fundamental documents:

- “Standards for Public Libraries” (1973).  
Provides guidelines for size and minimum services for each section of the population.  
It also recommends that each country establishes, within its own environment and capabilities, guidelines referring to quantity, bearing in mind the minimums set down in international guidelines. These standards were re-issued in 1977 with slight revisions.
- “Guidelines for Public Libraries” (1986).  
This was a revision of the guidelines brought out as a result of the transformation of the information society which began in the early 1980s with its huge technological advances.  
They can be defined as a practical reference point, and provide a thorough analysis of the services and installations which a public library should offer.
- “The Public Library Service: the

IFLA/UNESCO Guidelines for Development” (2001). Aims to offer libraries around the world standards and practical guidelines for the development of the public library service which are appropriate for the information age.

A new aspect of these guidelines is that they include examples of library service form around the world, and offer creative solutions to certain specific questions.

The IFLA establishes that the minimum number necessary to set up a public library is 3,000 inhabitants, and for smaller populaces, reading rooms, library buses and mobile libraries are recommended.

To create a “public library network” at least 50,000 inhabitants are needed, although the ideal number of the population group would be somewhere over 150,000 inhabitants.

In Appendix 1 the basic standards for the document collection, staff and features of the building are set out.

The IFLA also has library standards for groups of the population with specific needs (children, multicultural populations, etc.), as well as standards of “special services” (for the disabled, visually-impaired people, and so on.).

Planning library services in big cities creates a different kind of case study. That is why the IFLA's Metropolitan Libraries Section recommends creating urban networks for cities of over 400,000 inhabitants, based on the following structure:

- ▶ Central library:  
Coordinating the public library system in the city.
- ▶ District library:  
For populations in excess of 100,000.
- ▶ Local library:  
For populations of 15,000.

With reference to both the collection and the building, most of

the standards put forward by the IFLA are maintained.

## Standards in Spain

- Ministry of Education and Culture

The Ministry of Education and Culture, as part of the Cultural Infrastructures collection, published “Public Library Prototypes” in 1995. The study made recommendations on those questions concerning the building of these facilities.

In April 2002 the regulations for public library services were published, written by representatives from the Ministry of Education, Culture and Sport, the Autonomous Communities and the Spanish Federation of Municipalities and Provinces. The aim was to create a tool which would serve as a guide for the creation of public libraries and for the planning for and provision of the corresponding services.

As well as regulations concerning the users, information resources, the building, human resources, management and teamwork, there is an index with an account of the state, local and autonomous regulations, and a summary of the main aspects (types of centre according to population, services that should be provided, opening hours, building's floor surface area, collections and staff). Also included are the basic standards of the Public Reading Map of Catalonia and the Public Library Regulations for the Region of Murcia.

## Standards in Catalonia

- Official Association of librarians-Documentalists of Catalonia

Taking into account the fact that the regulations had been published internationally in 1973, the Catalan government asked the professional collective for some regulations for public libraries in Catalonia. Based on the standards put forward by the IFLA, the regulations were

adapted to Catalonia, and brought together in two volumes:

- “Regulations for Public Libraries in Catalonia” - volume I (1984)  
These list some categories of library, along with the types of services they should provide and the number of documents they should have available, taking into account the number and density of the population.  
The aim of this regulation is to set out some minimum levels for collections, staff, spaces and services which, though they may fall short of international norms, can be used immediately as a starting point for development in the future.
- “Regulations for Public Libraries in Catalonia” - volume II (1991).  
The complexity of the huge belt around the city of Barcelona suggested the creation of some independent norms with solutions based on the geographical, demographical and social personality of each area.  
Like the first volume, for each type of library this volume sets minimum levels for collections, surface, work stations, opening hours and staff.

- Autonomous Government of Catalonia

In 1992, the Department of Culture began production of the “Public Reading Map of Catalonia”, which was approved on June 23, 2003. It is an informative working document which takes the municipality and the region as a single territorial unit of analysis.

General features of the “Public Reading Map”:

- It brings together the needs of public reading, and establishes parameters and standards for the size of facilities which the public service model demands, in municipalities of over 5,000 inhabitants.
- It also takes into account municipalities of between 3,000

and 4,999 inhabitants, which should be served by a subsidiary library service.

- It establishes modules to show the facilities’ dimensions, making it possible to define a theoretical basic structure, and brings together the current reality of public library services in Catalonia. Analysis of this data means that shortfalls can be recognized and actions prioritized.
- It determines which kind of service corresponds to each municipality according to the structure of the Public Reading System set down by law.

- Provincial Council of Barcelona

Due to improvements in library facilities in the province of Barcelona begun in 1987 by the Provincial Council of Barcelona, it became necessary to establish a module agreed by the corporation, as a reference framework for modifications and new constructions of libraries forming part of the Library Network. The parameters, established and updated by the Library Service depending on the number of inhabitants and on whether it is a central library, set out criteria for the surface area of the building, the initial document collection and maintenance, the study stations and equipment points, opening hours to the public and the necessary staff.

The Library Service also works with basic financial standards which add together the cost of initial investment and annual working and maintenance, according to the type of library and the number of inhabitants in the municipality.

- Autonomous Government of Catalonia and Provincial Council of Barcelona

A joint project between the Library Services of both institutions has led to the publication of the “Public Library Standards for Catalonia” (Estandards de Biblioteca Pública de Catalunya) - January 2008.

- The document deals with the following criteria: (see: Appendix 1).
- Document collection.
  - Project surface area divided into specific activity areas and total built surface area.
  - Necessary staff.
  - Minimum hours open to the public.
  - Number of units needed for work stations and equipment points.

## REGULATORY FRAMEWORK FOR UNIVERSITY LIBRARIES

### International standards

- IFLA (International Federation of Library Associations and Institutions)

In 1986 the IFLA published the “Standards for University Libraries”, with a globalized overview which meant they could be applied to all kinds of countries and circumstances, leaving it up to each individual country to fix the quantitative minimums in accordance with their own needs.

The document sets down ten norms and a series of recommendations:

- Objective:  
Need to clearly define the objective of the library within the structure of the university.
- Organization and administration:  
Responsibility and authority of the library administration and its director.
- Services:  
The services must be appropriate to the objectives set by the university and the library.
- Collections:  
Need for the library to intervene in the selection process and acquisition of material jointly with the educational staff and with the agreement of the university administration.
- Staff:  
The basic nucleus of functions of the library is developed, according to the IFLA, by the librarians. Therefore, professional training programmes must be set up for all staff.
- Place:

Mention is made of factors of building design, lighting, air-conditioning, temperature and damp control.

- Budget and financing:  
The guidelines highlight the need to fix a library budget as a separate item within the general budgeting of the university, and for it to be produced and carried out by the library director.
- Technology:  
The obligation to be up-to-date in order to be able to offer the users a service with a high level of technology.
- Preservation and conservation.
- Cooperation.

### Standards in Spain

- Decree on the Creation and Recognition of Universities

This follows the IFLA model in collection recommendations from a qualitative point of view and establishes the following requirements:

- The building must allow for simultaneous use by 10% of the total of students.
- It must provide reading rooms, archives and a lending system.
- Opening hours must be of at least 55 hours a week.
- The library must offer the number of volumes and other types of support necessary for the development of university education.

- Regulations and directives for University and scientific libraries

These were published in 1999 by the Ministry of Education and Culture, and they are an extension of the 1997 edition.

The document establishes guidelines for the following areas: collections, services, infrastructures, financing and staff.

*Flexibility*  
*Compactness*  
*Accessibility*  
*Extendibility*  
*Variety*  
*Organization*  
*Comfort and Constance*  
*Signane*  
*Sustainability and Maintenance*  
*Safety*

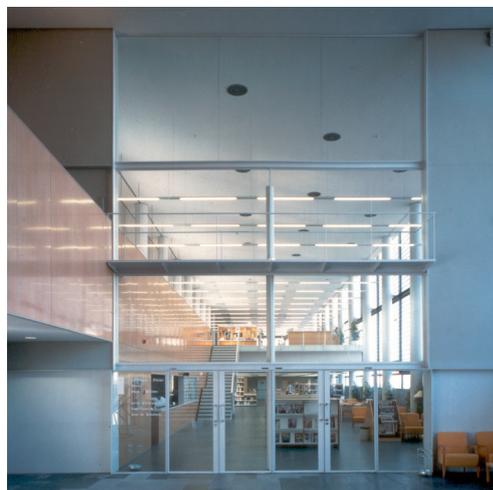
When the subject of what new libraries should be like comes up, the library professionals' functional discourse produces the following conclusions:

- Rejection of the “temple of culture“ image, and a general discrediting of the symbolic devices which discourage higher attendance like great imposing entrances, grand staircases, the spatial hierarchy and gloomy passageways.
- Incorporation of devices to encourage access:
  - A library adapted to everyday life, weaving it into the urban fabric so it becomes part of the social fabric.
  - A library opening on to the street, with a user-friendly layout allowing the public free movement.

There has been some disagreement between the architectural world and certain library professionals who have taken these conclusions to the extreme, with demands which are orientated towards the strictest functionality and reject architecture and the architect's work.

Controversy has also been whipped up by those library professionals who see the architect as a specialist in literally translating a functional programme into a building.

The interrelation between the two disciplines has produced some libraries with both good architecture and good functionality of the facility. Just as an architect can make a house which he is not going to live in, or design a memorial to the dead without actually dying himself, he can also create a library without being a user.



**07.01**  
*Public Library*  
*(Vildecans,*  
*Barcelona).*  
*Architects:*  
*Artigues & Sanabria*  
*arquitectes.*

The factors involved in the construction and conditioning of a library vary enormously, and the buildings should be seen from two points of view:

- The common functions that every library must fulfil, whether it is a research, university or public library, or one belonging to a scientific society.
- The differences which come from the specific philosophy of each kind of library, whether due to government policy, education policy, cultural, geographical and urban policy, or the public which the building is going to serve.

Analysis of the positive common aspects of library architecture makes it possible to create a list of generic characteristics to provide a clear idea of what the buildings have to be like, now and in the future.

These “desirable qualities” should be seen from the following viewpoints:

- The building exterior:  
Installation, accessibility, orientation, extension, architectural option, etc.
- The building interior:  
Organization of space, variety, comfort, safety, etc.

There is obviously no one solution compatible with all the different situations. Similarly it is impossible to

bring all the best recommendations together in one building, one reason being that they might even be contradictory.

On the other hand, any discussion of an “ideal library” would mean that a series of contextual factors affecting the building are being ignored; factors such as the culture and education of the populace, the users’ needs, methods of use, the characteristics of the site or the financial situation.

However, an analysis can be made from the point of view of quality, durability, economics and maintenance.

### “FAULKNER-BROWN’S TEN COMMANDMENTS”

The English architect Harry Faulkner-Brown, and influential member of the IFLA, set down ten important qualities which all library buildings should have; a list known in the library world as “Faulkner-Brown’s ten commandments”. Faulkner-Brown’s Decalogue states that a library building should be:

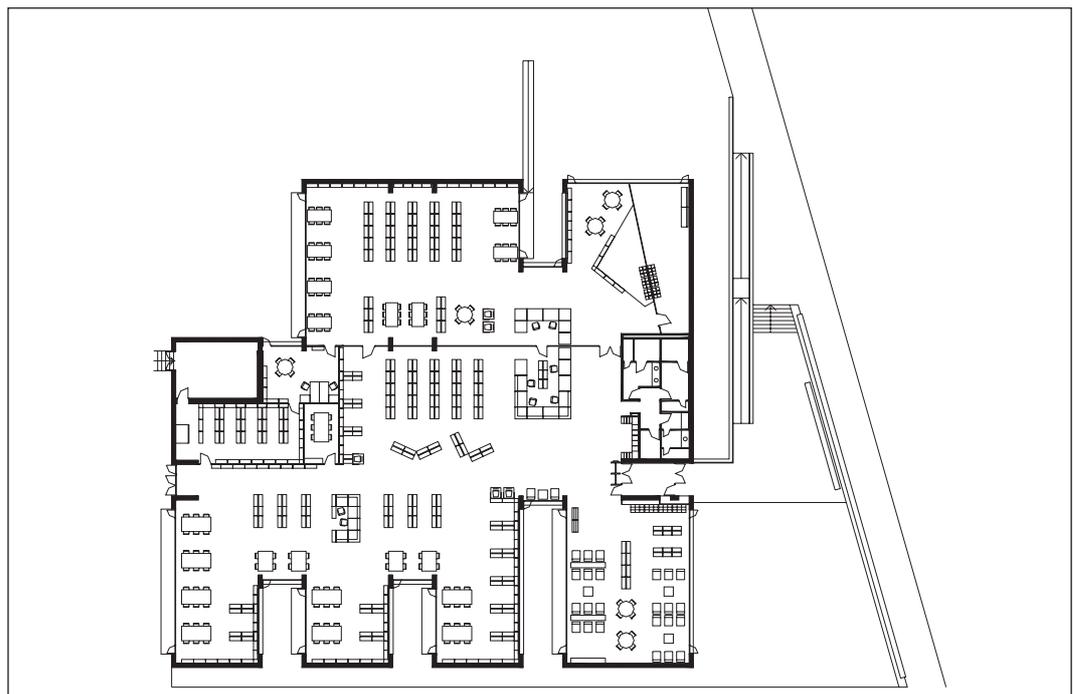
- Flexible.
- Compact.
- Accessible.
- Extendible.
- Varied.
- Organized.

#### 07.02

*Public Library  
(Ripollet,  
Barcelona).*

*Architects:  
Esteve Terrades and  
Robert Terrades.*

*Both the structural  
layout and the  
configuration of the  
facades mean that  
various spaces can  
be defined with  
simple building  
elements.*



- Comfortable.
- Constant in environment.
- Secure.
- Economic.

These “Ten Commandments” can be applied to varying degrees regardless of the size of the building.

Using this as a starting point, and not wishing to take them as strict rules and regulations, this chapter will analyse the main criteria which should be considered when starting a library building project.

- Flexibility.
- Compactness.
- Accessibility.
- Extendibility.
- Variety.
- Organization.
- Comfort and Constance.
- Signage.
- Sustainability and Maintenance.
- Safety.

## **FLEXIBILITY**

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Some buildings have not managed to keep up with the changes in the areas of activities and access to information. This is the question: Will the existent libraries and those yet to be built find it easy to adapt to requirements which are rapidly evolving in directions that cannot be predicted?

It is difficult, not to say impossible, to know how the buildings will evolve in the future. The only certainty is that they will. One conclusion can be drawn: the modular flexible building constitutes, these days, a highly developed type of building which comes from years of evolution and building improvements. The project has to envisage a building which will adapt to the passage of time. Whatever the future may hold, it has to be designed to be able to react to two almost certain developments: the expansion and the transformation of the spaces.

Flexibility measures:

- Structure and construction methods.
- Organization of traffic flow and spaces.
- Installations.
- Furniture.

## **Structure and construction methods**

In any library there is a close relationship between the architectural spaces and the facilities which it will house.

Consequently, the construction frame should not create any difficulties for the installation of any of the various furnishing elements.

- Straight / right-angled frameworks with wide spans are more advisable than irregular-shaped or curved layouts for load-bearing elements. (Fig. 07.02).
- The walls of the structure may make flexibility, and indeed visual monitoring, difficult. The possibilities for creating a variety of layouts is much greater if they are reduced to the minimum and are limited as far as possible to the unchangeable areas of the library, such as stairs and lifts, the toilets or the vertical installations conduits.
- The other partition walls, if indispensable for reasons of security or privacy, should not be structural, and should be easy to take down.
- Uniform capacity for use-load across the whole floor structure makes it possible to alternate activities.
- The uniform treatment of the finishing materials inside means that any changes to layouts will not mean any additional cost creating a unified image in the new spaces.

## **Organization of traffic flow and spaces**

- The vertical grouping of the toilets and the vertical communication areas means other spaces are freed up.
- If possible, floors should be on one continuous level, without any steps or ramps which can make mobility for both equipment and the users more difficult.

## **Installations**

- Design allowing easy adaptability and a certain amount of mobility of the various zones and functions.
- Uniform air-conditioning and lighting which can be adjusted without reducing the comfort of the surroundings.

- Installations which are fed by a system of cables which can be adjusted.  
This requires an estimate of the size of the operation to ensure adequate cable pathways.  
Vertical circuits do not present too many problems. However, the organization of the horizontal grid is more complex, and it has to be determined whether or not there will be technical flooring, suspended ceiling or predetermined ductwork. (Fig. 07.03).

## Furniture

Kind of furniture and distribution which allows mobility, and adaptation to new requirements.

Advantages of planning a flexible building:

- It is easier for the library to undergo modifications and to carry out new activities: all it needs is for a few pieces of furniture to be moved.
- An open plan, flexible library means savings on staff: monitoring is easier in one single open space than in fragmented smaller spaces.
- The various areas can occupy, if necessary, informally connected spaces some of which are more defined than others.

## COMPACTNESS

This concept refers to the concentration of traffic flow and movement in the library interior, whether that of users, staff or the documents.

Theoretically, in a compact building, the different parts create a unit which is coordinated and structured enough to maximize use of walkways. In a building of considerable volume, with inter-floor access and communications at the centre of gravity, distances are reduced to a minimum.

Broadly speaking, the two most compact floor designs are circular and square.

- The circle presents problems for wall

finishes and the organization of furniture.

- The curved façade might require special finishing materials with the consequent increase in price and complication of the work.
- For furniture, the main difficulty is with the shelving.  
When they are fixed on to the façade wall, they have to be curved. Such modules do not exist on the market and it is recommended that they be made to measure for reasons of versatility.  
In the interior of the library, the concentric layout uses up more floor space because the distances have to become greater as the circle widens.

Round, elliptical or hexagonal floors, or other shapes with sharp angles, necessitate a building plan which has a larger total floor space area than that indicated in the programme of requirements.

- A direct reference for the compact square-floor building is the model used by Louis I. Kahn.  
Philips Exeter Library is an example of this image of a library. The central section is a huge empty space dominated by a clerestory. The vast mass of books can be seen from this space, forming a kind of wall. Further on, nearing the light, are the reading zones, with individual niches at each window where students can find the isolation they need.

The vertical communication centres and the toilets are situated in the corners.

Khan explains the project in the following words: "*The idea of the library began with the periphery. I saw the reading room as a space where a person could be alone, next to a window, and it would become a private space, a place discovered among the nooks and crannies of the building.*"

Advantages of planning a compact library building:

- The balance between the interior volume and the exterior skin (façades and roof) automatically makes it more economical.

- The reduction of elements in contact with the outside decreases loss in thermal load, and consequently increases the energy savings.

## ACCESSIBILITY

Accessibility of a library service is determined by various considerations:

- Placement of equipment.
- Organization of the building.
- Distribution of the furniture and organization of the document collection.
- Adaptation of equipment for the disabled and those of reduced mobility.
- Opening hours.
- Cost free status of service.

When an architect takes on a library project, the placement and the running of the building are aspects outside his brief. However, he has a number of tools at his disposal to produce a library which is user-friendly.

Accessibility measures:

- General criteria.
- Building exterior.
- Building interior.

### General criteria

- Street level library, with access related to the main user-traffic flow areas.
- Organization of the openings in the façade allowing visual contact between the exterior and the interior, the idea being to show the outside an image of the more public activities being done inside.
- Direct connection with the exterior for the most appealing activities, such as exhibitions, or the periodicals and music areas.
- Adequate signage. Outside, to direct the citizen from any point in the city. Inside, to find the library's different zones and information easily.
- No physical barriers.

#### Disabled / Reduced mobility public

"Disabled" means anyone with a physical or mental disability, whether



#### 07.03

*The modulated organization of inspection covers flush with the flooring, means easy access to the built-in wiring above the floor structure.*

congenital or acquired which makes it impossible or difficult for the person to carry out an activity in a normal way. In our image-obsessed times, these people are particularly hard done by. Therefore, special attention needs to be given to them when creating a library, both in the adaptation of the spaces and the choice of the types of consultation methods used.

The law requires that buildings be built with no physical barriers to users with reduced mobility:

The interpretation of this guarantee as a generalized rule sometimes makes one forget the reality. A high percentage of the population suffer from disabilities which the legislation mentioned above does not consider.

We are talking about the blind, the deaf, those with poor eyesight or other physical defects which make it difficult for them to have full access to what a library offers.

The following groups of users also have reduced mobility or disabilities:

- The elderly.
- Users with pushchairs or shopping trolleys.
- Pregnant women.
- People with broken limbs.

The architecture and equipment of a library can help integrate these members of the public. Some aspects should be borne in mind:

- The increase in costs resulting from adapting the building to the needs of the disabled is insignificant if it is taken into account from the outset.
- All types of disabilities must be kept in mind.

#### 07.04

*Tecla Sala Library  
(L'Hospitalet de  
Llobregat).  
Architect:  
Albert Viaplana.*

*Entrance to the  
building, on the first  
floor, is via a large  
ramp incorporating  
several elements of  
street furniture.*



- A large number of the disabled do not suffer from total disability. Therefore, simple yet effective solutions can be incorporated for a large percentage of them.

#### Building exterior

- Attractive and easily-identifiable building.  
Whether you want the appearance of a commercial building or a monument, the character of both a public building and a library service which is open to everybody must be reflected in the outer image. This characteristic has to stand out when the library forms part of a wider building complex which contains other activities.
- Organization of entrance access to make people want to come in:
  - When there are physical barriers between the street and the foyer, there should be ramps or some other system to make entrance easy. (Fig. 07.04).  
To ensure that the visually

#### 07.05

*Fixed study station  
with dimensions and  
design suitable for  
the disabled.*



impaired can negotiate the building easily, there should be good lighting and high contrast of the volumes and the architectural elements.

- If the site allows, there are certain elements which help to give an image of accessibility to the building:
  - ▶ Space outside attached to the library for parallel activities.
  - ▶ Benches and other elements of urban furniture creating a rest and relaxation area.
  - ▶ Bicycle, motorbike and car parking facilities.

#### Building interior

- The foyer should be welcoming, and situated and structured to make it easy to understand the various different spaces.
- Ease of foot traffic flow:
  - Physical clarity:  
No obstacles, and ease of vertical (inter-floor) and horizontal communication.
  - Psychological clarity:  
The user must see the library as a free-access service, with one control centre in the foyer. This solution means that moving from one section of the library to another will not cause any sudden environmental changes or feelings of restriction.
- A friendly and welcoming image for all users. Design aspects likely to cause a feeling of alienation should be avoided.
- Traffic flow spaces, finishes and sufficient equipment for disabled access.
- Furniture:
  - The bookshelves and the furniture using other types of support must allow all material to be seen and accessed. With these criteria in mind, the situation of the pieces, the distance between them, the height and the full range of furniture must all create a comfortable environment and easy information search.
  - Adaptation for the disabled:
    - ▶ The layout of the furniture must make circulation as easy as

- possible for those with mobility difficulties.
- ▶ The shelving system and other elements containing the free-access collection must allow access to all documents.
  - ▶ The customer service desks must allow for the frontal approach of wheelchairs.
  - ▶ A fixed study station designed to the dimensions needed for the disabled is also accessible to other users. The installation of such furniture throughout the library avoids the need to create special points. (Fig. 07.05).
  - ▶ The visually and hearing-impaired must be able to work with a companion. For this reason, on long reading desks, dividers which can be moved or taken down should be considered.
  - ▶ Equipment:  
The new information technologies provide a level of independence in the process of social integration which cannot be achieved through other methods. There are computer peripherals adapted for use by the disabled, materials for the visually and hearing impaired and orthopaedic apparatus which helps with mobility.

## EXTENDIBILITY

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Some say the library is a living organism: if it doesn't grow, it dies.

The functional programme must set out the perspectives in this way: apart from the built surface which the future library must have, it is also advisable to consider the area it will occupy further into the future, and the approximate date of extension.

Possibilities for growth are closely connected to the choice of site and the implementation by phases.

### Choice of site

- If the site allows for it, the architect must anticipate possible extension on

all sides, upwards with the addition of more floors, and downwards with underground floors.

This operation should be possible without major architectural interference, unnecessary expense or major interruptions to library service. It is therefore advisable to complete the library project with an organization and volumetric study which would form the basis of the extension project when the time comes.

- If the characteristics of the site make any extension impossible, the building must allow for renovations and the setting up of new functional directions.

### Implementation in phases

Many times, the developer gives the architect a library project to be implemented in phases.

The main reason is the desire to open a library within a budget which only allows for the construction of a building with the lowest possible total floor space.

Although there may be a works calendar which ensures that the further phases will continue to be carried out, it is advisable for the architect to resolve each step as a complete unit, as if it were an apparently finished building. Otherwise, the excessive extension of the deadlines means that the library becomes bogged down, and there is a constant feeling of temporariness which affects the functioning of the service.

Growth measures:

- Choice of construction materials.
- Types of furniture.

### Choice of construction methods

- Materials:  
Exterior and interior materials must make extension relatively easy. It is obviously advisable to use repetitive modular units, but it is a good idea to choose materials which ensure the appropriate formal solution to the possible extension.
- Structure:  
If extension upwards is envisaged, the appropriate measurements will have to be taken. If it extends

horizontally, then a modular solution is the best option.

- **Installations:**  
Both the installations as part of the building itself, and those specific to the library service will have to be extendible systems. This feature will mainly affect the size and accessibility of the installations' wiring, central distribution panels and so on. (Fig. 07.06).

### Types of furniture

Whether the building will need to be extended in the future, or is already large enough, most libraries organize their collections anticipating an annual increase in the collection.

The bookshelves and furniture for other media must be of a design which allows for increasing capacity or repeating the module.

Apart from that, when it comes to organizing the furniture, the architect should anticipate a layout which offers the possibility of growth.

Most of the recommendations described above represent a financial increase in the implementation of the work. Despite this, the final cost of an enlarged building will obviously be less when these measures are considered from the outset.

Experience shows that, generally, the building should be planned with a view to expansion. Some of the "Ten Commandments" could be repealed, others could be tempered somewhat, but there is never a time when library extension should be discarded.

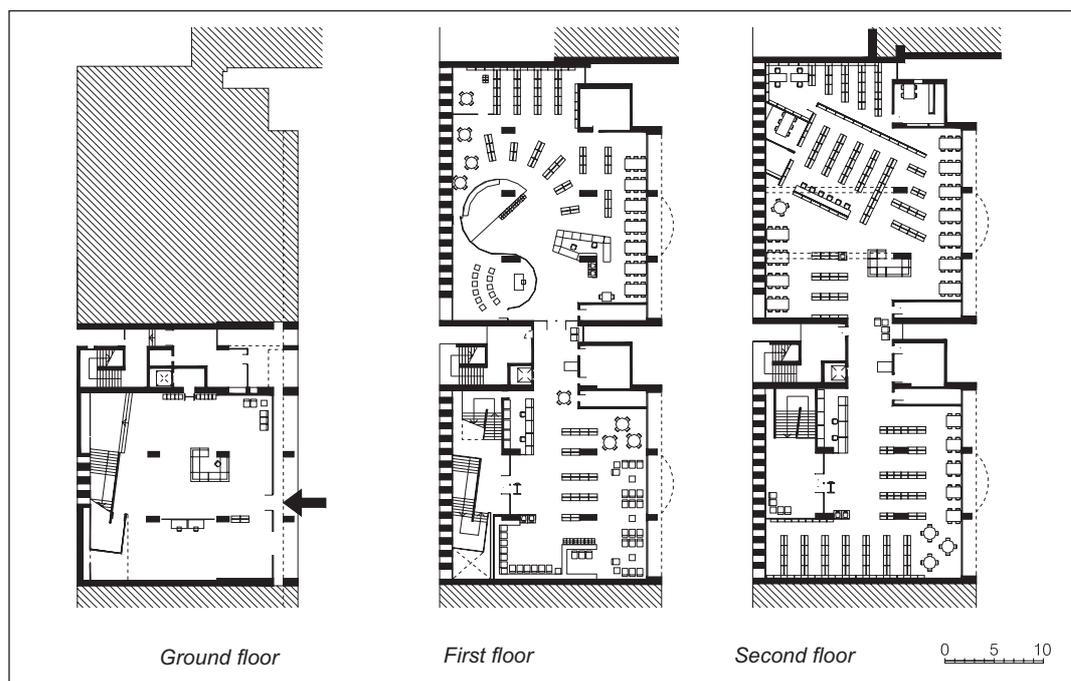
### VARIETY

Libraries are facilities with very varied content:

- **Users:**
  - Most libraries are free-access. Therefore they are aimed at any and all user types.
  - Every user has different interests and needs.
- **Types of library:**
  - National, specialist, university, public, etc.
  - Even within the same type, the various libraries have aspects which differentiate them such as size, location and the functions provided for.
- **Activities:**  
In each area of the service different activities are carried out, both by the staff and the users. An appropriate environment needs to be provided for everybody:
  - Spaces for information and consultations of any kind of

**07.06**  
*Central Library  
(Cornellà de  
Llobregat).  
Architect:  
Josep-Emili Donato.*

*The library is in a large building which houses other facilities. The modulated structure of the building and the strategic placement of the core areas facilitate the growth of the library.*



07.07



**07.07 and 07.08**  
*Pompeu Fabra Library (Mataró, Barcelona).*  
 Architect: Miquel Brullet.

*The placement and size of the lobby make it possible to immediately take in all the library's principal areas.*

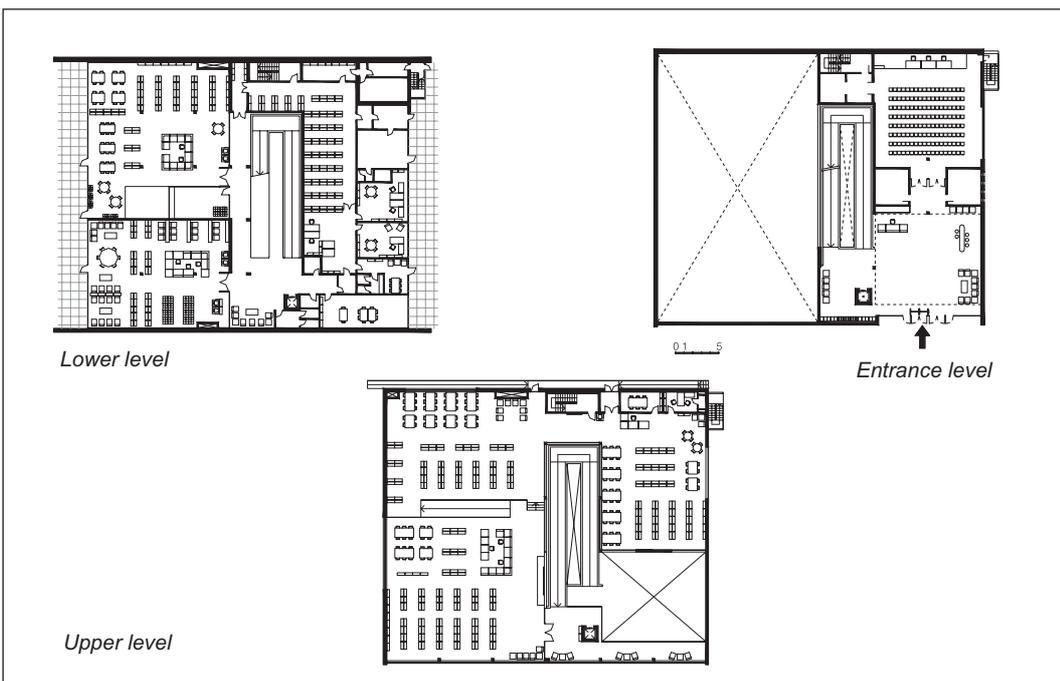
material (books, magazines, CDs, etc.).

- Spaces grouped together to improve concentration.
- Comfortable rest, leisure and relaxation areas.
- Document collection:  
 The collection is found on multiple media. The library must make consultation in any and all of these formats possible.
- Equipment:  
 The furniture is both diverse and very specific.  
 The IT and audiovisual equipment

also needs to be installed in a large number of points in each area .

Despite the variety of elements which make up the library service, the architect also has ways of providing an inviting environment for each of the activities.

- Size and shape of each space.
- Height of different zones within each space.
- Exterior openings: natural light and interior-exterior contact .
- Artificial light: strength, colour of the light, etc.



**07.09**  
*Pompeu Fabra Library (Mataró, Barcelona).*

- Furniture:  
Design and layout, height of the various shelving groups, shape and size of the work surfaces, location and composition of the information desks and so on.
- Treatment, texture and colour of the finishes.

## ORGANIZATION

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The library must facilitate the user / collection interface.

The number of elements which the library offers can actually produce visual fatigue in the user. This should therefore be compensated by good organization of the spaces, the furniture and the collection.

The architect should plan the project using the following recommendations: (Fig. 07.07, 07.08 and 07.09).

- Articulation of the building should allow immediate understanding of the main spaces from the foyer. To a large extent, this “visual unity” determines the traffic flow of the whole library.
- Special emphasis on the concept of movement. The user must use the library with freedom, and the building must offer the possibility of moving around the various areas naturally.
- Articulation of the spaces:
  - Respecting the spatial relationships between the different areas specified in the “functional programme”.
  - Improving the spatial flow between areas.
- Vertical communication core:
  - Stairs and lifts recognizable to the user.
  - Entrance halls on different floors which offer clear visualization of the spaces, and minimize unnecessary detours.
  - Clear differentiation between installations for users and those for staff.
- Location of toilets:  
Access from all spaces, particularly from the zones which might have a timetable or a use which is independent from the library service as such.

- Number of floors in the library:  
When the site permits it, the advantages to organizing the whole programme on one level are obvious:

- Improvement in accessibility.
- Flexibility in traffic flow organization.

There is a series of criteria to bear in mind when the size of the site necessitates a distribution of the programme onto various levels:

- Locating on the ground floor those spaces most compatible with noise, those which are most visually attractive and those which will attract the largest number of members of the public.
- Organization of the floors according to the specific nature of the activity, so as not to disturb the readers with any noise caused by user movement.
- Organization of furniture:  
Using different pieces of furniture, it is possible to create the passageways, the free-access shelving areas, reading areas and so on. With the information desks, their number and location will be a direct result of the architectural solution. Well-thought out organization results in:
  - Reduction to the minimum of the number of desks so as to increase the efficiency of the library staff's work.
  - Ability to monitor all the spaces.
  - Location of desks in highly-visible places which offer the public easy access from any point.

## COMFORT AND CONSTANCE

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The library has to be a convenient, comfortable place where the public can feel at home: a place which makes them want to come back.

Moreover, studies made on the preservation of collections indicate that a constant atmosphere has to be maintained.

The range of activities, the varying number of users at any one time and the different media in the collections mean it is enormously complex to achieve an inviting atmosphere for every situation.

The means at the architect's disposal to provide a safe and comfortable working environment:

- **Air-conditioning:**  
A cool, constant temperature together with a regularized level of humidity will improve the library's efficiency and encourage more frequent use.
- **Artificial light:**  
Installation must allow for changes in furniture distribution, but at the same time it must provide working environments of different types.
- **Sound-proofing:**  
Treatment of the building's skin, sound-proofing equipment and interior finishing materials must ensure acceptable acoustic levels in each zone.

In the chapter "Kitting out the spaces" the requirements connected to interior comfort are dealt with in detail.

## SIGNAGE

Information offered by the library should be clear to all members of the public. Some libraries specialize in a particular subject and others are aimed at the general public but in almost all cases an attempt is made to offer open access to their whole collection.

What is needed is a system of indicators to facilitate the readers' navigation of spaces running continuously through a carefully laid out collection.

Signage is the public information system which answers this need.

Because of its importance and complexity, a specific study is recommended, carried out by a professional and incorporated into the architectural project which encompasses all the different aspects from a basis of a specific programme of requirements.

### Types of signage

- **Exterior:**  
Separate from the building:
  - Signs to the library placed around the urban landscape.
 At the building itself:



**07.10**  
*P. Miquel d'Esplugues Central Library (Esplugues de Llobregat, Barcelona). Architects: Artigues & Sanabria arquitectes.*

*Exterior signage.*

- Identification of the library.
- Signs showing opening hours, parking, book drops, access to service, etc. (Fig. 07.10).
- **Interior:**  
Directing to functional spaces:
  - Indicators to guide the user towards the various areas and services. (Fig. 07.11).
 Parts of the building:
  - Toilets.
  - Vertical communications.
  - Walkways and emergency exits.
  - Staff-only areas, etc.
 Library regulations:



**07.11**  
*Interior signage.*

- Silence notices, signs explaining the collection access and other user regulations.

Subject areas:

- Subject areas and sections.
- Contents of different shelving elements.
- Interests.
- Information on activities, etc.

### Aspects to consider

Signage has the following purposes:

- To facilitate access to the library.
- To maximize use of the spaces and services of the building.
- To increase user-autonomy in access to the document material.

At the same time it can contribute to the creation of a visual identity or “brand image” for the library.

The complexity of this discipline is visible both in the number of messages and in the number of places it applies to (spaces, all furniture containing documents, activities, information, etc.). Difficulties increase when one bears in mind that a section of the public is disabled (visually-impaired etc.).

There are three stages to signage:

- Study of requirements.
- Translation of visual language.
- Design, execution and installation of all the components.

The second and third phases need certain points to be defined:

- Type of graphic.
- Messaging.

- Hierarchy.
- Type of sign.
- Colour.
- Materials and construction.
- Location.

### Type of graphic

This is based on the signs, images and words which, with varying degree of difficulty, can be reduced to symbols. From this point of view, ideal signage is that which allows the human eye to identify a symbol or pictogram before reading or deciphering the meaning of the word or image.

Given how difficult it is to find symbols which are clear to a heterogeneous public, pictograms can only be used in the signage of the building as a building – toilets, lifts and so on – using a range of symbols which everyone can understand.

Signage for subjects will inevitably involve a graphic system requiring a certain amount of text. (Fig. 07.12).

Optical guidelines to facilitate legibility:

- Size and character proportion allowing signs to be read at a glance.
- Height of letters or images to depend on the distance from which they are to be read (a rate of 1 cm of height for each metre of distance).

Terminology:

- Text: The terms used must clearly represent the concepts to be identified, but at the same time be in ordinary standard language, as long as they are correct.
- Arrows: Unmistakeable symbols which cannot be misinterpreted.
- Floor plans: Easy to follow, with indicators telling the user where s/he is on the plan in relation to other areas.

### Messaging

- Clear, concise and comprehensible for all members of the public. One of the principles of this discipline

07.12



is that too much information cancels out the information.

- Quick to read.
- Produces the objective desired by the user.
- Not too many prohibitions.

## Hierarchy

The library use is motivated by three things: search, identification and, finally, obtaining the document.

The signage system must provide the step by step completion of the process of getting to information.

## Type of sign

There are two types of signage, in terms of information:

- Permanent.
- Temporary (events information, etc.).

This characteristic will determine the design and the execution of the sign's components.

## Colour

Colour contrast is an optical law which commonly used in signage. Basically there are three types:

- High contrast: superimposition of light and dark.
- Low contrast: superimposition of shades or intensities of the same colour.
- Very low contrast: superimposition of matt and gloss finishes of the same colour.

Contrast between a particular colour and its complement (for example, green on red, orange on blue or violet on yellow) is a popular technique in painting, but is not advised for signage. Looking at a colour on top of its complement gives an impression of movement, and this optical illusion affects comprehension of the text.

The following table shows the best colour-combinations for sign/background, from maximum to minimum contrast:

<b>Signs</b>	<b>Background</b>	<b>Score</b>
Black	Yellow	5
Black	White	4
Bright green	White	4
Bright Blue	White	4
Red	White	3
Yellow	Black	3
White	Blue	2
White	Red	1
Red	Yellow	1

There are implicit connotations with certain colours which must be considered. For example, reds are associated with danger or prohibition and greens indicate authorized access.

## Materials and construction

- To withstand changes of location, vandalism and, where necessary, inclement weather.
- To remain unchanged by time or changes in light or temperature.
- Non-glare finish.
- Types of support and lettering which are adaptable to future changes.
- Method of construction which allows library staff to add new information or to change its contents completely. This recommendation is essential for regulatory and thematic signage. Therefore, the types of support must have a format and a manually changeable system which can be carried out using tools available in the library itself (sign making by computer, etc.).

Inflexible solutions mean that completely different parallel signage systems appear, destroying the unity of image.



**07.13**  
*Mercé Rodoreda  
 Library (Barcelona).  
 Architect:  
 Màrius Quintana.*

- Systems of signage installation:
  - Freestanding.
  - Hanging.
  - Painted onto fixed elements.
  - Placed on other elements.
- Most typical types:
  - Banners.
  - Directory signs.
  - Street maps.
  - Notice boards.
  - Information posters.
  - Shelf Subject labels.

- Strategically situated at the point where the user wants to the information.

Possible locations:

- Ceiling, ground or other horizontal surfaces.
- Vertical surfaces.
- Furniture (hanging, placed between documents, standing, etc.).

## Location

Main characteristics:

- Will determine the user pathways.
- Implicitly translates the library service's decisions regarding the collections, access to materials, welcome policy and ways of exhibiting the resources at the public's disposal.

Basic recommendations:

- Visible:
  - Located within the user's field of vision:
    - ▶ Correct height for user.
    - ▶ Placement related to normal movement (on the right when crossing a threshold, next to doors, etc.). (Fig. 07.13).
  - No visual obstruction by architectural elements or furniture (pillars, skylights, shelving etc.).
  - Placement to avoid glare from windows etc.
- Well lit.

## SUSTAINABILITY AND MAINTENANCE

### Lifespan of buildings

Construction elements go through changes in their basic characteristics, both in their original shapes and their physiochemical structure, eventually losing their original qualities.

Time period of useful life that can be expected of a building:

<i>Element</i>	<i>Useful life</i>
Useful life of the body of the building	at least 100 years
Supporting structure	should last as long as the building
Basic elements of the façade	should last as long as the building
Weakest elements of the façade (cladding, shutters, etc.)	from 25 to 50 years
Installations	from 10 to 25 years
Waterproof roofing material	from 10 to 15 years
Painting and varnishing	from 5 to 10 years

The causes of deterioration can be found in different phases of the construction process. The following is a list of the percentages:

- Project..... 40%
- Production of the materials..... 15%
- Onsite installation ..... 35%
- Maintenance ..... 10%

These statistical studies, carried out by various groups with an interest in monitoring and preventing risks (principally insurance companies), show that 75% of the cases of deterioration come about through errors on the part of architecture professionals, divided almost equally between those who conceive the building (40%) and those who make it reality (35%).

**07.14**  
Pompeu Fabra  
Library (Mataró,  
Barcelona).

*The energy produced by the photovoltaic façade translates into a major saving in library energy consumption.*



The following are factors that reduce lifespan expectancy:

- Prioritizing cost reduction, comfort and purely aesthetic considerations, creating new construction methods with results whose durability cannot be assured.
- Progressive growth of more and more innovative industrial production which renders other solutions obsolete long before they physically deteriorate.
- Taste and habits change at a faster rate than the adaptability of the buildings.

We are heading towards a cycle of construction/demolition. Therefore the future points towards a new way of building where the “recyclable” aspect is more and more important, and the “durability” aspect is less and less so.

## Sustainability

Sustainable refers to everything that can last, meaning that there should be a balance between two actions: the first consists of thinking, planning or wishing, and the second, of materializing, guaranteeing that the objective conditions and the subjective initial ideas are brought to completion.

Our planet’s limited capacity and the major effect that the construction sector has on it are bringing about changes which are substantially modifying present working methods. The impact that a building has on the environment can be analysed from the following angles:

- Implementation and integration into the environment.
- Impact of the materials on the environment during the process of extraction, processing and fabrication, useful life and recycling or elimination.
- Influence of the architectural design on the way the building is used during its useful life.
- Energy consumption both in construction and use. (Fig. 07.14 and 07.15).

Over the past few years, there has been an increasing interest in making the construction sector more environmentally friendly.

The lack of regulations in this area

means it is necessary for the public developer to intervene to encourage the incorporation of new, more sustainable building practices at every step of the process: from promoting to demolishing.

## Strategies for a sustainable architecture

The following phases should be applied:

- Programme.
- Implementation.
- Project.
- Onsite installation.
- Maintenance.

### Programme

A sustainable facility, both in the execution of the building and the useful life of the service, must be programmed with the following criteria in mind:

- Response to the actual needs of the property.
- Construction of a profitable building, with a balance between the initial cost and the maintenance costs during its useful life, which can be managed in a way requiring the minimum financial and human resources.
- Inclusion of an investment and maintenance costs forecast for both the building and the library service.

### Implementation

Environmentally friendly.

### Project

Conception:

- Show-building for the activity for which it is built.



**07.15**  
*Pompeu Fabra  
Library (Mataró,  
Barcelona).*

*Photovoltaic façade.*

- Versatility which allows for evolution.
- Accessibility to those parts or materials most susceptible to deterioration.

#### Shape:

- Buildings which do not require many hours of artificial light or air-conditioning to maintain a constant, uniform environment.  
From this point of view, the cubical building is the best option to reduce the surface area of exterior cladding. This is due to the low ratio between the area of walls and roof and the area of the floor space.

#### Façades:

- A balanced ratio of exterior openings and masonry walls to aid energy saving. The windows let heat out in winter and in during summer.
- Use of protectors to provide shade at the windows, reducing the entrance of sunlight during the hot months and limiting the need for air-conditioning during summer.
- Anticipating a cleaning system for the windows. “Hermetic” buildings or ones whose openings are inaccessible need specialist cleaning companies. The financial cost involved often results in – particularly in public buildings – insufficient cleaning.
- Treatment of the walls to guarantee thermal inertia. Thermal insulation in new buildings and the thickness of walls in existent buildings help maintain the interior temperature.

#### Materials:

- Adaptation to budget.
- Capacity to last in anticipated

conditions of maintenance and in their possible repair.

- Indication of the supply conditions in which the materials must arrive at the site (packaging, accessories they must have, etc.) and the onsite storage conditions until they are used.
- Types of materials:
  - In the exterior, weatherproof but permeable from the inside out.
  - In the interior, light-colour flat finishes on walls and ceilings to allow better light diffusion.
  - Mainly recycled or easily recyclable materials (iron, aluminium, ceramic, wood, stone, glass etc.).

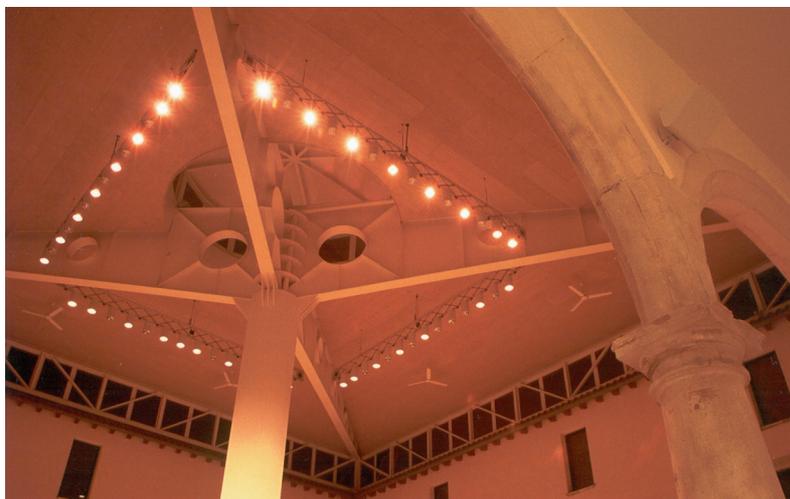
#### Construction systems:

- Knowledge of the local climate to determine construction systems. Water and temperature change are the constants which are practically always present in the causes of deterioration.
- Care when studying construction details: they must be thought out with a view to their being implemented at a later stage.
- Thorough assessment of options in the choice of construction solutions:
  - Avoid new solutions where there is evidence of deterioration appearing somewhat earlier than it does with traditional construction solutions.
  - Bear in mind the high cost of labour when it comes to deciding specific solutions. For example, from a conservation / maintenance point of view, it is more advisable to have finished panels than a plastered and painted partition wall.

#### 07.16

Joan Triadó Library  
(Vic, Barcelona).  
Architects:  
Bosch-Cuspinera  
Associats.

*The features of the building, with a roof over the old cloister, suggested lighting from the highest part. Difficulty in reaching the lighting rails is solved by means of motorized system which brings them down to floor level.*



- Find a balance between actual long term experience, quick laboratory experimentation and the application of all available knowledge.

With the construction process and usual materials, systematic observation of the material's behaviour is an essential method for taking measures to prevent future deterioration.

In the case of innovations, one can only know whether a new method really is long-lasting after a certain length of time of more than two decades has elapsed.

New product laboratories have been working on test methods which accelerate the actions which deteriorate materials, but no study can predict with absolute certainty the complex reality of behaviour in the long term, and many materials which were endorsed by laboratories have had serious premature aging problems.

- Systems which anticipate the building being taken down in the future, which can be easily dismantled with most of the components being easily recycled (sprung structures, uncoated materials, separable interior dividers, etc.).

Energy control:

- Energy is a key part of sustainability. Given that 50% of energy consumption in western countries is from buildings, ways must be thought of to improve energy efficiency. When it comes to deciding on maximum investment in the matter of energy saving, one cannot only consider the market and market mechanisms. Apart from the relatively low price of fuel, there are other criteria connected with the environmental question, as well as higher consumer awareness. All this should be translated in Europe into stricter building regulations, among other political measures aimed at guaranteeing that EU member states fulfil their commitments in international treaties to limit emission of greenhouse gases. Sustainable architecture must make use of environmental energy sources and the daily and seasonal changes on the outside, so as to reduce

dependence on mechanical and electrical systems.

Energy saving measures:

- Well-insulated buildings.
- High solar exposure control systems.
- Natural cooling systems.
- Incorporation of renewable energy.
- Natural light and ventilation.
- Low energy lighting.
- Installation of hot water only where strictly necessary.
- Systems for saving water (use of rainwater and grey water for toilet cisterns and watering outside, self-closing taps, mechanisms to regulate water use in the toilets, etc.).
- Other measures:
  - ▶ Computerized central control.
  - ▶ System designed to assess results which helps improve future actions.
  - ▶ Training programmes for staff and users so that they get to know the energy-saving systems in use, as well as how to control consumption and improve efficiency of the installations. Active participation is indispensable to achieve the environmental objectives.
  - ▶ Installation within the building of real-time energy consumption displays which show the users the direct effects their acts are having.

#### Onsite installation

- Reception of materials according to project specifications. By a method of quality control, all those which might be susceptible to, or the cause of, deterioration must be rejected.
- Thorough monitoring of construction solutions. Small problems in the execution can render the best construction details ineffectual.

#### Maintenance

Over the last few years studies have been carried out demonstrating the cost of continuous maintenance:

- 30% of problems can be avoided with preventative measures.
- In the medium term, it is more economical to invest in maintenance

than to repair slight damage caused by lack of maintenance.

- In the long term, maintenance costs are higher than the initial cost of the works.

Advantages of including it from the outset:

- Choice of materials and construction systems based on criteria of quality and durability rather than cost.
- Rejection of sophisticated cleaning and maintenance systems. (Fig. 07.16).
- Starting a “programme” or “building log” with instructions for appropriate use and maintenance.
- Establishing an annual maintenance budget.

### The “Building Log”

This is a document with all the information about correct use and maintenance of the building. It could be structured like this:

- Registration record:
  - Details of developer, builder, technicians, manufacturers, suppliers, etc.
  - Incident log:  
Maintenance operations carried out by specialists or qualified technicians.
- Document archive:
  - Licences, final completion certificate, deeds, guarantees, insurance policies, supply contracts, etc.
  - Instructions about the use and maintenance of the building produced by manufacturers or installers of the building’s components.
- Maintenance programme:
  - As-built plans.
  - Instructions for use.
  - Instructions for maintenance.

### General recommendations

- Comply with all directives. Otherwise there may be major repercussions in terms of civil liability.
- Engage a specialized company able to carry out general maintenance of the whole building to ensure more straightforward management.
- Update the “Building Log” whenever changes in any component are made.

### As-built plans

During the works process there are generally modifications with respect to the original master plan. With this in mind, new graphic documentation should be drawn up covering the actual state of the built work.

This documentation must deal with the aspects which might affect the use and maintenance of the building:

- Structure calculations including indication of load anticipated for each zone.
- Exact positioning of the installations’ wiring.
- Most important construction details.

### Instructions for use

This specifies how users treat the building, with the following indications:

- Use and function:
  - Characteristics of the construction which define its use.
  - Instructions which users must follow for the building’s appropriate use and function.
  - List of minor maintenance operations which are simple enough to be carried out by the users themselves without need for specialists or technicians.

Chapter format: load limits, structure, roofing, doors and windows, partition walls and ceilings, painting and varnishing, water, gas and electricity installations, drainage, air-conditioning, lifts, fire safety installations etc.

- Domestic cleaning:  
Recommendations for effective and economical cleaning, with advice on appropriate products.  
Specified by element: partition walls, ceilings, horizontal surfaces, doors and windows, toilet fixtures, mechanisms, installations etc.
- Evacuation and emergency actions:  
Instructions are given on how the occupants of a building should react in an emergency: fire, blizzard, hailstorm, hurricane, flood, water or gas leak, explosion or other type of accident.

### Maintenance instructions

Lists the operations which are basically preventative which must be carried out to keep the building in good conditions of use and function.

Purposes:

- Avoid any minor damage which could constitute a hazard.
- Avoid components getting broken or wearing out.
- Reduce costs. Preventing minor damage probably costs less than repairing it.
- Check building construction to determine if any damage has occurred in hidden areas.

There are five sections:

- Maintenance by users:  
Maintenance operations which are usually simple enough for users to carry out.  
Specified by element: terraces, roofs, metal fittings, shutters, superficial structural elements, etc.
  - Maintenance by operatives:  
Operations which need to be done periodically by professionals independently of other incidents which have occurred.  
Apart from those set down by law, others might be suggested by the management as they see fit.
  - General technical inspections:  
Carried out by qualified technicians, their objective is to get to know the general state of construction of the building.  
Special emphasis must be placed on structure, the roof, exterior cladding, evacuation system and the installations.  
Objectives of the inspection:
    - To prescribe the repair of elements in bad condition.
    - To set down new instructions for use and function.
    - To modify building maintenance in accordance with its state of disrepair or the refurbishment already carried out.
    - To make recommendations about restoration or modernization of certain components.
- Recommended frequency:
- First inspection after 2 to 3 years. Preferably carried out by the original technicians.
  - Further inspections every 10 years.
  - Occasional inspections to check specific points requiring special monitoring.
- Replacements:  
It must be determined which elements

of the building need replacing due to their short useful lifespan.

- Maintenance in case of incident:  
Measures which must be taken in case of fire, water leak, appearance of cracks, damp or any other kind of damage.

## SAFETY

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Libraries, as public buildings exhibiting material of high value, must guarantee safety from three points of view:

- Collections.
- Users.
- Building.

### Collections

The safety of collections has always been a major worry for libraries.

In the past, most of the collection consisted of valuable documents which had to be conserved and needed closer individual vigilance due to the lack of electronic surveillance systems.

The current time has more complex questions:

- The large numbers of visitors, the increase in numbers of documents in different formats and the lack of personnel to carry out surveillance creates a need for sophisticated surveillance systems which are not always the right ones, to avoid or at least discourage robbery and mistreatment of the documents.
- The centuries-old material in certain libraries demands a specific method of surveillance. In most cases it consists of individual consultations using a special pass or in reserved spaces.
- Free-access libraries with renewable material present a problem which is closely related to the times we live in. Most of the collections do not have excessive financial value in themselves, but the problem occurs in the complicated red tape connected with renewing any stolen or damaged material.

The solution to avoid robbery consists of putting an electronic tagging system on everything. This solution means the incorporation of magnetic strips or electronic circuits on the documents, with

the consequent complication and expense to the running of the library service.

## **Users**

Because it is an open-access building, some checking of the public is necessary. A library's activities, with users of all ages and types, must not be allowed to be disrupted by vandalism, excessive noise or anti-social behaviour.

## **Building**

Regulations covering access and fire-protection solve some aspects of user safety within any given building. Even so, it is not unusual to come across libraries that have not updated their security systems to current regulation standards, and others who have loosely interpreted these regulations without giving sufficient guarantees.

Tools available to the architect to improve security against theft and vandalism include the following:

- Single foyer:  
This limits the number of detection systems, and allows free traffic flow within the building as well as bringing the users' entrance and exit together in one space.
- Open diaphanous organization of the spaces.
- Strategic placement of the customer service counters:  
This makes it possible to monitor most of the library zones with the minimum of staff.

The word "freedom" is the first one that springs to users' minds when describing their perfect library. Freedom to move around, to read, to consult works - and all this when they want, as they want and for as long as they want.

They also want to feel protected from aggression and disturbance in the reading areas.

The spaces have to be fluid, they have to allow people to wander around and come across things by chance, but they must not become impersonal spaces where one feels lost.

These and many more things are achieved if the basic criteria above are followed – criteria which are occasionally contradictory and which obviously cannot all be brought together in the same library.

Security, flexibility, fluidity, privacy, high numbers of visitors, silence, closeness to the collections. The architect is being asked to square the circle. But the architect's criteria will help to prioritize the importance of certain concepts in each specific situation and case.

# PLACEMENT. CRITERIA FOR LOCATION

*Analysis of urban context*  
*Criteria for choice of location*  
*Site requirements*  
*Public libraries*  
*University libraries*  
*Conclusions*

There are three basic questions connected with building a library:

- What type of public will it have?
- What services will it offer?
- What is the best place to put it?

The library is a basic part of urban design, constituting a centre of attraction of major importance which should be situated and planned within the global concept of the city.

The choice of location is subject to complex conditions outside the architect's control. His function will be the realization and formal resolution of the location/user relationship.

The right choice of location will emphasize all the positive effects of the facility on the community, while the wrong one will severely limit its capacity as a service.

## ANALYSIS OF URBAN CONTEXT

The dialogue between the building and the city is critical, not only from the point of view of the creation of an urban architectural space, but also from that of the service that the library must give the citizens.

The first step is to analyse the following aspects:

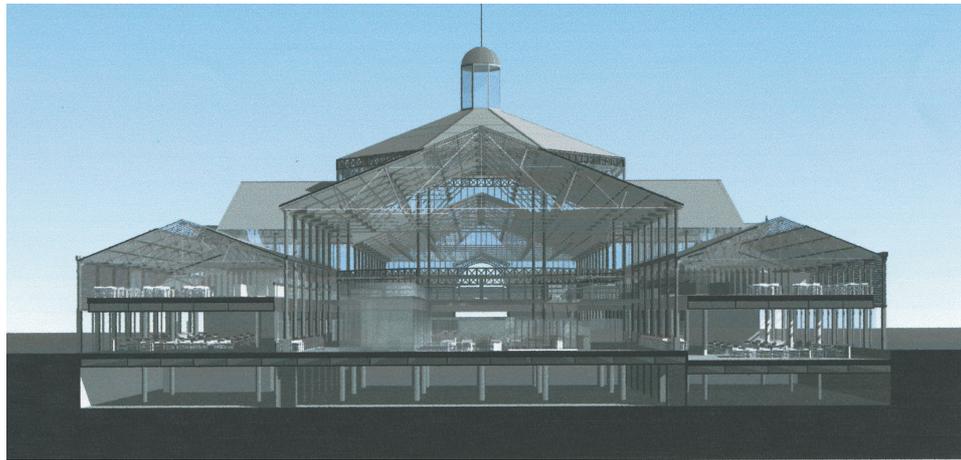
- Population:
  - The area the future library will serve.
  - Demographic importance.
  - Variables in city population: year-round, weekend, seasonal, etc.
  - Perspectives of growth: creation of new neighbourhoods, regeneration of existent areas, etc.



**08.01**  
 Murcia Regional  
 Library (Murcia).  
 Architect:  
 José M. Torres  
 Nadal.

## 08.02

*Born Public Library  
(Barcelona).  
Architects:  
Rafael de Cáceres  
and Enric Soria.*



*The location of the library is the result of an urban renewal programme for the area which includes other facilities.*

*Centrality: It is situated in the urban, political and cultural centre of the city.*

*Accessibility: public transport, fluid pedestrian system and parking.*

- Socio-professional structure, age pyramids and anticipated evolution.
- Mobility.
- Climate conditions.
- City location within its environment: a regional capital, a city in a metropolitan area, a satellite city, an isolated urban unit, etc.
- Urban morphology: concentric, corridor model, multi-nuclear, etc.
- Physical geography: pronounced orography, a city crossing various topographic levels, natural barriers (ravines, rivers, etc.), artificial barriers (motorways, railways etc.), and so on.
- Typology of buildings: historical quarters, rundown buildings, multi-storey or low density dwellings, etc.
- Land use systems: dormitory neighbourhood, large commercial and business areas, green spaces, roads/transport system, etc.
- Transport to and from the area.
- Transport organization: public transport, parking, private transport habits, journey time, etc.

- Location of main educational, social and cultural facilities.

## CRITERIA FOR CHOICE OF LOCATION

The frequency of use of an urban space is mainly connected to the number and variety of facilities, the urban configuration and the public transport system. Even so, many studies indicate that a library which is welcoming and has an extensive collection, long opening hours, competent staff and which is trying to meet the needs of the users will find a public which is willing to travel further than is actually convenient.

The location should be analysed according to the following criteria:

- Urban characteristics.
- Accessibility.
- Attractiveness.

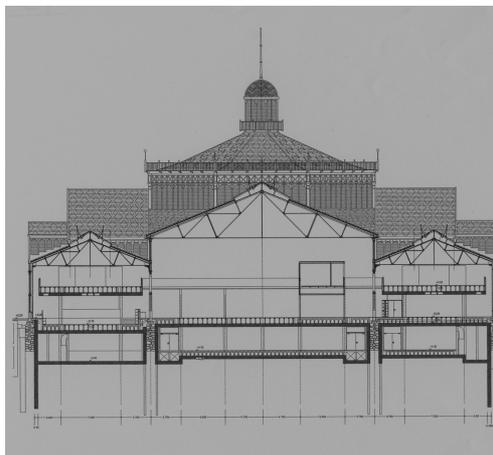
## Urban characteristics

- Unlike some cultural facilities, such as theatres or museums which are intended to be used only occasionally, the library has regular visitors. For this reason, in terms of functional urbanism, there is a clear connection between frequency of use and location within the city. (Fig. 08.02 and 08.03).
- Its coexistence with other community facilities automatically means a premium location. Even so, the decision to build a library can start off other, more generalized, policies:
  - Neighbourhood renewal.

## 08.03

*Born Public Library  
(Barcelona).*

*Cross section.*



- Urban nuclei without community facilities are activated.
- Regeneration of urban fabric.
- Integrated actions. (Fig. 08.04, 08.05 and 08.06).
- Distribution of the areas of interest within the city as a whole.
- Putting a library in an area which is very noisy, largely conditioned by major transport systems or with dense population traffic for reasons of necessity or convenience will need an architectural solution which focuses on the transition from the aggressive exterior spaces to a more inviting interior environment.
- When a shortage of land parcels means the library has to be placed in a building where other activities are carried out, the advantages and disadvantages of the coexistence of functions will have to be assessed. If it is a building with other facilities, in order to simplify its running, it might be more simple to arrange cooperation between the services rather than create multi-purpose spaces.
- Cultural centres.
- Educational areas.
- Areas with a large amount of housing.
- Commercial areas:
 

In the case of public libraries, a wide range of adult public sees proximity to commercial areas as a positive thing. In an area of high traffic, it is more likely that users from different social groups will be able to have access.

On the negative side, some people think that such a location would give too commercial an image to the product.
- Public transport:
 

The library must be easily accessible to people who make up its intended public. Depending to an extent on the type of library, particularly in large cities it needs to be near public transport.
- Private transport:
 

Private transport means a need for parking areas for cars, motorbikes and bicycles.

Provision of parking places in an urban centre creates enormous problems, both because of the amount of space needed and the cost it represents.

Including enough space for exterior parking affects the price of the site, and building underground parking pushes the cost of the building up considerably. For this reason, this should only be considered if the city does not have a satisfactory public transport system.

Locating the library in commercial or business areas with parking lots makes it possible to reserve some spaces and make the investment pay for itself.

Provision of parking places will also depend on the character of the library.

Neighbourhood libraries, mainly aimed at users from the area immediately surrounding the facility, do not have the same needs as a central or national library, which is aimed at all the inhabitants.

As a general rule, and apart from all the considerations mentioned above, it is a good idea to follow these provisions:

## Accessibility

- Proximity:
 

Many specialists claim that the time taken to walk to a library should not be more than 20 minutes, which translates into physical distance as a radius of between 700 and 1200 m. This value would need adjustment in each different case. The existence of physical barriers on the journey means shortening the radius. On the other hand, nearby public transport and car-parks will lengthen the library's radius of service.

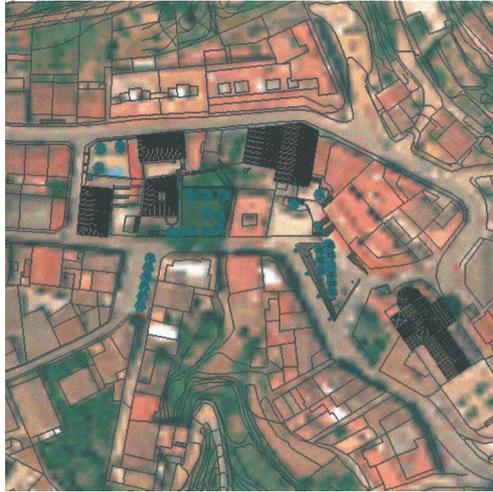
So, analysis of proximity in fact means looking at the way it is located in relation to the area where the everyday life of the various sectors of the public takes place:

  - Business areas:
 

In some surveys there is a positive response to the idea of using a library without having to change daily working habits. There is, however, the danger here of their use being limited to a public which is too narrowly defined when these areas are hardly connected to the city itself.

**08.04**  
Public Library  
(Torrelles de  
Llobregat,  
Barcelona).  
Architect:  
Jordi Navarro.

*The building of the library is the starting point for a major reorganisation of the urban centre.*



- ▶ Loading and unloading space varying in size depending on the type of library.
- ▶ Disabled parking, close to the entrance, whose dimensions are described in the relevant regulations.

### Attractiveness of location

Locating the library in a scenic area such as a large park or a green area which is not used much might not be a satisfactory solution. The choice must be made using a study of the relationship between the green zone, the library and the city.

### SITE REQUIREMENTS

The step following the location analysis for the library in an urban context is the choice of site.

The sites which are suitable for the requirements mentioned above must be put to a series of comparative studies. Therefore analysis using these new criteria is needed:

- Size and shape of the land.
- Nature of the ground.
- Legal questions.
- Orientation of the building.

**08.05**  
Public Library  
(Torrelles de  
Llobregat,  
Barcelona).

*Entrance.*

### Size and shape of the land

Size:

- It must easily accommodate the project, with a building with enough

space for the various services, which is protected from the negative effects of surrounding structures and with the necessary parking area.

- It is advisable to house the whole programme on one floor. Numerous floors makes the mobility of the public more difficult and needs more staff.
- Possible extension of the building must be considered. If the site is small, it must be ensured that regulations will allow the volume of the construction to be enlarged.

Shape:

- Square or rectangular sites which are wide and deep enough, plus land which is fairly flat allow for the maximization of the floor space.

### Nature of the ground

The existence of freatic proximity or poor-quality soil mean using very deep foundations.

A major increase in costs caused by complex foundation-laying makes it advisable to carry out a geotechnical study before taking any decisions.

### Legal questions

- Conditions of bulildability which allow the programme requirements to be fully developed.
- Approval of urban planning and site zoning.
- Verification of legal ownership and all legal obligations.

### Orientation of building

Natural light in the reading rooms creates a good atmosphere for the users and



helps save energy in air conditioning and artificial lighting.

However, the negative effects of excessive solar radiation cannot be ignored, so a study should be carried out to ensure that the building has all necessary protective systems in place.

## PUBLIC LIBRARIES

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The functions of a public library benefit mostly from location based on urban centrality. The popularity of the activities which are run parallel with reading is directly connected to the location. Without forgetting this basic requirement, the various public libraries' areas of service will influence the choice of specific location:

- Central library:  
These libraries have a direct influence on the whole community and an indirect one on the peripheral communities which they support. The best location would be the city centre, both from the question of urban centrality (commercial, cultural and educational activities and so on.), and the question of accessibility (transport, services etc.).
- Local and branch library:  
As tools of urban decentralization, their location is directly linked to the characteristics of the neighbourhoods and municipalities which they serve. (Fig. 08.07 and 08.08).

## UNIVERSITY LIBRARIES

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The university library is an essential facility for the university but also for the city, where it should give an accessible



impression to the citizens. Integration of the building into the urban fabric will help it to become a doorway to the university campus.

Before discussing the best location for the library some observations about the situation of the universities need to be made:

- The concept of the “university campus”, based on the American and British model, has not always been satisfactory. Distances to the city contribute to the breakdown of the student/city relationship.
- With the aim of breaking down these barriers, the trend is towards making the university part of everyday life, its location connected to urban centres. When lack of space forces the university into the outskirts, a transport system must be in place to serve it and connect it to the neighbouring areas or populations.

Library/University campus relationship:

- If the library is part of the group of university buildings, then its location will be defined by that of the group. It must be in the nerve centre of the university but at the same time be a peaceful space, with sufficient transition created between the exterior noise and the silence needed in the reading rooms.
- If it is to be an individual building, the location should be based on the accessibility for the university public. It will anyway have to be part of the traffic system which makes access from the city possible.

## CONCLUSIONS

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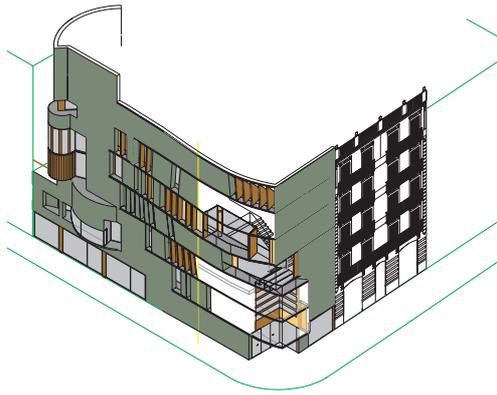
- Information about the options available makes it possible to carry out a comparative study in order to assess the advantages and disadvantages of each site. When no location is perfect, more in-depth studies of other possibilities is an option. With a basic programme of the necessary spaces, simulations can be carried out in order to see the various organizational possibilities and the cost of the operation. In this way, the definitive choice will

**08.06**  
*Public Library*  
*(Torrelles de*  
*Llobregat, Barcelona).*

*Roof terrace.*

**08.07**  
*Public Library in the Gracia neighbourhood (Barcelona).*  
 Architect: Josep Llinàs.

*The library is on a very small site, which means the programme has to be executed over a number of levels.*

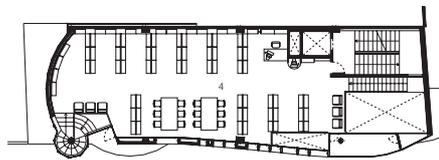


urban centrality, it would be appropriate for those institutions involved to make a major effort to prioritize this aspect.

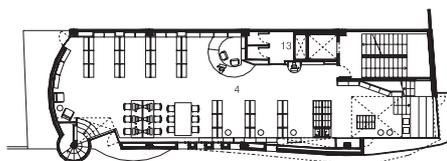
- Once all the alternatives have been considered, and only as a very general rule, it is recommended that centrality and accessibility take priority over size and shape of the site.

be made with all the operational incidents in mind.

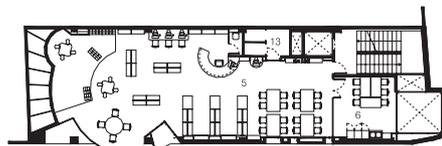
- Finding a site which perfectly incorporates all the positive aspects is usually very difficult, from the point of view of both land-price and the structure of the property. The uncontrolled urban growth we have seen over the last few years has meant that most of the land which urban planning intended for facilities does not fulfil these requirements. However, given the importance of



*Third Floor*



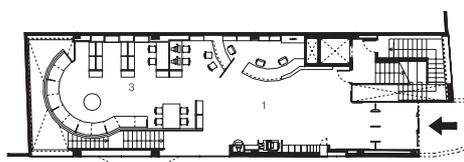
*Second Floor*



*First Floor*

**08.08**  
*Public Library in the Gracia neighbourhood (Barcelona).*

*The scarcity of urban land has been no obstacle to building a cultural facility for the neighbourhood.*



*Ground Floor*



# LIBRARIES IN HISTORIC BUILDINGS

*Intervention in heritage sites*  
*Advantages and disadvantages*  
*Typological considerations of buildings that*  
*can be converted*  
*Working methods*  
*Conclusions*

## INTERVENTION IN HERITAGE SITES

The classic idea of heritage refers to goods being bequeathed; things of value which a previous generation has preserved for future generations.

At the same time, there is an increasingly common tendency to attribute some added value to everything which in a specific context identifies a particular culture or place.

With architectural heritage, a culture has grown up oriented towards restoration and reuse, and public opinion generally agrees with the idea of recuperating it for social ends.

Reality presents some very different situations:

- Dealing with a heritage building:
  - Finding a function for it in order to maintain it.
  - Reusing it for a specific purpose.
- Dealing with the need for a facility:
  - Renovating an existing building.
  - Building a new one from scratch.

The library, by its nature as a cultural local service, becomes a central target for this conservation policy.

## ADVANTAGES AND DISADVANTAGES

Renovation of heritage sites has obvious advantages but is also surrounded by technical, functional, financial and sometimes aesthetic pitfalls. They all vary according to the nature of the building, and take on more or less importance depending on how you see the final result.



**09.01**  
 Sant Pau - Santa  
 Creu Library  
 (Barcelona).

## 09.02

Central Libray  
(Igalada,  
Barcelona).  
Architect:  
Pau Carbó.

*The floor surface area demanded by the "functional programme" meant an underground level had to be built, necessitating more money and more time for the operation.*



### Advantages

Generally speaking, the principal attractions or elements in favour of using a heritage building are:

- Location:  
Urban centres, areas where no land is available, areas where land prices are prohibitive and so on.
- Symbolic value:  
The historical prestige that the community gives the building.
- Architectural interest.

Correct rehabilitation of the building can also incorporate the following positive points:

- Recuperation of municipal identity.
- Preservation and maintenance of building heritage.
- Reassessment of the building by giving it a new use.
- Urban renewal:  
In some cases, it can be the first step in the renewal of the urban area in which it is located.
- Final cost:  
Depending on the state of the building and how much work needs to be done, the cost of the action can be less than building a new one from scratch.

### Disadvantages

The main obstacles to converting a heritage building to a library are caused by the following factors:

- Type of building:
  - Distribution of spaces:  
Fragmented layouts do not lend themselves to a rationalized organization of the service, and mean a considerable drop in the intended standards.

The other extreme is over-large spaces and a spatial concept which makes the requisite subdivision for the library programme very difficult.

- Different floor levels:  
These make flexibility more difficult and get in the way of complying with regulations concerning removal of physical barriers.
- Vertical communication areas:  
When the law states that the original staircase must be preserved, its location and size can have a negative effect on interior traffic flow.  
On the other hand, the new facility will require fire and access regulations to be fulfilled, which will include the installation of new staircases and lifts.
- Façades:  
Buildings with windowless façades or with very limited openings might make it difficult to incorporate all the necessary elements needed to create a good relationship between the interior and the exterior of the library.
- Types of building:
  - Resistant materials:  
In most cases, the structural overload that comes with the library necessitates reinforcing or replacing the basic structure.
  - Installations:  
Necessity of implementing all the installations.  
With air-conditioning, both the noise level and certain spaces such as the façade's materials and the type of roof can make the insulation of the building as well as estimates and locations of the units more problematic.

When a building is converted to a library, the negative aspects of the facility are usually connected with:

- Inflexible organization of the spaces.
- Difficulty of extendibility:  
The reorganization and extension needs presented by current library systems go against the inflexibility of most heritage buildings.
- Building identity:  
The character of some heritage buildings does not allow for conversion into a library facility, and sacrificing a

building in order for it to fulfil its new role is as ill-advised as forcing a library into the building's original shell.

- Complexity of the operation: Apart from the typical architectural difficulties of a library project, there are technical, spatial, financial and many other complications connected with the conversion of an existent building. (Fig. 09.02).
- Cost of the operation.

## TYOLOGICAL CONSIDERATIONS OF BUILDINGS THAT CAN BE CONVERTED

Some advantages and disadvantages of the most typical kinds can be considered:

### Single-family dwellings

- These buildings usually have limited floor space area, presenting fragmented spaces over two or three different levels.
- They could be suitable for specialized libraries with low numbers of visitors.
- Even so, they have problems of traffic flow, access and invigilation by the staff.

### Palaces and castles

- This kind of building is normally found in urban centres or outskirts, connected to parks, or in areas which the city will soon encroach on. This



### 09.03

*La Cooperativa Library (Malgrat de Mar, Barcelona). Architect: Josep M. Romani.*

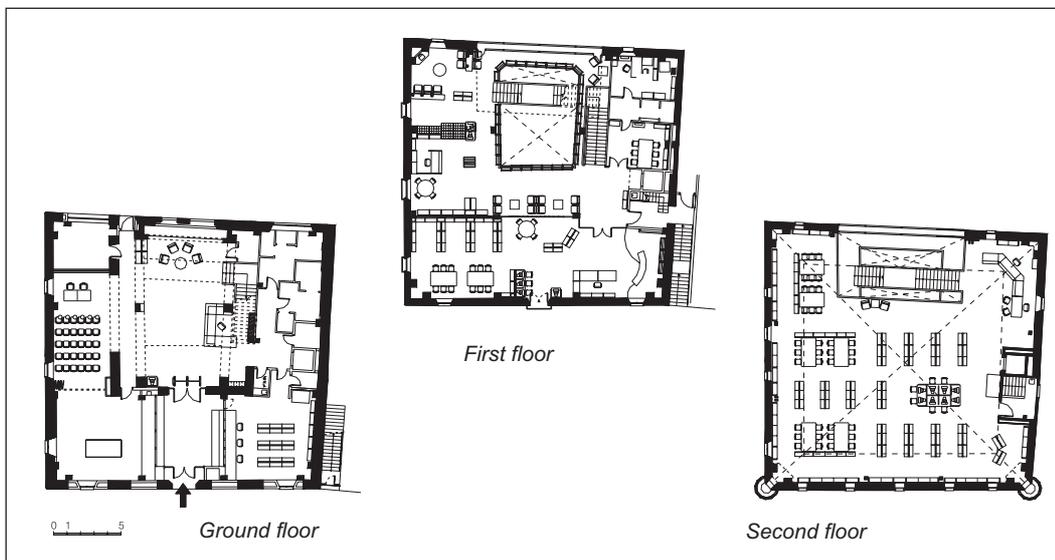
*Conserved façade.*

location could be especially ideal for particular types of library.

- Large interior spaces mean that designated areas of considerable size are possible for community use which at the same time offer a certain amount of flexibility of use. (Fig. 09.03, 09.04, 09.05, 09.06 and 09.07).

### School buildings, hospitals and convents

- In many cases these are found in urban areas and already have open spaces, cloisters, playgrounds and large courtyards and so on which



### 09.04

*La Cooperativa Library (Malgrat de Mar, Barcelona).*

*The building has only kept the façades and a few elements of the ground floor, which means the library programme could be organized freely.*

**09.05**  
*La Cooperativa  
 Library (Malgrat de  
 Mar, Barcelona).*



would make exterior activities more easy to mount.

- These are buildings of major dimensions with spaces of varying characteristics, many of which are easily adaptable to library use: archives, study rooms and so on.
- They have good natural light, and the regularity of their façade composition means more windows can be built in, to improve the interior/exterior relationship.
- The volume of space used by classrooms or dormitories depends on the type of layout and structural solution. Layouts using a central corridor with rooms off it on both sides mean large spaces can be freed up. On the other hand, a layout with a lateral corridor which is separated from the rooms by load-bearing walls offers only long spaces which are difficult to convert.

### Industrial buildings

Positives aspects:

- Building planned for the simultaneous use of many people.
- Large spaces on one level.
- Ceiling heights which make it possible to add floors.
- Structure meets the flexibility and resistance requirements of a library.

**09.06 and 09.07**  
*La Cooperativa  
 Library (Malgrat de  
 Mar, Barcelona).*



- Large openings in the walls and roofs to let in natural light.
- Technical installations which can be converted (goods lifts, air-conditioning and so on).

Disadvantages:

- Fire regulations state that the cast-iron pillars which are very common in such buildings have to be recoated, which results in the loss of one of their most attractive points.

### Markets and other nave-design buildings

Positive aspects:

- Central location in the urban context.
- Large spaces with no internal subdivisions.
- Ceiling heights which make it possible to add floors.
- Structure meets the flexibility and resistance requirements of a library.
- Good natural light, generally through the roof.

### Churches

Positive aspects:

- Central location in residential areas.
- Large spaces with no internal subdivisions.

Disadvantages:

- Lack of natural light.
- Disproportion of the designated spaces:

The huge heights of a church make air-conditioning/heating difficult, and do not lend themselves to the creation of areas suitable for concentration and study.



09.07

## WORKING METHODS

When the renovation of a heritage building for library use is considered, it is a good idea to analyse all the historic, architectural, technical and financial questions in order to assess the extent of the operation. This information will facilitate the choice of type of operation, with a general overview and careful financial consideration.

The diversity of different cases makes it difficult to determine a specific working method. However, any assessment of the overall problem should include the following phases:

- Definition of the objectives of the new facility.
- In-depth study of the building.
- Diagnosis.

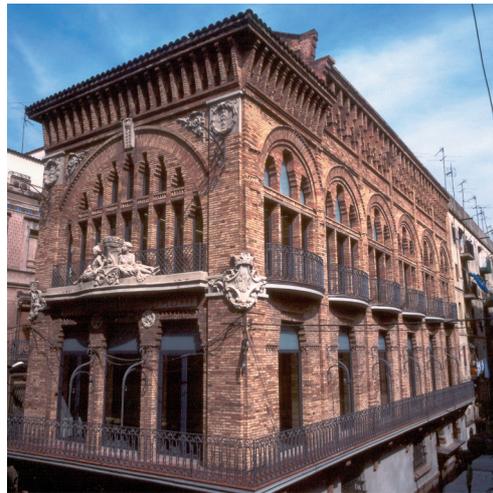
### Definition of objectives of the new facility

Producing a qualitative and quantitative library programme without considering the characteristics of the building which is to be converted.

### In-depth study of the building

A heritage building must be analysed from two different points of view: as historical document and as architectural object.

- Preliminary study:
  - Location of basic elements connected to access.

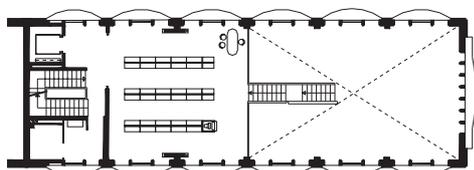


09.08

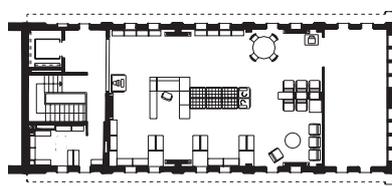
*Barceloneta – La Fraternitat Library (Barcelona).*

*Architects: Eugeni Boldú, Orlando Gonzalez, Josep M<sup>a</sup>. Rovira.*

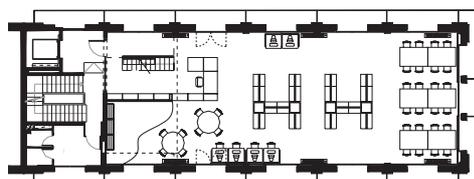
- General state of conservation and any major damage.
- Possibilities of adaptability to library programme.
- Analysis of legal questions connected with the building as a historical monument, and the regulations connected with the possibilities of adaptation (extension, addition of levels, installation of windows and so on).
- Historical and archaeological analysis:
  - Chronology of various construction phases.
  - Constructive logistics involved in each operation, whether for damage or adaptation to its new use.
  - Determining which elements to conserve.
- Physical exploration:
  - Architectural features:



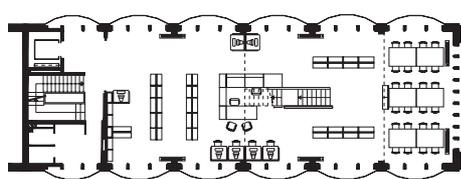
Second floor mezzanine



Third floor



First floor



Second floor

09.09

*Barceloneta – La Fraternitat Library (Barcelona).*

*The positive aspects of this construction are its location and the urban, architectural and social interest of the re-use of the building. The most obvious negative point is the need for the library to be set out over several levels.*

**09.10**  
*Barceloneta – La  
 Fraternitat Library  
 (Barcelona).*



- ▶ Surface areas available.
- ▶ Dimensions of the main spaces and their location on the various levels of the building.
- ▶ Height between floor/ceiling structures.
- ▶ Horizontal and vertical accessibility.
- ▶ Problems connected with the choice of installations necessary for the new use (light, air-conditioning, toilets, compliance with fire regulations and so on).
- Construction features:
  - ▶ Outer walls and roof.
  - ▶ Concrete, steel framework, load bearing walls and structural frame, calculating acceptable overload.
  - ▶ Infrastructures and installations.
  - ▶ Construction and finishing materials.

### Diagnosis

- Comparative study between the defined requirements of the new facility and the possibilities of adaptation of the building.
- Assessment of the complexity of different types of operation.
- Approximate cost of the operation.

### CONCLUSIONS

Conversion is advisable when the following factors coincide:

- Satisfactory location.
- Building type suitable for new use.
- Surface areas available to make the carrying out of the programme possible on few floors.
- Favourable diagnosis of the state of the building, the capacity for reconstruction and urban, architectural and social interest in the reuse of the building.
- Specialists on various disciplines.
- Suitable estimate.

However, occasionally unsuitable buildings are picked for conversion. This is generally for two reasons:

- Lack of available land space.
- Political or social policy. The local situation determines interest in heritage sites and the feasibility of the project. (Fig. 09.08, 09.09 and 09.10).

Generally speaking, the library world tends to focus more on problems connected with the use of the new facility rather than the systems needed to solve specific questions affecting the conservation and adaptation of the building.

There is also a dangerous preference for putting questions of historical conservation before the requirements connected with the organization of the designated spaces.

In this kind of operation, the same level of efficiency cannot be expected as in building from scratch. No matter how much a building is transformed, it can never have spaces of the optimum organization and size. It is not the building which has to adapt itself to the new functions, but rather the new functions which have to be compatible to the existent structure, for which the right solution will obviously have to be found.

Once the decision has been taken to convert a heritage building, the architect must have creative freedom, and the architectural and historical reasoning he uses to carry out the project will produce solutions ranging from imitation reconstruction to the use of the formal language of the time of the project, bringing in new elements to highlight the use and significance of the monument.

*The functional organigram*  
*Interior traffic flow*  
*Designated areas. The case of the Public Library*  
*Reception / Promotion lobby*  
*General area*  
*Children's area*  
*Non public / Internal work room*  
*Logistics areas*  
*Toilets*

The architect who does the project will find two equally valid but mutually exclusive typological options:

- Single-purpose design library with unique characteristics and personality.
- Library as multipurpose building, whose spaces have a structure, installations and communications which mean they can function as a library, or as anything else.

The first option might be too restrictive, without enough room for adaptation, flexibility or expansion. The second may seem poorer from a formal point of view, but functionally it obviously contains more possibilities for growth. This latter option – a cold, multi-function building – is also one way of avoiding an overload of determining factors, and the lack of specific formal designs can actually constitute the main design of the project.

Whatever the case may be, the idea is to plan spaces which encompass a rich variety of interactions in an environment where anybody and everybody can find a living space.

Architecture can adopt strategies using spatial layouts and environment solutions which promote specific attitudes and behaviour. In this way, everyday actions such as picking up a book, knowing and respecting the basic norms for use and encouraging freedom of choice can become natural and independent acts.

## **The functional programme**

In the chapter “Programming and Planning” we touched on the need to



**10.01**  
*Terrassa Central Library (Barcelona).*  
*Architect:*  
*Josep Llinàs.*

**10.02**

Correlation study preceding the finalization of a functional organigram. This shows the importance of the relationships between the various functions of a public library, following a grading system limited to four values. The size of the library and other orientations of the programme help with problem management. So, a strong relationship can be translated into the integration of two functions. On the same line, a repeated relationship between one service and a number of other services or spaces could result in a centralized location, an increase in the floor surface area or a multiplication of the service in question.

	Reception	Adult loans	Adult reference	Photocopying	Periodicals	Exhibitions	Children's loan	Library staff
Reception								
Adult loans	■							
Adult reference	○	■						
Photocopying		○	○					
Periodicals	○	■	○	○				
Exhibitions		■	●		●			
Children's loan	■	●	●	●	●	●		
Library staff	○	●	●		●	○	●	

Independent service

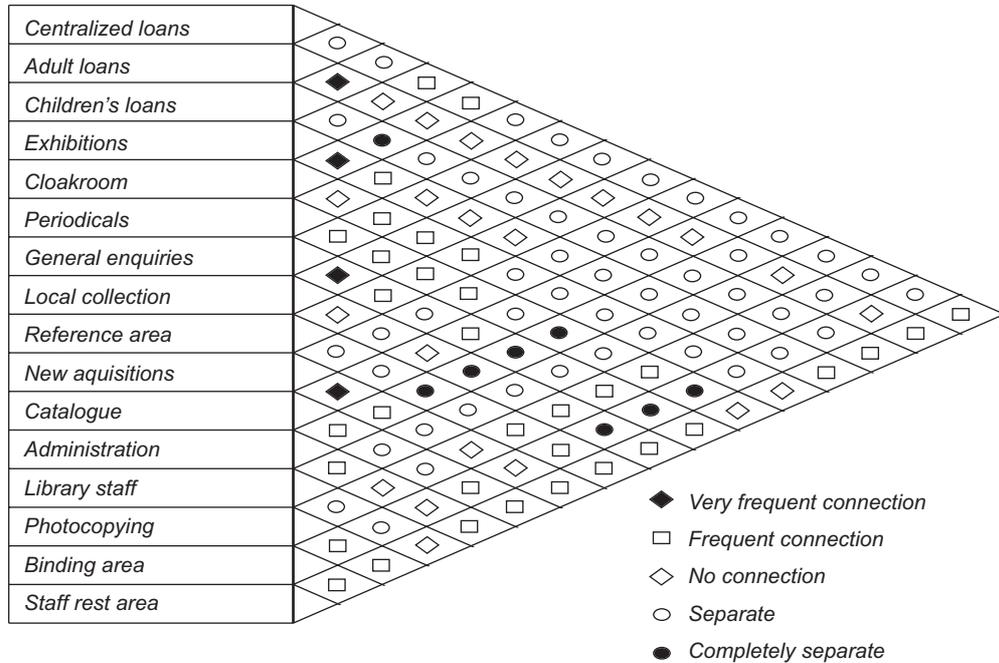
Frequent connection

Infrequent connection

Very frequent connection

**10.03**

Functional relationships between the different sections of a medium-sized central public library.



give the project architect a programme of requirements in which the objectives and demands connected to the project are set out clearly and concisely.

The structure of the programme can differ depending on the programming techniques, but the information given – based on a series of qualitative and quantitative data – will provide the architect with the necessary knowledge about the characteristics of each activity and the requirements which each space must meet.

One part of the programme of requirements is the “functional programme”, with data referring directly to the organization of the building; this can be divided into two parts:

- Written information about the type of user and the collection, the staff and the opening hours, the spaces and the services which should be available, the furnishings and the main construction and atmospheric requirements.
- “Functional organigram” as a graphic representation of the way the various sections inter-relate.

## **THE FUNCTIONAL ORGANIGRAM**

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As a transitional element between the functional programme and the actual spatial rendering, the organigram is the tool which gives the clearest expression of the relationship between the various activities. This graphic representation of what the library is aiming to be is an essential guide when taking on the project.

An organigram should not be confused with an architect’s drawing. It does not deal with the shape, or the size or the location of the different levels of the building. What it is, is information which completes the “functional programme”, and it is this programme which has to be rendered in architectural terms: floors, sections, volumes, installations, materials and so on.

The organigrams which follow, although they are graphically different, give the impression of being repetitions on the same theme. There is a reason for this: functional relationships in a library are based on logical unity, and cannot be

subject to major changes. However, there are many aspects which remain to be seen, such as secondary connections, spaces which can be joined together or ones that are of less importance.

In fact, simple observation of the wealth of library architecture shows that architects have never been shackled to the drawings which help them begin on their projects. (Tables 10.02, 10.03 and 10.04).

## **INTERIOR TRAFFIC FLOW**

---

The layout of the walkways is the key to the successful functioning of a library, which makes it the key to the whole architectural project.

With this in mind, the importance of a functional organigram is self-evident as an initial sketch of the interrelations which there need to be between the various activities.

Analysis of movement within the library indicates three types of foot-traffic circuit, all closely connected

- Public:  
Readers and people participating in activities.
- Staff.
- Documents:  
From their entrance into the library to the place where the user can consult them: acquisition, receipt, cataloguing, physical treatment and storage.

The three main “actors” in a library service: public, staff and documents, once in movement, create two types of circulation:

- “Internal” circulations:  
Foot traffic flow from the reading station the user is using, from the bookshelf the document is on and from the desk at which the staff works.
- “External” circulations:  
Connections between the various services of the building.

There are also some key elements of the programme, factors of different types, which the architect has no power of decision over, but which are determining

factors when it comes to the conception of the function plan.

These decisions, which refer to the way access to the collections is organized and how the public is received, can be expressed in the definition of these pre-existent conditions:

- The existence of spaces requiring use by clients during opening hours independent of the library service (conference room, study room, cafeteria and so on.).
- Loan section: central in the entrance to the library or well situated within each specific section.
- Anti-theft system: free-movement library or different types of control for each area.
- Incorporation of the municipality's other information services, to create an integrated concept of citizen information.
- Outside meeting and activity spaces connected to the library service. These would function best if they were placed somewhere that could be reached without passing through the anti-theft system. Otherwise, the user will have to check the book out every time he wants to go outside. Spaces which do not meet these conditions could become illogical places which the user cannot get out of, and will use only very occasionally and always depending on the specific library's management policy. (Fig. 10.05 and 10.06).

Some generic basic recommendations can be made for circulation within the library:

- User circulation must not interrupt, and must not be interrupted by, staff and document circulation.
- Fluidity of access to documents and information must be improved. This in no way goes against limiting access to certain services or collections.
- Users must be able to find their way around easily without asking for help.
- Safety must be guaranteed in all vertical and horizontal circulation, which must therefore comply with current regulations, be clearly signposted and have a security system in place.
- The walkways should be organized as a logical series of steps to be gone through to reach a particular service.

The public automatically creates a hierarchy of the designated spaces according to how far you have to go to reach them. It makes sense, then, to put the places with the highest levels of research knowledge, the most valuable books and documents, those places where silence for thought is critical, as far as possible from the noisy areas which give onto the street and bring people in. It must, however, be remembered that if this layout is applied with no flexibility it can stop readers' free circulation and give the impression that there are privileged users.

As always, the objectives of the library will determine the most appropriate foot traffic flow patterns, and the architect, along with the size and shape of the spaces, the finish and colour of the materials, the style of the architectural elements and a whole series of environment/atmosphere choices, will similarly influence the way the public feels towards the library.

## **DESIGNATED AREAS. THE CASE OF THE PUBLIC LIBRARY**

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This is a description of the designated spaces and services of a public library, which is more complex for the following reasons:

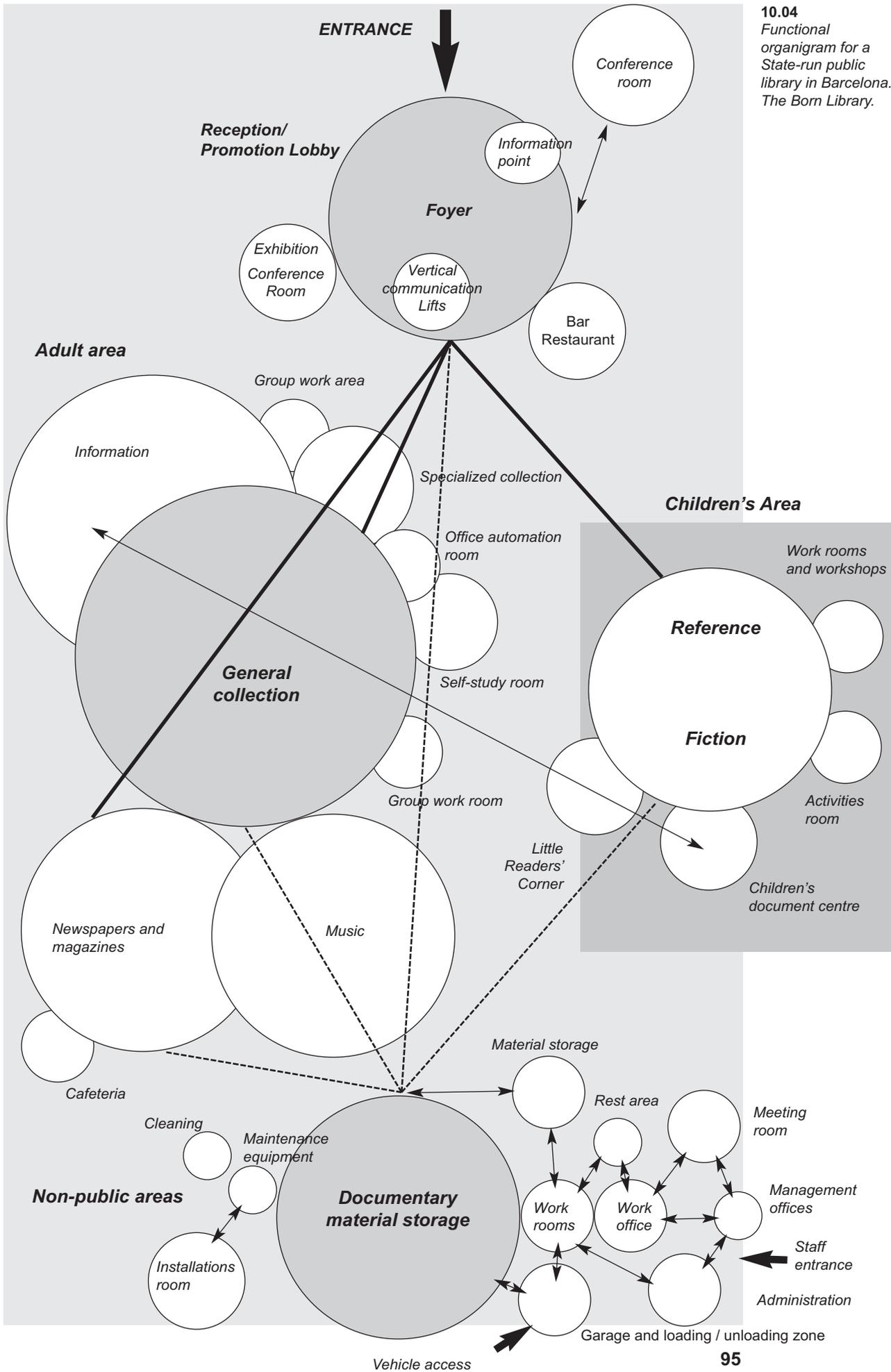
- It aims at a more diverse public, meaning anyone, of any cultural level.
- It has a greater variety of services.

### **Activity service areas in a public library**

In order for the services to function properly, the library structure should follow these functional zones:

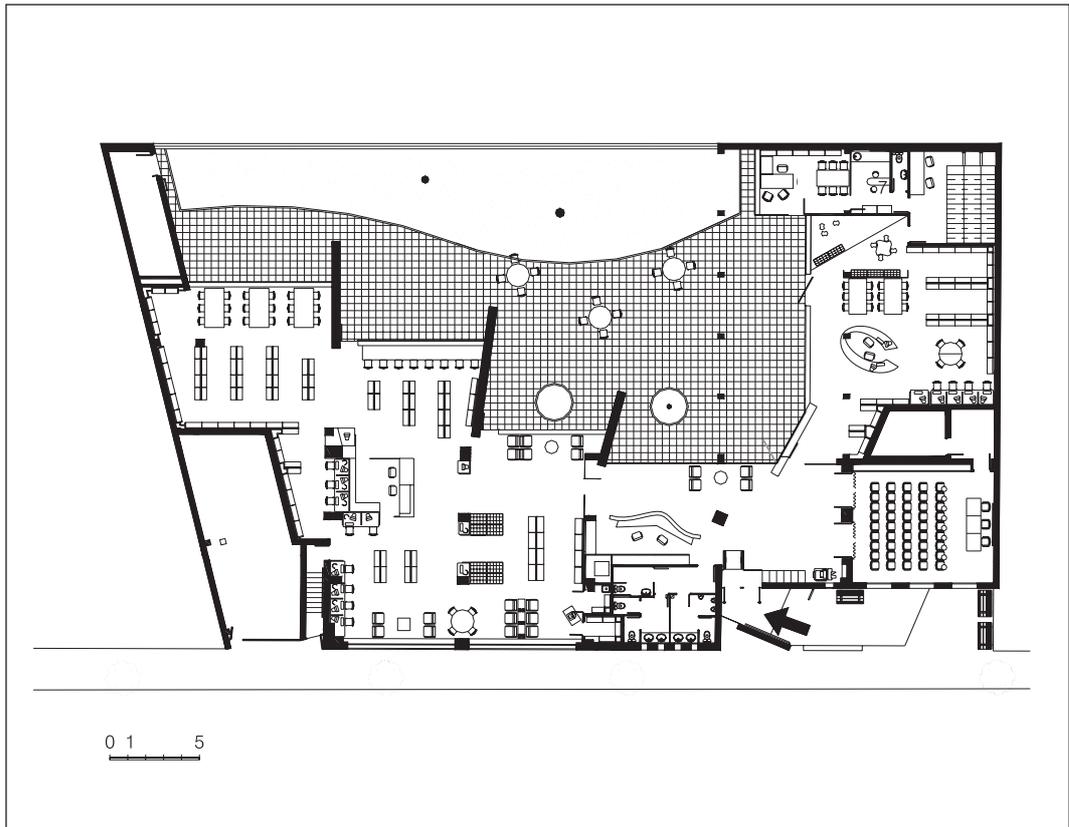
- Reception/Promotion lobby.
  - Entrance foyer.
  - Promotion and activity spaces.
- General area.
  - Information and reference area.
  - General collection area.
  - Specialized collections area.
  - Newspaper and magazine area.
  - Music and film area.
  - Support spaces.
- Children's area.

**10.04**  
 Functional  
 organigram for a  
 State-run public  
 library in Barcelona.  
 The Born Library.



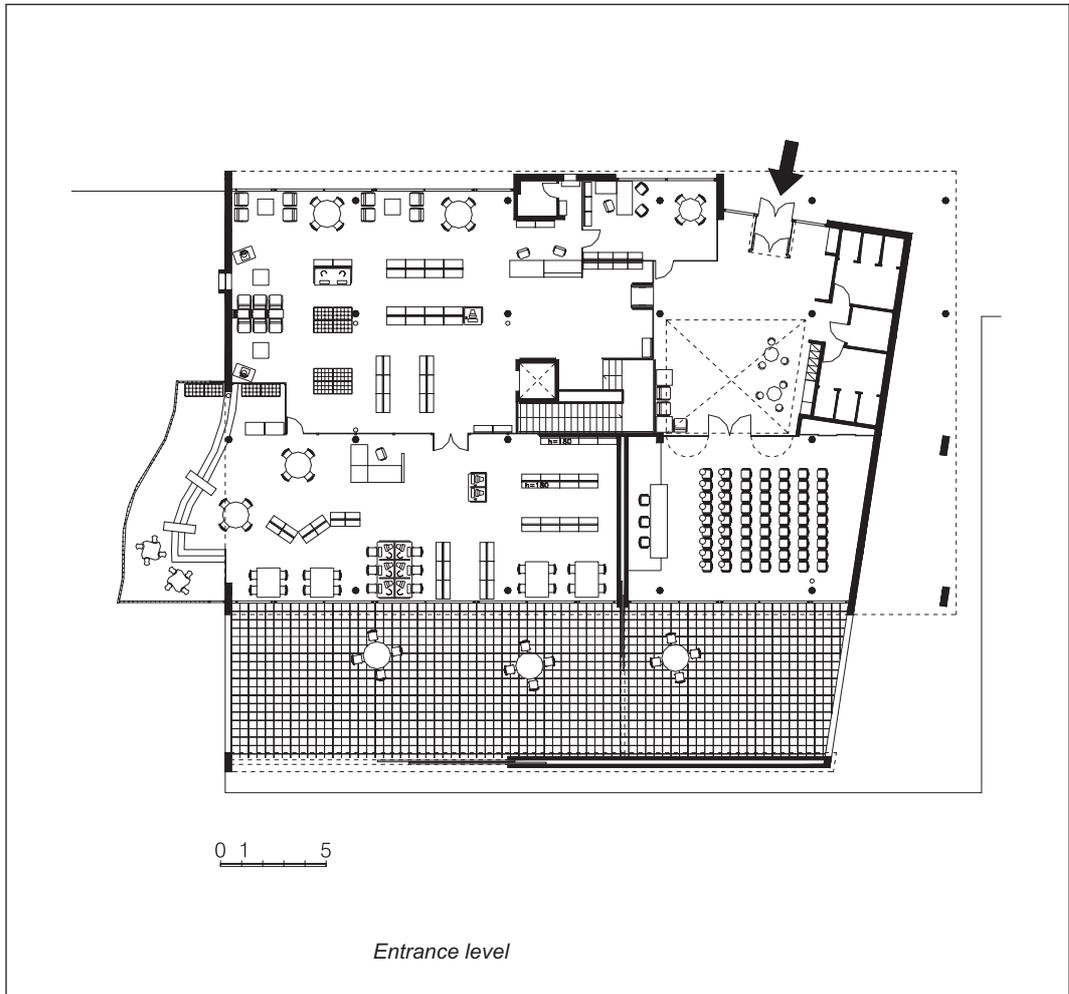
**10.05**  
 District 2 Public  
 Library (Terrassa,  
 Barcelona).  
 Architect:  
 Gemma-Rosa Badia.

Centralized lending  
 area. Free circulation  
 library. Outside area  
 belonging to the  
 library.



**10.06**  
 Public Library (Sant  
 Quirze de Vallès,  
 Barcelona).  
 Architects:  
 Cristóbal Ramirez  
 and Manuel Somoza.

Multi-use room and  
 exterior space with  
 possibility of  
 functioning independ-  
 ntly of the rest of the  
 library. Free  
 circulation library.



- Reference collection area.
- Fiction collections area.
- Little Readers Corner.
- Support spaces.
- Non public areas.
  - Internal working area.
  - Documentary material storage.
  - Staff rest area.
- Logistics areas.
  - Materials storage.
  - Cleaning staff rooms.
  - Installation rooms.
  - Parking and loading / unloading zone.

## **RECEPTION/PROMOTION LOBBY**

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Reception/Promotion lobby:

- Entrance foyer.
- Promotional and activity spaces.

## **ENTRANCE FOYER**

### **Floor space area**

Programme methods follow the general criterion of setting out the foyer according to anticipated daily foot traffic flow into the library.

The floor space can increase depending on the activities which the programmer chooses to include in the designated area. So, when the foyer includes a meeting area, the centralized lending area or any additional function, the required floor space area will result from the application of the ratios corresponding to each of the activities. However, it is hard to carry out a quantification, even based on percentages, of the meeting spaces, spaces belonging to the entrance foyer or to the traffic flow between the various sections.

The actual creation of the foyer depends as much on the dimensions set by the programmer as it does on the basic overall concept of the building, but fundamentally it is a layout thought out by the person or institution who estimate the dimensions needed for an activity for which there are no set rules or standards.

Basically, whether these interspatial relations and activities are possible or not becomes a question of allowing more

space and flexibility in the proposals, of knowing that the building planned is more than just its purely functional aspects and of giving the common spaces importance, making them places to *be*, rather than simply to walk through.

### **Functions connected to the entrance foyer**

- Entrance and exit.
- Cloakroom.
- Reception, directions and public information.
- New users registration.
- Exhibition of news and public information.
- Central document loan and return area.
- City Council information point.
- Users meeting and relaxation area.
- Photocopy area.

### **User characteristics**

- The main characteristic of activities in the foyer is that they are of a non-regularized kind. Figures indicate that 30% of the public use this space specifically to ask for information, find out about news or as a relaxation area.
- On the other hand, it has been shown that a large number of users who come into the library without any preconceived idea of what to do, stay in the foyer without using the other services or partaking in any more formal reading activity.

### **General characteristics of the space**

- The foyer must be a defined environmental unit, not simply a circulation area. (Fig. 10.07).
- As it is the user's first contact with the library, it must have a pleasant, comfortable feeling, which facilitates both negotiation of the library and access to the desired information.
- The desk must not become an instrument for checking up on people or an obstacle to access to the library services.
- The need for a dynamic image demands that the space can be easily

transformed, in order to constantly renew the users' interest.

### **Description of the functions and characteristics of each functional space**

#### **Entrance and exit**

- As the bridge between the road and the building, the foyer distributes the foot traffic flow to the various parts of the library, bringing together the noise zones and keeping them from the reading areas.
- Numerous entrances means more invigilation is needed, and thus more library staff.
- Access covers two types of foot traffic:
  - Access of general public during library opening hours.
  - Access to activities which require a separate timetable.
- Single access libraries must allow for autonomous functioning of those areas which require an independent timetable and which are connected directly to the foyer, such as the conference room, the toilets or any other area of activity which is specified in the functional programme. Therefore lighting and air-conditioning installations must be adapted for autonomous use.
- A separate entrance for children is another possibility. The objective of certain experiments in this area was to avoid the library looking to adults like a children's' space. These days, characterized by a much wider range of choice and added value in the integration of all types of public, makes it advisable that the foyer should be seen as a space where one can find information for everybody.

#### **Equipment:**

- Anti-theft system. Locating it at the exit facilitates free circulation around the building.
- Public telephones.
- Exterior book-drop, adequately protected, which means loaned books can be returned when the library is closed.

- Paved areas which act as a filter to keep the interior spaces cleaner.

#### **Characteristics of the space:**

- The location and architectural form must make it easy for the user to see how the spaces that it gives on to are distributed, as well as allowing the library staff full visibility of the area.
- As the library's show window, the foyer should offer:
  - Visual relationship between the interior and exterior of the building.
  - Visible access, and an inviting image. When the location allows, it is recommended that the exterior space have elements which increase the feeling of welcome. Benches and other urban furniture, the signs and information boards make the exterior a space connected to the library.
- Windproof or automatic doors are recommended to avoid draughts, escaping heat and noise.
- The main doors must offer adequate security when the library is closed as well as maximum ease and speed of use when large numbers of people are passing through them.

#### **Relationship to other spaces:**

- Direct relationship to sections it is connected to.
- Proximity to the reception area, the public information area, cloakroom, the new user registration and the loan area.
- Close to public parking. When the urban location makes it impossible to have car parking, attempts must be made to reserve a parking space for bicycles and motorbikes.

### **Cloakroom**

The options are a system manned by a member of the library staff or public-access lockers.

#### **Equipment:**

- A counter for the first option. Running is complicated by the need for personnel, and this can only be recommended for very large libraries.

- For the second option, coin-operated lockers of various sizes are needed, for the use of the readers themselves.  
The number of lockers recommended is 30% of the number of reading stations.  
These can be in the entrance foyer, or distributed around various points near designated activity areas.
- Umbrella stands. Should be placed at building entrance. (Fig. 10.08).

### Reception, directions and public information

#### Activities:

- Monitoring of users entering and leaving.
- New users registration.
- Information about how the library works and the cultural activities programme.
- City Council Information.  
More and more users are looking for information about subjects connected to the local area: local business, clubs and societies, sports and recreation, work, social services, training courses etc. This kind of information needs informative literature which also has to be available in libraries. The best management solution, then, is to run both services together.  
What is included in the information service goes beyond what could strictly be termed "library based" and must be part of a council policy.  
Another point to be considered is location within the library. The entrance foyer is suitable when the library does not wish it to interfere with services given in other areas. On the other hand, the close relationship there must be with the reading room and the general reference collections might make it advisable to offer the service from the information area in the general area.

#### Equipment:

- Reception counter with interior shelving, designed according to the number of activities.
- Computer terminals to access data banks.
- Boards for posters, advertisements and information.



10.07

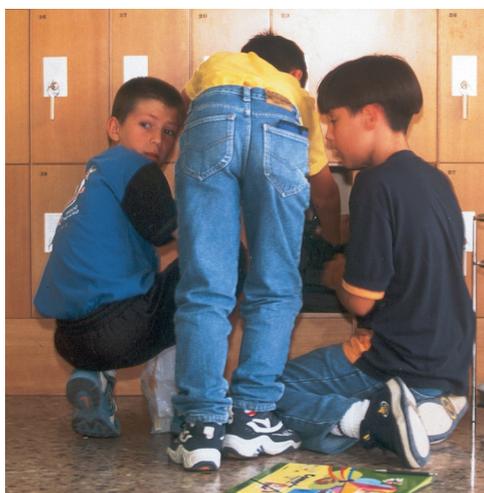
- Plan of library or directory board with the various sections numbered.

#### Characteristics of the space:

- Easily identifiable.  
Good lighting and signage will attract the users to the area.  
The boards must have individual and directional lighting.
- The information service, as it is continually growing, should be given ample space.
- The location must not interfere with foot traffic in and out, and should allow for groups of people gathering without causing an obstacle to access to the rest of the activities.
- It should be possible to change the layout. The space should allow for different configurations of the notice boards.

#### Relation with other spaces:

- Direct connection with the entrance and the news reference area.



10.08

## News reference

### Activities:

- News notice boards, official publications and other information of public interest.
- Distribution of informative material.
- It can have a meeting place as well as an exhibition and newspaper/magazine reading section.

### Equipment:

- Display furniture of various designs, depending on needs.
- Tables, chairs and armchairs.

### Characteristics of the space:

- Possibility of varying the organization of the furniture.
- Lighting which makes a clear difference between display areas and those for meeting or reading. The latter two need a different, warmer atmosphere.
- The activities done here mean that this area can become the natural transition zone between the noisy zones which open onto the street and the quieter interior areas.

## Centralized loan area

The centralization of loans in the foyer is advisable for two reasons:

- The public can circulate freely around all the zones without having to check books out in each section.
- The library staff can carry out the essential work of informing and helping the reader, leaving the more mechanical work of book-lending to the auxiliary staff.

### Activities:

- Recording of loans and returns.
- Temporary deposit of returned material, to be returned to the shelves later.

### Equipment:

- Loan counter spacious enough for the demagnetizer and computers to be installed and to guarantee a comfortable working space for the staff.
- Shelves and book carts for the temporary deposit of returned material.

- Automatic self-service systems. This option is advisable for larger libraries with a significant volume of loans.

### Characteristics of the space:

- Easily identifiable.
- A location which allows groups to gather, with the counter set out in a way that allows there to be several queues if necessary during the "rush hours".
- When the size of the foyer means that the centralized loan system has to be joined to the information area, the counter must have enough space for both activities to be carried out.

### Relationship with other spaces:

- Proximity to the entrance.
- Communication with internal working areas and the loan collection areas.
- In larger libraries, there must be some form of automated connection to the distribution centre.

## Users meeting and relaxation area

This activity, as a self-contained area, is determined in the functional programme by the size of the library and other aspects mainly connected to the planning.

### Equipment:

- Tables and chairs, armchairs and other furnishings which create different interactive spaces.
- Drinks machines.
- Possibility of installing a café. This option would need separate management for the service, plus a study on the location dependent on the expected opening hours. If the café has an entrance from the street and another from the library, questions of security will have to be properly dealt with.
- Public telephones.

### Relationship with other spaces:

- Direct connection to the foyer, and at some distance from the reading sections.

## Photocopy service

Self service systems are recommended,

with coin or credit-card operated machines.

Equipment:

- Photocopiers.
- Place for paper and other materials.
- Binding area, depending on type of library.

Characteristics of the space:

- If the use is limited, it could be placed in the entrance area.
- If it will be used a great deal, it would be preferable to have an enclosed area within the foyer itself.
- The noise produced means it should be soundproofed if it is close to reading areas.

## PROMOTION AND ACTIVITY SPACES

Cultural promotion and activities are central to a public library, and are presented as a group of varied, integrated activities in a group project within the community.

These functions, as a complement to the information, documentation and reading service, have two objectives:

- To encourage meeting and dialogue between the members of the community.
- To bring books closer to cultural activities and to the least interested users, stimulating their interests and developing critical sense and creativity.

### Activities

The functional programme must specify the floor space and the activities, which can generally be divided into three levels:

- Basic activities:  
Open days, presentations of collections, etc.
- Activities organized by the library itself:  
Debates, conferences, reading clubs, etc.
- Socio-educative activities organized with the community:  
Exhibitions, meetings of professional societies, permanent training courses, acts connected with other organizations, etc.

## Floor space area

The size of the spaces will depend on the objectives set, rather than directly related to the size of the library.

Alternating different functions during the day should be considered.

## General characteristics of the space

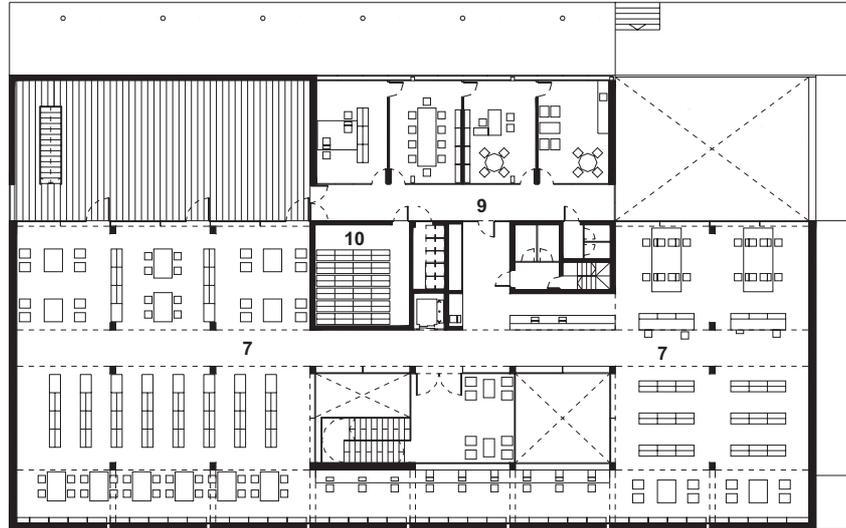
- Direct access from the foyer, and totally separate from the reading areas.
- It must offer its own suitable timetable (as flexible as possible) and independent of the library's timetable.  
This fact must make possible the division of the room as it is from the foyer access, the relaxation area and the toilets.
- The versatility of the space and furniture must allow for specific adaptation to each of the hypothetical uses.
- It is a good idea to have a small storage area or lockable cupboard to keep materials; seats, benches, notice boards, audiovisual equipment and other items connected with the activities being carried out.
- The possibility of connecting the multipurpose space to the foyer by means of sliding doors should also be considered, especially when the foyer is small, as it means the space can be maximized when there are no activities on.
- When it is a large room, it should be able to be separated into various soundproofed areas so that more than one activity can be done at the same time. (Fig. 10.09).

Although a flexible space can cover a number of cultural promotion and development activities, there is occasionally a need to separate them into three types, each of which tends to prioritize a particular type of function:

- Multipurpose room.
- Conference room.
- Group work room.

### Multipurpose room

Activities:

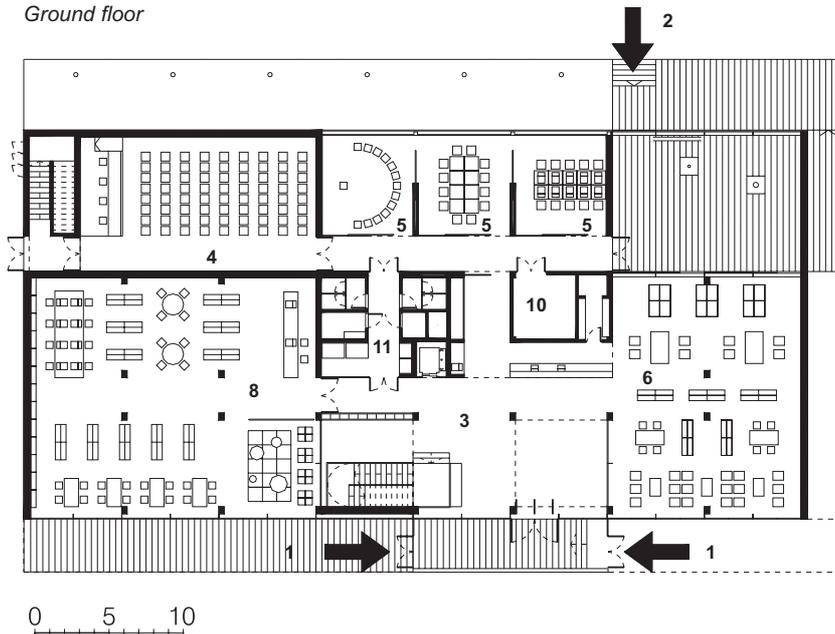


First floor



1. Entrance to the library
2. Optional entrance to multipurpose spaces
3. Foyer
4. Conference room
5. Multipurpose room
6. Magazines and music
7. General area
8. Children's area
9. Non-public / Internal working area
10. Storage
11. Toilets

Ground floor



**10.09**  
Public Library  
(Vilanova i la Geltrú,  
Barcelona)  
Architects:  
Josep Benedito,  
Santi Orteu,  
Glòria Pifarré.

This library has excellent distribution in terms of the availability of multi-use spaces with completely independent entrances, making it possible to have a wide range of activities during the day.

- Conferences and debates, projections, small presentations, exhibitions, etc.

#### Equipment:

- Stackable chairs.
- Table for attendees.
- Projection screen.
- Audiovisual equipment.
- Picture rails on walls and ceiling to mount exhibitions.

#### Characteristics of the space:

- Minimum capacity of 40 people.
- Possibility of blocking natural light and darkening room.
- Flexible and directional lighting, adapted for conferences, meetings and exhibitions.
- Acoustic treatment adapted to each activity.

### Conference room

#### Activities:

- Concerts, theatrical shows, congresses etc.

#### Equipment:

- Stage with storage and dressing rooms.
- Table for attendees.
- Seats.
- Stage curtain.
- Projection room.
- Simultaneous translation booths.
- Audiovisual equipment designed by specialist staff depending on the anticipated activities, with independent control centre.

#### Characteristics of the space:

- If a particular room is given over to these activities it is because the library already has multipurpose spaces for other uses. Therefore, flexibility is not an essential. Even so, moveable rows or tiers of seats can be used so that the whole space can be freed up if needs be.
- Suitability, depending on size, for the inclusion of an independent entrance hall, with the corresponding cloakroom service.
- Special lighting focused on the stage and lower lighting with dimmer controls.
- Specific acoustic treatment.

### Group work rooms

#### Activities:

- Group work or meetings around a table, seminars and training courses, study room, etc.  
The use of this space as a study room outside library hours turns it into one of the services with most added value, as far as local students are concerned.

#### Equipment:

- Modular tables for meetings and group work sessions.
- Chairs with attached tablet.
- Moveable screen for projections.

#### Characteristics of the space:

- Possibility of compartmentalizing or unifying a group of spaces.
- Possibility of an independent timetable, but at the same time connected to the library to make it easier to get access to the documents which might be used for particular activities.
- Uniform lighting across the whole space.

## GENERAL AREA

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This large zone, which takes up about 50% of the total floor space, will include the following areas:

- Information and reference area.
- General collection area.
- Specialized collections area.
- Newspaper and magazine area.
- Music and film area.
- Support spaces.

### General characteristics of the space

- Feeling of spaciousness.
- Visual relationship with the outside.
- Structural solution favouring flexible distribution, keeping away from fixed zones.
- Visual and functional unity:
  - Location of activities depending on the logical sequence of use.
  - Visual interrelation between the various environments.
- Geometry and height of the spaces, finishes and furniture distribution as tools to signal the different areas.

- Strategic location of the catalogue reference points and the information desks. Where they are placed will influence the foot traffic around the different environments. They should be placed near the entrance. They should also be visible and accessible from the rest of the spaces. As well as that, the catalogue reference points must be close to the desks to make it easier for the library staff to help and monitor.
- Depending on the size of the library, the various services offered in the general zone could be grouped together at one desk, which would also maximize efficiency in the library staff's tasks. (Fig. 10.10).
- Enough natural light with filter systems which help avoid direct sunlight.
- Adequate artificial light, with flexible distribution which allows the furniture to be moved, and can create contrast between the various environments within the same functional unit.
- Space insulated from street noise and

also sufficiently insulated against interior noise.

## INFORMATION AND REFERENCE AREA

The current tendency to turn the public library into the main information resource for the community has resulted in the growth of this section, which is seen as an exclusive *in situ* reference space for material which is not available for loan. The document collection, exhibited in any format, is made up of works for consultation and reference: dictionaries, directories, year books, encyclopaedias and telematics reference.

Activities:

- Document research.
- Systematic document consultation.
- Individual study, with possible use of computer equipment. (Fig. 10.11).

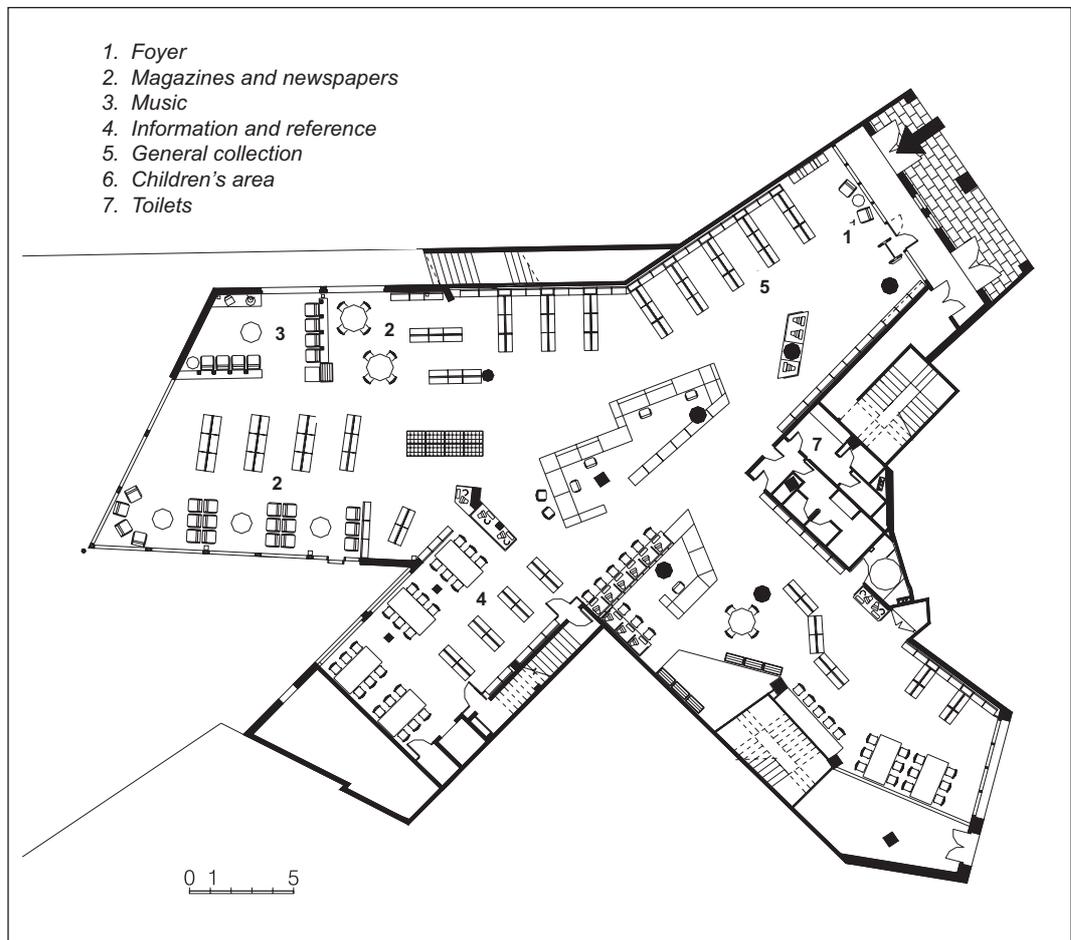
Characteristics of the users:

In most cases, the user of this section

### 10.10

*Dos Rius Public Library (Torelló, Barcelona)*  
Architect:  
Melcior Manubens.

*The geometric shape of the layout is the result of adding together various spaces belonging to different buildings. The general area can be divided into separate areas, with centralized administration from a single customer service counter.*



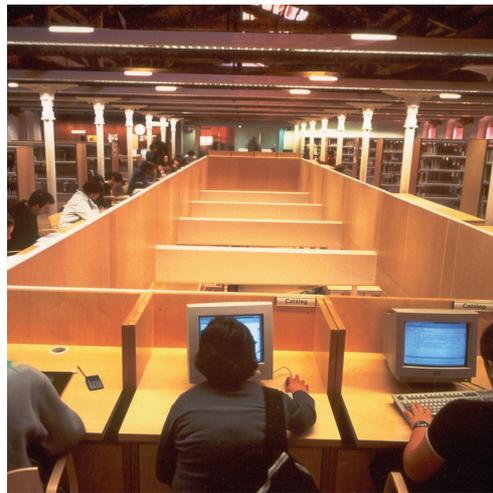
comes into the library to look for a document or some specific information. Their needs are different from those who come out of curiosity or to see what news is up.

#### Equipment:

- Easy-access shelving for all documents, whether in paper copy or any other medium.  
The nature of the subject matter on the shelves means that consultation is done standing up, taking more time. Therefore, the capacity of the shelves should be less than it is for the general collection and its organization should ensure that large groups do not gather at one point.
- Display cases, drawers and other furniture for special format documents, such as atlases, maps and plans.
- Work tables and chairs for the users, with the necessary computer connections. (Fig. 10.12).  
Unlike what happens in the children's zone, adult readers go to the library to work, preferably, alone and do not want the interference caused by too much proximity to strangers. This is why it is a good idea to have a connected range of possible work stations.  
The usual tendency of having a series of four to six-person tables in one area must be changed to a more varied range of possibilities including individual booths or long tables more suited to individual working.
- Informal reference areas with comfortable chairs and smaller tables.
- Reference areas, both seated and standing, to suit any need: computer catalogue, Internet, CD-roms, data bases and other information systems. (Fig. 10.13).
- Public information desk with different areas for personalized service.
- Specialist subject area help points throughout the section.

#### Characteristics of the space:

- Organization of the furniture in separate areas.  
In the overall area, the shelving, the tables and informal reading there must be subspaces of a suitable size. (Fig. 10.14).  
The subspaces created must be



10.11

open, so they can be invigilated and circulation is easy through all the areas of the room.

In the work stations, it is important not to get away from the classroom image, which comes from having a systematic distribution of one single model of table.

With the sequence of use of this area, it is advisable to put the individual work stations in the quieter areas which are more insulated from the foot traffic zones.

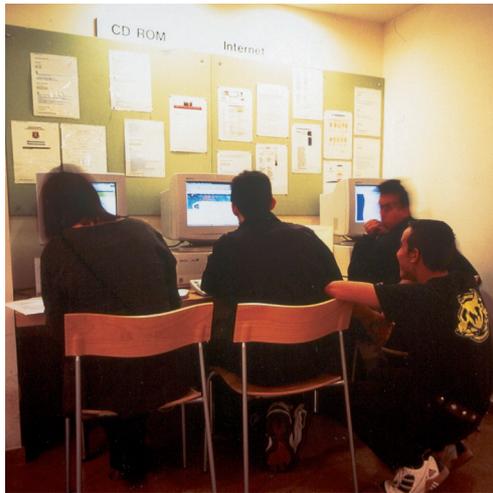
- Internet reference points should be placed near the customer service desk. The user might need the staff's help, and it is also useful to monitor the kind of information being consulted. Also, when it comes to printing the material out, it is better that the printers are not within reach of the public.

#### Relationship to other spaces:

- Connected to general collection section.



10.12



10.13

- Connected to the specialist collection section.
- If the library is very large, there can be independent access from the foyer.

### GENERAL COLLECTION AREA

This is the largest functional unit in the library, occupying around 35% of the total floor space, and needing the highest number of staff to run it.

It contains the loan collection and should be seen as an exhibition and quick and easy reference space.

It offers lending and reference services.

The collection consists of the general subject collection which is mainly novels, literature and general knowledge. These can be on any format and are usually

organized into blocks by subject to make it easier to find them. (Fig. 10.15).

#### Equipment:

- Shelving made to take documents of different sizes.  
Shelf layout must allow room to move around comfortably, with enough distance between them to facilitate reference done standing up without getting in the way of other users. Unlike the reference sections, the general subject collection produces faster consultations: the reader takes the book, looks through it and decides whether to borrow it or look at it at a fixed reading station.

This being the case, the shelves can be higher and have a larger capacity, as this is the section with the most documents per square metre of the whole library.

Even so, they do not go above 2.10 m so that all the material on the shelves is visible and within reach.

- Informal reference areas with chairs and armchairs, within the general space. (Fig. 10.16 and 10.17).
- Computer-based catalogue reference points.
- Information desk.

Depending on the library's size, other customer assistance points can be set up to avoid congestion at the front desk.

Although the centralized loan service is in the foyer, it is a good idea to have the means to complete the lending process at the counter.

#### Characteristics of the space:

- A regular layout helps the user's research.
- Separate environments should be created within the shelving area. Repetitive organization can give an over-academic feeling which is not inviting.
- The width of the aisles must be in keeping with the anticipated foot traffic flow.

#### Relationship to other spaces:

- Direct connection to the foyer.
- Connection to the information and reference section.

In small and medium sized libraries, the general collection section might be set up as a kind of hinge between



10.14



10.15

the foyer and the information section, with furniture that differentiates the zones.

- Access from the magazines and music sections.

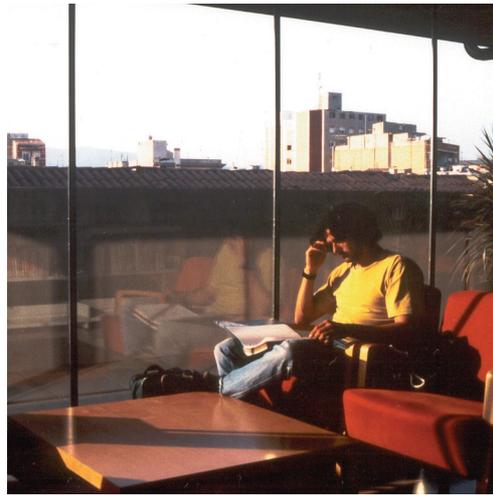
### SPECIALIZED COLLECTIONS AREA

This section is for the following documentation:

- Local collection:  
Information connected to the local area and its history.
- Special collections:  
Documents which, because of the specifics of the population, make up a subject collection which has grown within one particular library, and which demands special attention.

The services offered will be information, reference and loan.

Due to the specific nature of the collection, it might be on any



10.15 and 10.16

shelving/display system or in any format (maps, posters, pamphlets, etc.).

Equipment:

- Shelving and display cases made to keep documents of different formats. Delicate material or material of a specific heritage value will be in lockable cases, cannot be lent and needs to be requested directly from the staff to be consulted.
- Chairs, work tables and technical equipment needed to make reference of any medium / format possible.
- Computer-based catalogue reference points.
- Customer service desk with equipment needed to complete loan process.

Characteristics of the space:

- If the size of the collection makes it necessary, it should be organized as a separate area, with a similar treatment to the one for the information and reference section.



10.17

- If the collection is less grand, it can be incorporated into the information and reference section, with furniture distributed to create a different space.

Relationship to other spaces:

- Connected to information section and general collection section.
- Connected to the group work rooms.

## NEWSPAPER AND MAGAZINE AREA

10.18 In a public library, the periodicals collection is made up of:

- Daily press.
- Magazines:  
The content of the magazines can be general interest or specialized in various fields of knowledge.  
In many cases, specialist magazines are put in the corresponding thematic sections, whether it be the information and reference section or the general collection section.

It offers the services of reference and loan. (Fig. 10.18).

Equipment:

- Shelving made to accommodate different formats.  
The need for past issues to be available means that shelving with built-in storage should be used. These installations make it easy for the user to find the documents without having to ask library staff. (Fig. 10.19 and 10.20).
- Special racks for the daily press and other material of particular dimensions.

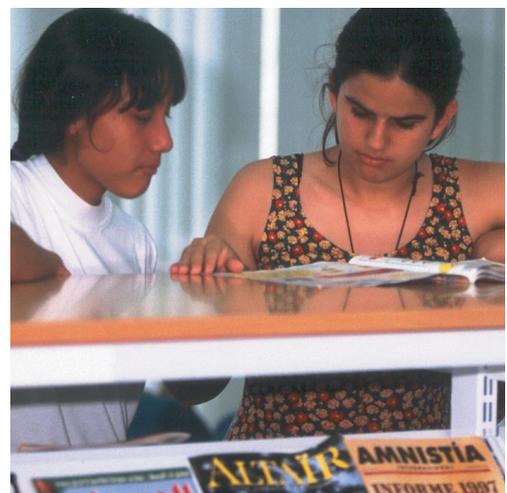
- 10.19
- Informal reference areas with comfortable chairs and smaller tables.
  - Tables and chairs for reading.  
Although this is basically an informal area, many users, generally the older ones, prefer to read a paper sitting in a chair, leaning on a table. (Fig. 10.21).
  - In libraries where all the publications are together in one place, work tables with computer connections must be included as well as the technical means of accessing electronic magazines.
  - Computer-based catalogue reference points.



- Customer service desk with equipment needed to complete loan process.

Characteristics of the space:

- In order to function smoothly, it should be organized into two distinct areas:
  - General interest press, as an informal reading space.
  - Specialized press, organized by subject, with furniture which facilitates reference and work.
- The type of collection means that the space is particularly attractive for the general public. This is why the area must have the most inviting atmosphere of the library.  
Despite the requirements being similar to those for the general collection, it should be organized along more informal lines, with a freer layout of the elements.  
The finishes, the colours and the lighting must contribute to a homely rather than academic atmosphere, a





peaceful relaxed image which makes you want to come in.

- The convenience of placing it next to the foyer makes the area a cornerstone for the whole project. For this reason, planning of the space must include the following possibilities:
  - Structuring the magazine section as a bridge area between the street noise and the interior silence of the reading zones.
  - Openings to the outside which create a clear interior/exterior relationship. (Fig. 10.22).
  - Direct connection to an exterior area to enlarge the space, and where activities can be held.

Relationship to other spaces:

- Direct connection to the foyer. When the programme demands that this functions independently from the rest of the facility, it will have to be joined to the users' relaxation area and the cafeteria.



- Connection to the general collection section.
- Joined to a small storage area for past issues. This requirement depends on the size of the collection, and to the existence of shelving with built-in storage.

## MUSIC AND FILM AREA

This section holds the musical and cinematographic section.

The document collection, exhibited in various formats, is made up of compact discs, films and documents in the form of books, sheet music and magazines. The services offered are reference (sound, vision, reading) and loan. (Fig. 10.23).

10.20

Characteristics of the users:

- The material on show makes this space one of the most attractive for users:
  - For a large section of the young, the music section is their main contact with the library.
  - The section is also attractive to older users, but the large number of young people often means that they do not use the service as they do not feel they fit in.

Equipment:

- Display systems sufficient for the different media that make up the collection. (Fig. 10.24).
- Furniture elements with adequate technology to consult the audiovisual material.
  - Audio: In some cases the playback systems are behind the information desk and are controlled by the staff. Users who want to hear a document in an audio medium must ask for it at the counter, where they will be given headphones and shown the audio channel to use. (Fig. 10.25).
  - Visual: In this case, the headphone sockets must be connected to a screen.
  - Audio-visual self reference points: More and more, libraries have sound and image reproduction

10.21



10.22



10.23



10.24



10.25

systems which are controlled by the users themselves. This possibility frees the library staff from a very time-consuming task. At the same time, the users feel more freedom in their choice of whether to check a document out.

- Armchairs, chairs and tables for different types of reference:
  - Audiovisual:
    - The armchairs should be part of the audio and video posts areas.
  - Reading:
    - Chairs and working tables.
    - Informal environment, with armchairs and smaller tables.
- Computer-based catalogue reference points.
- Customer service desk with audio visual equipment and means to complete loan process.

Characteristics of the space:

- The design and distribution of the furniture must take into account the characteristics of the different media, and their use.
  - The space between the material displays must allow for groups of people. The small format of the medium means that the capacity of the shelving is very high. Also, the appeal of the material means large numbers of users.
- The type of activity calls for an informal and inviting space.
  - As has been mentioned in other chapters, one of the challenges posed by a public library consists in each user finding his space. This section is particularly susceptible to the possibility of being invaded by one type of public and completely ignored by another. This is why the size and atmospheric solution must offer different environments for all the users.
- Furthermore, many of the music and film section's activities can be given over to a communications network connecting the counter to the listening/viewing points.
  - A large number of connections will make it possible to vary the layout of the furniture.
- Lighting: the act of listening to music and watching a film is more pleasant with indirect, low lighting.
  - Despite the advantages of uniform

lighting across all the areas, this zone should have some kind of lighting system which creates more intimacy.

Relationship to other spaces:

- Direct contact must be established with the newspaper and magazine area and with the general collection area.

## SUPPORT SPACES

These working spaces, of different sizes, are complementary to the general area and are a considered response to the permanent cultural training programmes.

Support spaces connected to the general area:

- Self-study room.  
This must have appropriate furniture for individual study.
- Office automation room.  
This should be conceived as a simply laid-out space, depending on the use set out in the functional programme.

Other support spaces:

- Group work room.  
Connected to the information area and the specialist collections.
- Space connected to the music and film section .  
Acoustic treatment must solve the problem of noise made by instruments or group listening.

Characteristics of the spaces:

- Location visible and with easy access to other areas.
- Acoustic insulation of group work rooms.
- Technical equipment necessary for the connections to any kind of apparatus belonging to the library or the user.

## CHILDREN'S AREA

This is for children and young people up to 14, who represent 25% of the library users.

These numbers have meant that the children's section, originally treated as a section added on to the adult library, has

progressively become a complete self-contained service within the public library.

Unlike a school library, which must be an educational support, the children's library has a mission which is more play-oriented and generalized. (Fig. 10.26).

Because it has such a varied public, the areas will have to be structured according to the needs of each age group:

- Reference collection area.
- Fiction collection area.
- Little Readers Corner.
- Support spaces.

## General characteristics of the space

The recommendations given for the general area are valid for the children's area.

Also, given the imbalance between the number of activities and the space available, it is advisable to structure the space along the following lines:

- The entrance to the children's zone has to give easy access to the two larger areas, general knowledge and fiction, with one shared information desk.  
Children need more help choosing and finding documents, and the work of the library staff is critical for interpreting their needs and advising them in their research. For this reason, the advantages of arranging the various spaces around one desk are obvious.
- Mechanisms will be sought to help create different subspaces without having to separate them.
- There must be a progression

10.26



established, based on age, with the furniture sequenced according to their different needs.

While toddlers are happy with any activity, adolescents find it more difficult to identify with the children's zone than the adult ones. So the part for the oldest group should be close to the adults' reading rooms, creating a natural transition between the two spaces.

In a single spatial context children coexist with preadolescents, where there are huge behavioural differences. Proportions, shape, physical spread, lighting, materials and other elements belonging to architectural language will become the tools for planning children's areas suitable for such a diverse public. On the other hand, a large proportion of children, with their very specific perception of spaces, suggests paying particular attention to certain aspects of space and atmosphere:

- An elongated space creates the need in children to measure it, not so much by sight as by sound. That is why they will run down it screaming, to hear how long it is. And that racing round will excite them, rather than calm them down.

The answer is to set out furniture to divide up the space.

- An overlarge space can produce physical and psychological isolation, and produces insecurity and confusion.

There are many options for avoiding this feeling, from dividers to contrasting lighting.

- High ceilings also create insecurity. Children react by raising their voices, and the increase in the sound level

has a negative effect on the rhythm of reading.

Height-reducing elements are suggested. Recreation of domestic dimensions will help the conversation level.

- An undersized space can produce defensive reactions which provoke violence.

In such cases it is preferable to reduce the amount of furniture, because children prefer space to objects.

- An atmosphere which has too many stimulants and is overloaded with objects creates apathy and lack of interest in the children.

The right number of objects will allow them to move around with complete freedom, while at the same time allowing them to get involved in the reorganization of the space.

- Children generally reject structured and organized spaces. The overall image must encourage their imagination and knowledge, but keep a sense of continuity with the rest of the library.

### Relation with other spaces

- Children in the library must find their own area without feeling excluded from the rest of the library. That is why the children's area must be accessible from the foyer, must share the common spaces and be directly connected to the other areas.

- When the library is on more than one floor, the children's zone should be on the ground floor to avoid having to deal with noise or the added burden of keeping an eye on the children going up and down stairs.

Problems arise when the floor of entry has no space for a general area. In such cases, one must take into account the negative reaction which a large proportion of the public has to libraries where the first thing they see is the children's zone.

- An independent group of toilets should be installed in libraries where the dimensions or the organization oblige the users to take non-direct routes.
- If the building has an outside area, it should be connected to this zone so

10.27



that open air activities can be enjoyed, with elements which make playing and reading easy, both individually and in groups.

## REFERENCE COLLECTION AREA

This area includes reference works about different fields of knowledge. It offers information services, consultation (individual and with staff) and loans.

Equipment:

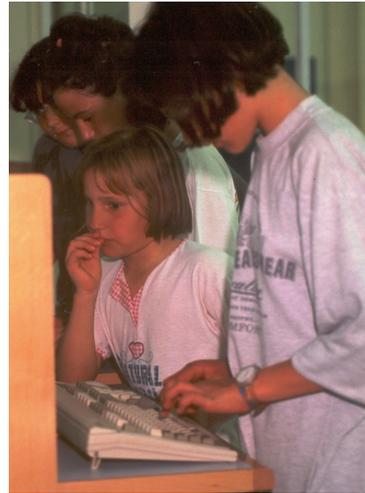
- Shelving of no more than 150 cm high, to enable access by the younger users.  
In exceptional circumstances, and depending on the needs of the various age-groups, shelving of up to 180 cm could be considered.
- Work tables and chairs for the users, with the necessary computer terminal connections.
- Informal reference areas with armchairs and smaller tables.
- Reference points, both seated and standing, to suit every need: computer-based catalogue, Internet, CD-Roms, databases and other information systems. (Fig. 10.27 and 10.28).
- Customer service desk with equipment needed to complete loan process.  
As mentioned above, this desk should cover service to the fiction zone.
- In rare circumstances, there could also be a music and film zone specifically aimed at children, with the same equipment as the general music and film area.

## FICTION COLLECTION AREA

This is conceived as an informal reading area including a collection made up of comics and fictional literature. It offers information, reference and loan services. (Fig. 10.29, 10.30 and 10.31).

Equipment:

- Shelving with maximum height of 150 cm.
- Furnishing of various formats to display comics and illustrated books.



10.28

- Tables and chairs for the users. Plans should include at least 50% of reduced dimensions for the smallest children.
- Floor cushions and other elements which create an informal reading space.
- Depending on the size, a customer service desk specific to this area might be needed as a support for the central information desk.

## LITTLE READERS CORNER

The idea of this space is to be a play area for smaller children, who must be accompanied by an adult, where they are introduced to the world of reading. The Little Readers Corner is connected to the fiction collection area and has no library staff directly involved. It offers a reference service. (Fig. 10.32).



10.29



10.30

**Equipment:**

The space's equipment should be particularly safe, with no sharp corners or edges which might cause accidents.

- Warm material flooring, which children can sit and lie on.
- Game modules, theme rugs, different shaped cushions and other elements suitable for this age group.
- Smaller tables and chairs.
- Reading areas for accompanying adults.

**Characteristics of the space:**

- This area has to have a particularly attractive and cheerful look, with architectural elements providing lots of space and colour.
- Depending on its size, it is advisable to soundproof it as far as possible from the rest of the children's area. Using glass room dividers will enable the staff at the customer service desk to see what is happening.

- The entrance must have an area for prams and pushchairs.

**Relationship to other spaces:**

- Because of the type of public it is aimed at, there should be access close to the children's area entrance making it unnecessary to go through the other areas.
- Direct connection to the toilets, which must have nappy-changing facilities.

**SUPPORT SPACES**

Spaces for general expression and movement activities, both individually and in groups.

They have similar characteristics to those of the support areas of the general area, and should have direct connection to the children's area.

Preferably they should be situated next

10.31



10.32



10.32

to the general area so they can be used for different purposes during the hours that few children are using them.

Support areas attached to the children's areas:

- Group work rooms and workshops.
- Activities room.

### **Group work rooms and workshops**

Activities:

- Group work, artistic activities (painting, building, etc.).

Equipment:

- Furniture which can be adapted to working with documentary material and to manual work, allowing an organization of the space according to needs.
- Tap with hot and cold running water, and a highly-resistant work surface.
- Cupboards for equipment and materials.

Characteristics of the space:

- Possibility of creating work areas for small groups.
- Resistant easy-clean flooring.
- Hanging space prepared for exhibiting works.

### **Activities room**

Activities:

- Story time, performances, reading aloud, etc.

Equipment:

- Seating of different shapes allowing various possible payouts depending on the activity.

Characteristics of the space:

- An atmosphere related to the imaginary world of these users.

### **NON PUBLIC / INTERNAL WORK ROOM**

---

Problems connected with the organization of a library's internal services are very different to those of the public services.

- The public services try to cover two major types of activity (informative and motivational) in various differentiated areas.
- Internal services require a few apparently simple elements (offices, workshops and storage facilities) which enable the running of numerous varied activities.

The creation of library systems has meant that many administrative and technical tasks can be centralized with organizational modules which present very different situations depending on the territorial context.

This variety, like the functional diversity of the internal services themselves, means that the programmer has to create an organizational work plan which will be a determining factor in the location and layout of the spaces.

It would be very complicated to attempt to describe the material consequences derived from one or other organization plan. This is why internal services are not analysed by service, but by function with a schematic indication of the tasks produced by each one, and the types of spaces where they are carried out. Some generic requirements of more specific activity areas will be looked at separately.

### **Functions**

Four major functions can be isolated:

- Administration. (Table 10.33).
- Acquisitions. (Table 10.34).
- Technical management. (Table 10.35).  
This function, which is not easy to define, can include practically any activity not included elsewhere. Those activities which it is advisable to carry out through centralized management of a group of libraries will be listed.
- Conservation. (Table 10.36).  
This includes any activity connected to conservation, exploitation and availability of material needing special treatment.

<b>Administration</b>	
<i>Activities</i>	<i>Designated Area</i>
<b>Management:</b> – Organization and coordination – External relations – Work and Information meetings – Monitoring building and equipment maintenance	Office Meeting room
<b>Administrative management:</b> – Accounts – Statistics – Loan management – Staff	Office
10.33	
<b>Acquisitions</b>	
<i>Activities</i>	<i>Designated area</i>
– Choice of documents	Office Meeting room
– Management of requests	Office
10.34	
<b>Technical Management</b>	
<i>Activity</i>	<i>Designated area</i>
<b>Treatment of materials</b> – Reception: – Unwrapping – Checking requests – Registration	Storeroom (reception) Office
– Cataloguing	Office
– Reproduction	Workshop
– Physical treatment: – Initial treatment (installation of anti-theft devices, laminating the covers, etc.) – Maintenance of the collection (reinforcing covers, rebinding, etc.) – Small repairs	Workshop
– Classification of the documents for different destinations	Workshop Office
<b>Storage</b> – Deposits (collections intended for other libraries and the central depository): – Storage – Packing and sending to other libraries in the system	Storeroom (materials circulation)
– Supplying the Mobile Library: – Storage of the collections – Provision of the vehicle	Storeroom (materials circulation) Garage
<b>Organization of information and motivational activities</b> – Public information (creation of document folders and bibliographic lists, etc.) – Making copies of documents available – Inter-library loan – External relations – Exhibitions: – Preparation and mounting – Presentation to public	Office Workshop (mounting) Workshop (reproduction) Storeroom (material)  Public spaces: – Multi-purpose room – Exhibition room
10.35	

<b>Conservation</b>	
<i>Activity</i>	<i>Designated Area</i>
<b>Organization</b> – Classification of documents: – Antique collections – Retired open-access collections – Rare and valuable documents – Collections on specific supports (medals, manuscripts and other formats normally associated with antique collections)	Storeroom (conservation)
<b>Treatment of materials</b> – Checking state of documents – Reparation and restoration	Storeroom (conservation) Workshop (restoration)
<b>Cataloguing</b>	Office
<b>Reference</b>	Public reference areas
<b>Circulation of materials</b> – Inter-library loans – Reproduction Office	Office Workshop
<b>Exhibitions</b> – Preparation and mounting – Presentation to public	Workshop (mounting) Public spaces: – Multi-purpose room – Exhibition room

10.36

### Designated areas particularly specific to internal services

- Offices.
- Meeting room.
- Workshops.
- Storage facilities.
- Staff rest area.

Depending on the extent of the functions mentioned above, the building should be planned to include the creation of purpose-built spaces or at least ones where functions can be alternated.

Generally speaking the following aspects should be included:

- Staff, documents and information must be able to pass through the internal works area quickly.
- The working of a library creates the constant movement of documents, both between internal spaces and between them and the public services. The imperatives set out in the functional programme will create a series of project decisions:
  - Layout of internal services: Grouping together into one single functional unit or division onto residual areas of the public zones.
  - Document transport systems:

Adequate lifts, when they are on different floors, conveniently sized aisles facilitating the circulation of the book carts, mechanized auto-transport systems in the larger installations and so on.

- Appropriate level of comfort for the requirements of each situation.

### Offices

Equipment:

- Work tables and chairs with wheels.
- Shelf space and cupboard space of various types.
- Computers.
- Cloakroom.

Characteristics of the space:

- Individual offices, normally given to positions of responsibility, have to be calm working areas, big enough to accommodate visitors and small meetings.
- Collective offices must allow for separated work stations.
- Sound insulation for the noisiest areas and areas of public use.
- Varied lighting depending on type of work.

Relationship to other spaces:

- Functionally separated from public zones.
- In smaller libraries there should be a visual connection with the public service areas. This connection allows for an alternation of staff tasks at times when there are few clients.
- Libraries with more administration management need to have some offices connected to one waiting room and one meeting room.
- Communication with rest areas and toilets.

### Workshops

Activities:

- Reproduction.
- Treatment of documents.
- Repairs.
- Restoration.
- Mounting exhibitions and other motivational activities.

Activities connected to restoration and mounting exhibitions need specialized staff and sophisticated materials. It is advisable to outsource this type of work to specialist companies and organizations.

Equipment:

- Shelving.
- Work surfaces.
- Specific equipment for each activity.
- Reproduction equipment.
- Book carts and other transport methods.
- Computer equipment.

Characteristics of the space:

- Natural lighting shaded according to type of activity.
- Temperature, damp, ventilation and lighting control.
- Water and drainage installations.
- Resistant and easy-to-clean flooring.
- Security systems.

Relation to other spaces:

- Direct connection to storage facilities and other spaces directly connected to each activity.
- Close to vertical communication and other transport systems.
- Connected to staff service areas.

### Storage facilities

- Reception.
- Circulation of materials.
- Conservation.
- Materials for exhibition mounting.

Equipment:

- Shelving, compact systems and other elements of suitable formats for the volume of storage, types of documents and security conditions required for the collection.
- Work surfaces.
- Book carts and other transport methods.
- Computer equipment.

Characteristics of the space:

- The layout of the shelving must allow a fluid reception and distribution of the material.
- The choice of storage system is also connected to the following spatial considerations:
  - Size and shape of storeroom.
  - Placement of structural elements and openings to the exterior.
  - Floor structure resistance.
  - Building's security system.
- Temperature, damp, ventilation and lighting control.
- Independent security systems.
- The conservation storage facilities, with material requiring specific atmospheric conditions, must occupy an area independent of the other storage areas.

Relation to other spaces:

- Direct connection to the workshops and other spaces connected to each kind of storeroom.
- Close to the vertical communication and other transport systems.

### Staff rest area

The kind of work done by the library staff – much of the day in direct contact with the users, irregular shifts – demands an exclusive space in the library where they can disconnect from the public service tasks.

Equipment:

- Sink with hot and cold running water, cooker, microwave and fridge.

- Work surface and cupboards.
- Tables and chairs.
- Armchairs and other furniture suitable for an area of meeting and relaxation.

Characteristics of the space:

- Visual connection with the outside.
- Inviting atmosphere.

Relation to other spaces:

- Inside the internal work area, and close to the toilets, but functionally separate from the work areas.

## LOGISTICS AREAS

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- Materials storage.
- Cleaning staff rooms.
- Installations rooms.
- Maintenance room.
- Loading and unloading zone.
- Parking.

### Materials storage

Place for temporary storage of perishable material and furniture which is not being used or is being repaired.

### Cleaning staff rooms

This should be situated near the toilets, keeping the plumbed facilities of the building together.

- Space including a waste bin and general cleaning equipment and products.
- Showers, toilets, staff changing facilities.
- There should also be rooms throughout the building big enough for a waste bin, a cleaning cart and shelving for products in frequent use.

### Installation rooms

The building will need to house these central installations:

- Air conditioning.
- Electrical installations: transformer stations, emergency lighting batteries, etc.
- Computers and telephones.
- Lift machinery.

- Centralized control system room for the whole building, etc.

These should be grouped away from the public entrance, with easy access for maintenance staff.

Some central installations need a great deal of space and exterior ventilation.

Their size suggests they are best housed within the general dimensions of the building.

### Maintenance room

Space equipped with showers, toilets and changing facilities for the maintenance staff, with material storage facilities.

### Loading and unloading zone

A (covered or uncovered) space must be provided, for large vehicle access, directly connected to the storage facilities.

### Parking

If the library has its own vehicles, a suitably sized garage must be provided.

Equipment:

- Telephone points, computer network, battery charger, etc.

Characteristics of the space:

- Ventilation and other systems to protect against vehicle emissions.
- Water and drainage installations.
- Resistant and easy-to-clean flooring.
- Large enough for model of vehicle, with space for manoeuvre. (Fig. 10.37).
  - Small vehicle:
    - Length.....3.5 m
    - Width .....1.5 m
  - Van:
    - Length.....6 m
    - Width .....1.6 m
  - Mobile Library Bus:
    - Length.....from 7. 5 to 11 m
    - Width .....2.5 m
    - Height .....3.5 m
- Easy entrance and exit for the vehicle. Generally speaking, vehicles reverse in to facilitate loading and unloading.



In these cases, there must be exterior space to manoeuvre the vehicle.

Relationship to other spaces:

- Direct communication with storerooms and other areas connected with the vehicle's function.
- Connected to a space equipped with changing facilities and showers for the drivers.

## TOILETS

The library must have toilets for the public and for staff only, the dimensions of which depend on the need for removal of physical barriers.

They should be situated away from the reading areas, with access from the foyer or the foot traffic areas.

The equipment will depend on the following factors:

- Surface area of programme.
- Numbers of users expected.
- General organization of the building and placement of the various areas.
- Number of floors.

For this reason the space to be taken by the toilets cannot be indicated on the functional programme – similarly, neither can the foot traffic areas, technical areas nor space occupied by construction elements be estimated.

Furthermore, there is a series of project decisions, sometimes independent of functional requirements, which could change any initial measures taken:

- Incorporation of smaller toilets in the children's zone.
- Complying with all regulation concerning removal of physical barriers in all the toilets of the building.

It is advisable to use equipment and materials which make the maintenance and cleaning work more easy, so as to avoid excessive consumption of energy and problems of vandalism:

- Materials with easy-to-clean and water resistant finishes:
  - Fully tiled walls.
  - Stoneware, tile or terrazzo flooring, sloping towards a drain (or with drainage incorporated).
  - Toilet fittings of glazed china with overflow system.
  - Doors lined with laminated plastic.
- Toilet flush mechanism with flushometer. Wall mounted chain-operated cisterns and lower lever-operated cisterns create many problems of function and vandalism.
- Self-closing taps.
- Other elements:
  - Soap dispensers. These should be placed over the basins to avoid soap dripping onto the floor.
  - Electric hand driers, or paper towel dispensers.
  - Sanitary waste bins.
  - Locking toilet paper dispensers.
  - Nappy changing facilities. These can be the foldaway type on the market, or there could be a space left available near the basins.

## Materials

*Basic selection criteria*

*Environmental criteria*

## Construction systems

*Foundations*

*Structures and dividing floors*

*Building envelope*

*Interiors dividers*

*Interior finishes*

## MATERIALS

### Basic selection criteria

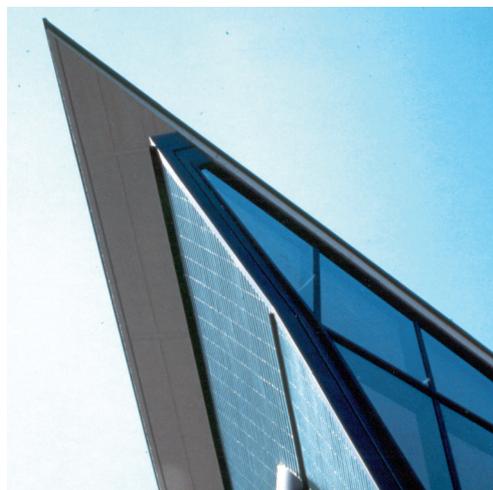
- Durability.
- Maintenance.
- Cost.
- Standardization, to guarantee use and easy repositioning.
- Knowledge of its characteristics / most suitable conditions for use and placement.
- Guarantees of use and application, quality stamps and maintenance plans.

### Environmental criteria

Sustainability in construction means minimizing the use of non-renewable or new resources. Some thought must be given to materials which can be recuperated or recycled at the end of their useful life, construction solutions which are easy to dismantle, and energy efficiency.

Classification of environmentally friendly materials:

- Alternative materials. Those which provide some environmental or energy improvement:
  - Recycled: A certain percentage of their composition comes from the same product or has been taken from another one.
  - Ecological: These do not contribute to environmental degradation in any of the most sensitive areas (ozone layer, acid rain, exploitation of



**11.01**  
 Montserrat Roig  
 Library (Sant Feliu de  
 Llobregat, Barcelona)  
 Architect:  
 Albert Viaplana.

- non-renewable resources, pollution, etc.).
  - Energy saving: Their use saves energy and consumption of certain energy sources.
- Reusable materials. These come from rebuilding or demolition sites, either through direct reuse or by recycling the material.

Some of the main materials used in the construction sector are analysed below, with a simplified look at the way they interact with the environment during their lifespan.

- Stone materials.
- Metals.
- Synthetic materials.
- Paints.
- Woods.
- Other materials.

This information comes from the following documents, which should be consulted for all details:

- *Programa LIFE. Formació de tècnics en medi ambient – edificació.* Barcelona.
- *Guia de l'edificació sostenible* (editors: Josep Lluís Rovira Fontanals and Imma Casado Martínez. Barcelona: Cerdà Institute).

## STONE MATERIALS

- Environmental impact is mainly produced during mining (modifications in the ecosystems and the landscape), transport (the weight and volume) and conversion into rubble (they are normally dumped and use up a large amount of space).
- Recycling consists of pulverizing and using as filler or as powder for concrete.

## Cement

- The basic component of mortar and concrete, this is one of the most common construction materials.
- A considerable amount of energy is used in the extraction, grinding and heating processes.

- Some types contain industrial residue like fly ash or blast furnace cinder, which give them special properties.

## Fibrocement

- Bound with compound fibres. The fibres can be vegetable, mineral or synthetic.
- Fibrocement, with synthetic or wood fibres, is a harmless material which can be used with no risk.

## Sand and gravel

- Mainly used in the manufacture of mortar and concrete, the production of base material for paving or as filler.
- When used alone, they can be recuperated at the end of their useful life and used as filler.

## Concrete

- This comes from mixing cement, sand, gravel and water, and the main impact comes from the significant use of gravel.
- Experimentation has begun on the possibility of using pulverized stone rubble for the powder.
- Concrete is a heavy material with a high specific heat, so it can be used in constructions which incorporate design criteria with passive solar energy, particularly in continuous-use buildings.
- Cellular concrete, in which arlite or another aerated granule is used in place of part of the gravel, and light concrete produced in an autoclave, are far lighter materials, with insulating properties and lower environmental impact.

## Natural stone

- Despite being a high-cost material, it still has a significant role in both interior and exterior surfacing.
- The most obvious advantages are durability and attractive appearance.
- It is important to highlight the consumption of energy for the

conversion processes leading to its final form.

- All stone types are potentially reusable, although this is only economically viable with the more expensive kinds.

### **Ceramic materials**

- Artificial stone which takes on a stone-like consistency through the heating of clays.
- There are various types, and the most notable environmental impact is the amount of energy needed for the heating process.
- In the case of bricks, results show great durability and low cost.
- Materials with a vitrified finish or porcelains (tiles, glazed bricks, bathroom materials, etc.) have an even higher energy content.
- Recycled ceramics, once pulverized, can be used for paving and poor concrete.

### **Plaster**

- A compound material produced through the partial or total dehydration of gypsum or plaster stone. Reduced to a powder then made into a paste by adding water, it recuperates its crystallization and sets.
- Currently its use is mainly for interior wall rendering, plaques and plaster casts, products manufactured for ceiling rendering and making plasterboard panels for wall covering and room divisions.
- There is a type of plaster which is derived from the fertiliser industry, phosphogypsum, which may contain toxic radioactive elements.
- Recycling plastering work stuck onto a support is not viable.

### **Glass**

- Glass is a man-made compound which constitutes a solid solution of various silicates of sodium, calcium, lead, etc., obtained through the fusion of siliceous sands, quartzite and limestone.
- The negative environmental impact is

connected to the energy needed for the fusion process, and with the use of glass containing lead or caustic soda, which are pollutants.

- On the other hand, it is the only stone-like material which is easily recyclable, as its production process is by fusion.

### **Fibreglass**

- The raw materials and the first phase of the production process are the same as for glass.
- It is basically used as insulation for roofs, walls, tubing, etc.
- There has been a certain amount of discussion about the risks associated with using this material and working with it.

It does not appear to be carcinogenic, but handling it requires safety measures to avoid irritation of the eyes, skin and sinuses.

- In its residual stage it has poor degradability, and the difficulty of obtaining clean residue which is uncontaminated makes recycling complicated.

### **METALS**

- Metals are extracted from minerals, and the environmental impact is connected to these processes of extraction (damage to the landscape and the natural environment), transformation (high energy consumption) and surface treatment (emission of dangerous substances).
- The positive side is that they have a high level of recyclability. Plus, some residues for the manufacturing process can be used as raw materials for other industries.

### **Aluminium**

- The raw material is bauxite, which is taken from tropical jungles and which causes a considerable impact on the terrain in ecologically highly valuable areas. Apart from that its electrolytic process uses huge amounts of energy.
- This is a light material with a low

maintenance cost because it is naturally resistant to corrosion.

- It can be recycled as many times as desired without losing quality .
- Recommendations:
  - Construction aluminium must be made up of recycled residues of the same product.
  - Its corrosion resistance means it does not need any protective coatings (lacquers or others using colour), which would reduce its recyclability.

## Steel

- This is an iron and carbon alloy, with small amounts of other materials added.
- Very common in structures and other building components, but has durability problems in damp conditions or in contact with water.
- Compared with other metal materials, the energy content per kilo is relatively low.
- The varieties of galvanized or stainless steel provide more durability, but use more energy.
- Recyclability is high and the useful life is longer than that of the building.
- Recommendations:
  - Building steel must contain iron or steel which comes from recycling.
  - Joining pieces of steel should not be done by soldering. Riveting is a good solution as it does not produce any toxic residue and it facilitates both dismantling and, in some cases, direct reuse of the elements.

## Copper

- This is very common in installations for drinking water and natural gas, and for electrical wiring.
- Installations of soft drinking water – that is to say with a low pH - can cause corrosion problems or deterioration of the material, and the resultant contamination of the water.

## Zinc

- This material is actually now at a

critical point, and is expected to run out within the next few decades according to current information about reserves and consumption rates.

- During the extraction process there are toxic cadmium emissions.
- In general, it is used for surface coverings of steel plates to protect them from corrosive agents. Despite this, like copper, when it is exposed to running water, certain ions are released which get into the water, thence to the ground which is harmful for the organisms which live there.

## Lead

- Very limited in supply, and also expected to run out in the next few decades.
- Only 3% to 10% of the total of the material extracted is actually used. For that reason, a relatively large amount of dangerous residue is produced, with the consequent environmental impact.
- This is a toxic material, and is very bad for health.
- Its durability, density and malleability make it suitable for many different applications.
- Recommendations:
  - In general, lead should not be used in building.
  - Lead in water pipes must be substituted by other metals or plastics.

## SYNTHETIC MATERIALS

- The raw material is crude oil, which is frequently the cause of eco-disasters during extraction transport. However, statistically only 4% of the total production is used to make synthetic material. In refineries, the crude oil is separated into various hydrocarbons. This process uses energy and causes the emission of organic hydrocarbons. From this, semi-manufactured products are obtained (ethylene, propylene, benzene, styrene, etc.), which are used as the raw materials for making plastics.
- An interesting point environmentally

of synthetic materials or plastics is the possibility of recycling them. Those known as thermoplastics can be melted down to obtain a basic powder. If they are mixed with other kinds of plastics and other materials they can be reused as filler.

- Once they have been installed, these materials produce no problems during their useful life. Because they have practically zero degradation, problems occur in the residual stage.

### **Polystyrene (PS) and polypropylene (PPC)**

- These are simple synthetic materials which are obtained through the polymerization of ethylene and propylene.
- The installation has minor environmental impact, and a realistic useful life expectancy is over 50 years.

### **Polyvinyl chloride (PVC)**

- The basic raw materials are crude oil and salt (chloride).
- It has excellent technical characteristics (long-lasting, resistant to corrosive substances, etc.) and apart from that its price is usually lower than that of other commonly used materials.
- Some of its intermediate products are considered to be dangerous, so the processing has to be done under specific conditions.
- Several studies have criticized PVC for its connection to chlorine, and have asked for it to be banned although the debate has not reached any definitive conclusions.
- As residue it can produce unwanted emissions.

### **Polyurethane**

- Some of its components and additives are dangerous, but the emissions which might be produced during the production-manufacture process are below current legally permitted levels.

- Polyurethane is used as insulation so it needs foam or blowing agents containing HCFCs, dichloromethane or CO<sub>2</sub>. HCFC is ozone depleting and its use is not recommended. Dichloromethane has health risks for the people handling it, so certain precautions must be taken.
- As it is chemically bonded to the walls, it is difficult to recuperate when the building reaches the end of its useful life.
- It seems that polyurethane ages with time and loses its properties, at the same time perhaps releasing the substances it is composed of into the atmosphere.

### **Expanded polystyrene and extruded polystyrene**

- Expanded polystyrene uses air as its blowing agent.
- Extruded polystyrene uses HCFC or CO<sub>2</sub>. The former is not recommended for environmental reasons.
- They are used for insulation.
- Both materials can be recycled, but this has not been done yet.

### **Bitumen**

- It is made from the residue of the distillation of crude oil.
- It has adhesive properties and is waterproof. It is mainly used on road surfacing, flooring, sealants and as waterproof paint.
- It can be easily reused, but in practice is not recycled as the residue is usually quite contaminated.

### **Ethylene propylene polymer (EPDM)**

- Rubber is obtained through vulcanization, which converts a soft plastic substance into strong, elastic material. The organic solvents needed for the treatment of semi-manufactured products can damage human health and the environment.
- Its useful life may be longer than that of bitumen.

## PAINTS

- These are composed of resins, solvents, fillers and additives.
- The principal difference is in the solvent used, which might be water or an organic solvent:
  - When the solvent is mainly water, the paints are known as plastic paints or water-based paints, and are the least harmful for people.
  - When the solvent is organic (hydrocarbons), they are normally called synthetic, organic or solvent-based paints. These have more environmental impact because after they are applied the hydrocarbons evaporate and pass into the air, with negative health consequences.
- In general, all paints have harmful additives.
- Over the last few years, the idea of *ecological paints* has appeared. Water-based paints can be considered as part of this group, but it is more difficult for synthetic or enamel paints to fulfil all the requirements needed to get the ecological labels that exist for these products.
- Materials which contain paint might represent a danger for the environment at the end of their useful life. When they are poured away, they can release harmful substances into the atmosphere, and when they are burned they can give off unwanted volatile compounds.

## WOODS

- As a construction material, wood has very positive intrinsic properties, such as its excellent relationship between mechanical resistance and density, good durability and fair flame-resistance.
- The problems are its susceptibility to certain fungi and insects, anisotropy and its sensitivity to the hygrometric atmospheric conditions and the consequent dimensional instability.
- The use of the wood option in building is often the solution of choice. It is a renewable material, requiring far less production effort than other structural

materials and it can be sustainably exploited.

- If wood is managed correctly, the ecological balance is positive. In general, in the more developed countries, sustainable forest exploitation policies are in force.
- In the case of wood from tropical trees, uncontrolled exploitation is having a major environmental impact on the last great reserves of the planet. Their use, which is not generally recommended, must be done with credible "seals of sustainability". The best known internationally is the FSC (Forest Stewardship Council) seal.
- Some preservation treatments can be carcinogenic, non-degradable and responsible for harmful emissions into the atmosphere when the wood is burned.
- At the end of its lifespan, wood can be recuperated and also recycled. Through pulverization it can be used to make particle board or similar products.

## Temperate climate woods

- These are woods in the form of planks or panels obtained from conifers or broadleaf trees growing in temperate climate zones of the planet.
- They are divided into two types: resinous and hard woods. These are most suitable for exterior use because of they are resistant to external agents and do not need the preservation treatments which can be detrimental for environmental behaviour.

## Plywood

- Plywood planks are made by bonding together wood veneer sheets, obtained from tree trunks.
- The adhesives used to bond the plies contain components which are harmful for the environment and for humans.

## Particle board (chipboard)

- This is manufactured from wood

particles of different sorts and sources which are held together by gluing agents and pressure.

- Environmental impact is caused by the adhesive substances.

## OTHER MATERIALS

### Linoleum

- This material is a combination of cork dust or wood flour mixed with linseed oil on a canvas backing.
- There are no figures on its energy content, but it is presumably low if each element is taken separately.
- Its residue behaviour is good, and it can be recycled.

## CONSTRUCTION SYSTEMS

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Construction systems:

- Foundations.
- Structures and floors.
- Exterior envelope:
  - Exterior walls.
  - Roof.
  - Openings.
- Interior divisions.
- Interior finishes:
  - Flooring.
  - Wall coverings.
  - Ceiling covering.

In each section, the following aspects will be considered:

- General criteria.
- Systems that may be used.
- Most recommended materials.
- Environmental recommendations.

## FOUNDATIONS

- Have to hand a plan of the levels of the site to be built on and adapt, as far as possible, the design of the building to the topographic and natural conditions of the land.
- Carry out a geotechnical study to get to know the geological and mechanical resistance characteristics. This information means you can:

- Adapt the type and size of foundations. Overestimating through lack of information means using extra material unnecessarily.
- Find out the economic impact on the total cost of the work. The freatic level, the need for pile work or any other unexpected inconvenience will add to project cost.
- If the library's functional programme anticipates future expansion, the foundation estimate should include supporting additional floors.

Environmental recommendations:

- Thermal insulation of flooring in contact with the ground, if the space above is a heated space.
- The best solution is probably sanitary ceilings with a ventilated chamber. They stop the damp from the ground affecting the building, and exposed installations could pass through the chamber, which would make repairs and maintenance work easier.

## STRUCTURES AND DIVIDING FLOORS

### Use load

#### New construction

Because a library might undergo a number of organizational changes during its useful life, the whole structure should be calculated according to a uniform use load.

- Use-load: 500 kg/m<sup>2</sup>.
- Reinforced compression layer in the floor: 5 cm.

#### Renovation

Building renovations require more detailed study. Most buildings cannot take this load, and demolition or reinforcement of the whole structure is not always an option.

The floor structure, columns and foundations have to take the load. That is why each element should be analysed to be absolutely certain what needs to be

done. In very general terms, the following recommendations can be made:

- Uniform load of all elements across the whole structure: 300 kg/m<sup>2</sup>.
- Added load of each linear element in the unidirectional girders: 500 kg / linear m.
- Reinforced compression layer in the floor: 5 cm.

#### Areas with compact shelving

The indiscriminate placement of this shelving can cause dangerous defects as breakage is caused through shear force, always without warning, meaning collapse is sudden and unexpected. The load is far higher than in the rest of the library, and the enormity of the structure means that in this case there should not be so much emphasis on the concepts of flexibility which this book constantly reiterates. This means it is the only area which needs a more fixed location.

- Decide on its definitive location in the early stages of the project.
- Whether a new construction or a renovation, a specific study should be made under the auspices of a competent technician, and added to the project log.
- Given that the density of paper fluctuates between 600 and 1.000 kg/m<sup>3</sup>, calculations should be made on the basis of type and number of levels of shelving. Even so, the following loads can be supposed:
  - Compact shelving of 150 cm high: 1,000 kg/m<sup>2</sup>.
  - Compact shelving of 225 cm high: 1,500 kg/m<sup>2</sup>.

#### Parking the mobile library bus

The size of the vehicle and the weight of the books cause huge occasional loads at the point of contact between the wheels and the ground.

This must be calculated on the basis of the size and design of the library bus.

- Approximate load: 1,000 kg/m<sup>2</sup>.
- Reinforced compression layer in the floor structure: 8 cm.

#### **Structural system**

- If heightening is anticipated, the structure will have to be correctly sized. If it expands horizontally, a modular solution is best.
- The layout of the structural elements must take into account the convenience of having floors as free as possible of fixed elements like pillars or walls, with the consequent ease of placing furniture.
- Straight/right angled structures with wide spans are more advisable than irregular or curved structures for the load-bearing elements.
- When it comes to deciding the layout, it is recommended that a study be made of a modulation based on a possible organization of the shelving which maximizes space. That is why the shelving's depth must be known, as well as the distance that must be left for user circulation. In the chapter "Internal Organization" these dimensions are given.
- Structures made of ceramic block or brick are only compatible with smaller spaces, as they make flexibility difficult.

The possibility of a variety of layouts is much more feasible if the number of load bearing walls is minimal and they are all concentrated in the fixed parts of the library, such as the stairs and lifts, the toilets and the vertical access installations.

- Metal structures have fire protection requirements which take away most of the attractiveness of their appearance, and fire retardant paint is not legal in some countries.

Environmental recommendations:

- The lighter structural systems or ones with less mass in cross section result in economy of materials and energy.

#### **11.02**

*Central Library  
(Santa Coloma de Gramenet,  
Barcelona).  
Architects:  
Artigues & Sanabria  
arquitectes.*



Normally they are more industrialized and therefore their installation and dismantling is easier, but they can cause problems of soundproofing and noise transmission.

- Thicker and greater-mass structures are considered good because thermal inertia accumulators can be used, but they mean the use of larger amounts of material.
- Prefabricated systems can be recommended for speed of use, quick assembly, dual functionality (they can be structural or cladding), ready-finished surfaces, etc.

## BUILDING ENVELOPE

Building envelope:

- Exterior walls.
- Roof.
- Openings.

The exterior walls cannot be limited to a few specific types, as each project will have to find its own configuration, depending on elements as diverse as the surroundings, the volumetric composition and the environmental conditions.

However, it should be pointed out that the solutions adopted in each case must guarantee: (Fig. 11.02).

- Protection from exterior elements:
  - Temperature and humidity.
  - Wind and rain.
  - Noise.
  - Insulation.
- Insulation and sufficient ventilation to stop condensation appearing on the inside.
- Safety.
- Easy repositioning of the various materials and construction elements.
- Access for cleaning and conservation.
- Ease of construction:
  - Construction systems which need no special personnel or sophisticated machinery to carry out.
  - Necessary graphic documentation to ensure that the joining of the various systems and elements of roofs, façades and structures is done carefully and neatly.

## EXTERIOR WALLS

Cladding:

- Solutions should be weather-resistant, long-lasting and need little maintenance.
- Accessible areas should be dirt-resistant (anti-graffiti paint or easy-to-clean materials).
- Types of cladding:
  - Exposed ceramic brickwork:  
The advantage here is the dual role of exterior finish and curtain wall.
  - Continuous cladding.
  - Treated wood, natural stone or artificial stone facing.

Environmental recommendations:

- For the walls, the market has a lot of materials (light brick or concrete blocks, etc.) which have better thermal and acoustic characteristics than traditional ones.  
In these cases specialized personnel should be brought in to ensure that they are installed in conditions for optimum functioning of the materials.
- The best finishing materials are those which are not bonded to the supporting wall, but are fixed mechanically or using a ventilated floating system.
- In areas or facades of the outer walls where overheating in summer could be a major problem, a construction solution must be considered whereby a ventilation cavity can be built between the exterior finishing material and the exterior wall itself.

## ROOF

- When the roof is metal, the elements used must compensate for noise produced by the impact of weather phenomena.
- A type of roof can be chosen which not only fulfils the exterior functions, but which also includes some additional system of environmental control:
  - Green roofs or ones with water which can help to balance overheating during the summer months.
  - Inclusion of solar panels for

**11.03**  
*Can Pedrals Library*  
 (Granollers,  
 Barcelona).  
 Architects:  
 Riera, Gutiérrez i  
 Associats.



thermal or photovoltaic applications.

Environmental recommendations:  
 The sun's position means that radiation comes in perpendicularly throughout much of the day onto flat or slightly sloping roofs, which covers most of them. In these conditions, and particularly in summer, there can be significant heating up of the surface, which increases the temperature inside.

- Flat non-trafficable roof:  
 Roofs with gardens humidify the atmosphere and act as barriers in terms of the amount of solar thermal transmission to the interior. The downside is that the consumption of water must be carefully controlled.
- Flat trafficable roof:  
 Prefabricated floating system parts allow air chambers to form which, if ventilated, minimize the overheating.
- Sloping roof:  
 This should be covered with ceramic or cement tile as they are made from natural stone materials.
- Sealing:  
 The best solutions are mechanical fasteners and assembled joints (heat bonding or special glues), rather than directly applying primers to the support, since this contaminates the base and makes it difficult to recycle.
- Insulation:  
 The increase in insulation level demanded in regulations makes interior heating/air conditioning easier, with the resultant energy saving. The best solutions are cork, cellulose, mineral wools and light concrete.

Synthetic materials offer the same level of insulation but are finer, hence their frequent use.

As for residue, the importance of the anchoring system's subsequent value must be highlighted. Rigid materials are preferable, which fit together or are joined by mechanical fasteners, rather than adhesive or sprayed-on substances.

## OPENINGS

### Basic requirements for the placement of the openings in the exterior walls of a library

- To establish a visual relationship between the inside and the outside.
- To allow, if possible, natural light into the designated activity areas.  
 This possibility, if it is properly controlled, will be nice for the users and will save energy in artificial light. (Fig. 11.03).
- Bear in mind the layout of the furniture.  
 Given that norms establish a direct connection between the facility's floor space and the volume of open access documents, shelving is the most influential factor.  
 From this point of view - without forgetting the flexibility that a library needs - the placement of the openings must also provide the possibility of freeing up wall areas for the higher shelves, leaving the more central spaces for lower furniture so that they can be monitored more easily.
- Conservation storerooms, with their specific needs, require direct radiation – both solar and ultraviolet – control.

### Requirements for windows and skylights

- Durability of the materials and the mechanics.
- Protection from sunlight.  
 Avoiding dazzling, and thermal radiation.  
 In most cases, fixed or movable mechanisms will be necessary to modulate the solar light (cornices,

eaves, shutters, curtains, sunbreaks, etc.).

- Thermal insulation.

Windows and skylights play an important role in the thermal functioning of the building, because they let in heat and cold far more easily than walls.

The transmission coefficient is influenced mainly by two considerations:

- Type of glass.
- Type of carpentry.

The following table shows the K coefficients of the main types of windows.



**11.04**  
Blinds built in to the window frames.

Solutions for reducing thermal conductivity:

- Double glazing with air chamber.
- Low emissivity glass.
- Solar laminates to control thermal and light losses / gains.
  - ▶ There are peel-and-stick solar protection laminates on the market which can be stuck to any glass surface. They act as a reflective screen which can reduce heat generated by the summer sun by up to 75%, and retain up to 70% of the heat radiated to the inside during winter, with the resultant energy saving. They also protect against breakage as they are three times more impact resistant. If they do break, glass splinters remain stuck to the laminate.
  - ▶ There is paint which performs the same function as the laminates. This is a realistic solution for

horizontal surfaces (skylights). On vertical surfaces gravity may cause some slippage of the materials.

The most recent product is a glass with an electro-optical film (on the exterior side or well laminated to the interior side) which by electric signal makes all its cells face in one direction and renders the glass impermeable to sunlight. This allows active control of light and heat transmission by application of electric currents.

- Shutters and blinds: It is best to have the solutions fastened to the outside as they stop sunlight getting in. They also protect the external carpentry. With shutters, great care must be taken in the construction solution and in the execution of the work, otherwise there may be any number of problems (thermal

MAIN TYPES OF GLASS SURFACES AND THEIR HEAT TRANSMISSION COEFFICIENTS			
TYPE OF SURFACE	THICKNESS OF AIR CHAMBER	TYPE OF CARPENTRY	HEAT TRANSMISSION COEFFICIENT K (W/m <sup>2</sup> °C)
Single	-----	Wood, PVC Metal	5 5.8
Double	6 mm	Wood, PVC Metal	3.3 4
Double	12 mm	Wood, PVC Metal	2.9 3.7
Double window	Over 30 mm	Wood, PVC Metal	2.6 3

bridges, filtrations, etc.). In this case it is best to use integrated carpentry (frame and shutter in one piece). (Fig. 11.04).

- Cornices and eaves:  
These must have holes which stop the heat rising through the façade penetrating into the inside.
- Watertight carpentry to ensure no loss of energy during winter.
- Acoustic insulation.  
As a guide, single glaze windows of 6 mm insulate between 25 and 30 dB. Double glazing of 6+6 mm, insulates between 29 and 34 dB.
- Natural ventilation.  
Our climate means that for much of the year we can enjoy thermal comfort through natural ventilation. Having some openable windows has hygiene advantages and at certain times of year might create a major energy saving.  
In conservation storerooms, if they are oriented correctly, there should also be holes made which will provide natural ventilation for the collections.
- Security.  
Exterior glass panes that do not have to be protected by shutters or bars must be safety glass or well laminated.  
To avoid robbery or possible accidents, openable windows which are reachable by users must have an opening mechanism which is controlled exclusively by library staff. Removable handles are a good solution.

Environmental recommendations:

- Woodwork is preferable to plastics or metals since it is a natural material with low thermal conductivity, renewable, biodegradable and with very low environmental impact.  
The wood must be weather-resistant or be treated with non-toxic products which give it these properties.
- A good fit and sizing of the openings in the building will avoid the need for sub-frames and a large amount of joint sealing material between the woodwork and the wall.
- When fitting the glass, it is better to use a rubber sealant rather than silicon or other type of filler, which do not always provide a complete seal and also need maintenance.

## INTERIOR DIVIDERS

- The building's walls make flexibility and monitoring of spaces difficult.
- For the partition walls which are indispensable for reasons of safety or privacy, it is recommended that they are not structural and that their construction system is one of easy assembly and dismantling.  
Divisions can be made to measure with any material, such as wood or glass, but the most suitable solutions are the prefabricated or industrialized systems (standardized screens of various materials, plasterboard partitions, etc.).
- General recommendations:
  - Ensure the necessary soundproofing between the different spaces.
  - Avoid visible installations (except electrical sockets, switches, etc.) and any element which will make it difficult to use the surface for shelves (projections, steps, etc.).
  - Accessible systems which allow cable-fed installations through their interior.

Environmental recommendations:

- The most advisable support systems are those with galvanized steel sections which are light and easy to handle and recuperate.  
When wooden sectioning is used, the process needs to be closely checked. In most cases, as they are seen as an auxiliary element, lower quality woods are used, either treated or untreated, which have no guarantee of durability.
- As for the finishing panels, local wood and plasterboard are considered the best solutions.

## INTERIOR FINISHES

Interior finishes:

- Flooring.
- Wall coverings.
- Ceiling coverings.

Interior coverings must fulfil a number of objectives:

- Aesthetic solution.
- Acoustic and thermal solution.

- Ease of maintenance.
- Reasonable cost.

As they form part of the interior surroundings, interior finishes come into contact with different types of energy, whether light, heat or acoustic.

Appropriate conditioning, then, needs knowledge and choice of the materials according to their characteristics as active surfaces:

- It might be a surface which absorbs or reflects light.
- Thermally, the covering might be an accumulator or an insulator of heat. A dark, high density surface will retain heat. A light surface, on the other hand, will reflect heat.
- With acoustics, they can also absorb or reflect sound. That is why the choice of materials will depend on the composition of the space, emission sources, emanation of sound and hearing levels.

## FLOORING

Flooring, which is always within our field of vision, obviously has an active role in architectural project plans. The use of colours, textures, the exploded view, the action of light and other variables can indicate a particular direction, an area for attention, and to emphasize a specific use.

There is a huge catalogue of requirements that can be applied. Apart from those mentioned for interior finishes, it includes matters as wide ranging as:

- Communicating a tangible message which is in line with the actual space itself and the rest of the building.
- Comfort and safety for the public and the staff.
- Ease of cleaning and repositioning.
- Acoustic absorption and protection against impact noise.
- Resistance against constant use and occasional overloading (shelves, wheeled furniture, etc.).
- Durability.

This is a key matter. The idea is to maintain the initial visual message for the longest possible time; but who can guarantee that? Manufacturers offer more and more sophisticated

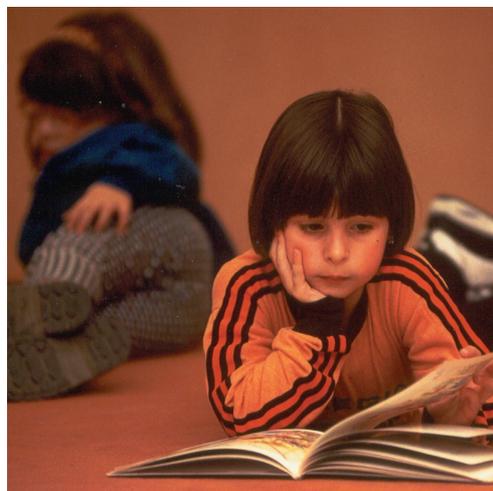
products in terms of laboratory testable qualities, but which have no real guarantees about their long term behaviour.

- The possibility of incorporating solutions to facilitate access to the installations underneath, either with junction boxes or a technical floor. The inspection system used must be compatible with the kind of cleaning required for the chosen material. If liquid products are used, junction box covers will have to be watertight. Junction boxes must be flush with the rest of the flooring to avoid accidents. It must be remembered that because of changeability, boxes concealed beneath furniture will be exposed when the distribution is changed round.

One other aspect to bear in mind, unrelated to the type of flooring chosen: several studies show that 60% of flooring problems are from incorrect laying, defects connected with stability, habitability, durability, fire protection and soundproofing.

Below are characteristics of some modern representative types of flooring:

- Fitted carpeting.
- Stone.
- Artificial compounds.
- Tile flooring.
- Light flooring.
- Wood.
- Laminate and veneer flooring.
- Continuous flooring.



11.05

## Fitted carpeting

Types of fitted carpet flooring:

- Natural.
- Synthetic.

### Natural

- This is normally made of one single material which serves both as resistant support and surface finish.
- There is a limited range because production depends on the raw material used, which is vegetable fibre.
- It has good non-inflammable behaviour and significant antistatic properties.

### Synthetic

- Consists of a resistant fibre base and a layer of surface finishing material.
- There is a wide range of qualities, textures, types of treatment, colours and thicknesses.
- The following treatments are possible: antibacterial, liquid resistant, non-fade, non-stain, antistatic, etc.

Available in rolls or tiles.

The laying does not need glues as it is a type of floating floor which is anchored by its own weight. (Fig. 11.05).

Conservation:

- Maintenance is only cleaning.

Positive aspects:

- Thermal insulation.
- Acoustic insulation:  
Fitted carpet flooring never insulates against aerial noise as it has a very low mass. Its major acoustic

properties are the absorption of internal noise and the muffling – since it is a soft flooring – of impact noise.

- Visual comfort.
- Safety in use.

Negative aspects:

- They retain an enormous amount of dust and can cause allergy problems. Anti-microbe treatments are particularly recommended for hermetic buildings.
- Limited useful life.  
The high foot traffic areas wear down quickly. Using tiles provides the possibility of partial substitution of the most damaged parts.
- Cleaning:  
Carpet flooring retains a great deal of dirt and dust.  
The hygiene needs demand regular cleaning, probably with a vacuum cleaner.  
The presence of so much different furniture make such an operation difficult.

## Stone

The stone flooring market is expanding, and there is a wide variety of types and formats, the price which is coming into line with other floorings and technology which means they can be floors of very reduced thickness – obviously depending on the type.

There are three types:

- Igneous rocks.
- Sedimentary rocks.
- Metamorphic rocks (Fig. 11.06).

### Igneous rocks

- These are dense, crystalline and can be brought up to a high shine finish.
- Granite is the most obvious as it is very hard, waterproof and resistant to wear and chemicals.

### Sedimentary rocks

- These are softer than the igneous and are made up of sediments and organic material.
- They have different levels of porosity, and certain treatments are necessary to avoid staining.
- The best known are sandstone, limestone and travertine.
- Sandstone keeps better than

11.06



limestone, and its main attraction is its veins and marine fossils.

### Matamorphic rock

- These are more recent, and are very hard due to the high temperatures and pressure they undergo during the process of their formation.
- The best known are marble and slate.
  - Marble:  
A variety of limestone which is slightly transparent with veins of other materials.
  - Slate:  
Impermeable rock with a great deal of mica, which makes it look wet and shiny.

### Conservation:

- Cleaning and protection.

### Positive aspects:

- Durability.
- Hardness, ease of maintenance – particularly with granite.
- Possibility of designing the shape of the pieces.

### Negative aspects:

- Noisy.
- Except for granite, most stone requires anti-porosity treatment.
- An over-polished finish can be slippery and cause falls.  
The unpolished finishes are more porous and difficult to clean, and are not recommended for a public building. On stairs and ramps, guaranteed non-slip elements are advised (polished bush hammered masonry, grips, ribbed strips, etc.).

## **Artificial compounds**

There are two kinds:

- Terrazzo.
- Compact.

### Terrazzo

- Pieces made from two different vibrated and pressed cement mortars forming the base, and a surface finish.
- There are two types, distinguished by the size of chips used in the surface layer:
  - Traditional: uses fragments over 4 mm.



11.07

- Micrograin: sand between 1 and 3 mm.
- Different treatments can also be used for the surface layer, such as using raised moulds or washing down the agglomerates to highlight the aggregates.
- Evolution in industrial processes over the last few years has resulted in new properties. Like control over water absorption near the joins and uniform defined colours in the case of the micrograin type.
- It is a fairly porous material. To avoid staining where liquid has seeped in, it is a good idea to protect the surface with waterproofing products, which also allow the flooring to breathe (Fig. 11.07).

### Compact

- Tiles formed of one single compound, which use different surface finishes: one on the walking surface and one on the surface laid on the adhesive mix.



11.08



11.09

- During manufacture, small marble, basalt or granite chips are used to which pigments are added. They are joined through pressure by the application of synthetic resins.
- They are more recent than terrazzo and are recommended for their high resistance to foot traffic wear, and their low maintenance.
- The colours are uniform and the aggregate granulometry is very fine.
- Production is in two well-defined formats: slabs for the marble industry and tiles for flooring. The first of these can also be used in large format flooring when the mechanics allow.
- Elastic joints are needed every 100 m<sup>2</sup> to counteract any expansion.

**Conservation:**

- Surface protection and occasional polishing.

**Positive aspects:**

- Hard wearing and durable.
- Its weight makes it suitable for technical floors.

**Negative aspects:**

- They are noisy, with low acoustic absorption.
- The material's configuration and weight can cause cracks and dents during handling and joining operations.

**Tile flooring**

Tile flooring has undergone major evolution with production of large very low porosity pieces.

**Types of flooring:**

- Ceramic tiles.
- Stoneware tiles.
- Porcelainised stoneware tiles (Fig. 11.08).

Ceramic tiles

Baked clay pieces which may have a glazed surface.

Stoneware tiles

The difference between conventional ceramics and stoneware is in the higher grade of vitrification.

The types of raw materials and high baking temperatures mean stoneware is a harder, less porous material.

Porcelainised stoneware tiles

Made of white paste, they have superior vitrification and water absorption below 0,5%.

This low porosity means it is perfect for indoor and outdoor flooring.

**Conservation:**

- Maintenance is only cleaning.

**Positive aspects:**

- Durability.

**Negative aspects:**

- Very noisy.
- They wear down where there is abrasion from foot traffic.
- Very marked grout lines which can gather dirt easily.
- In large spaces, the expansion coefficient means that elastic joints have to be used.
- Because this is such a dynamic market, series are limited and it can be difficult to find pieces which have exactly the same characteristics.

**Light flooring**

- Natural
  - Linoleum.
- Synthetic
  - Rubber.
  - PVC (polyvinyl chloride.)
  - Vinyl.
  - Polyurethane (Fig. 11.09).

- These are thin floorings which concentrate all the appropriate properties into a few millimetres.



11.10

- They are compression-, injection-, glue- and, more recently, vacuum-fused by in a mould.
- There is a wide range of colours and surface textures available. Uniform colour finishes are not recommended as they show up stains and wear.
- They come in adhesive tiles, floating tiles which can be set with others, and in rolls.
- A recent breakthrough has been the light flooring on a synthetic foam backing which increases the acoustic insulation and muffles impact noise.
- Anti-dust, anti-liquid and antistatic products can be applied, as can other protective products.

Differences between “natural” and “synthetic”:

- Advantages of “natural”:
  - More elasticity.
  - They produce no noise in contact with rubber soles.
  - They are not affected by small cuts or cigarette burns. In libraries, smoking is not allowed, but one must allow for certain unexpected situations, or possible changes of use.
  - Better environmental behaviour.
- Advantages of “synthetic”:
  - They are harder-wearing, cheaper, easier to maintain and they have a wider range of different types.

Differences between Rubber and PVC:

- Rubber is harder wearing and has better anti-slip properties.
- It is more elastic, has better acoustic and thermal properties, and is

antistatic (there is no appreciable charge from footwear electrostatic).

- The joints can be butt spliced because rubber does not expand or retract.
- It is resistant to cigarette burns, although permanent nicotine stains remain if the cigarette is left to burn in contact with the flooring.
- On the other hand, once it is laid, rubber flooring needs to be cleaned with detergent and de-waxing products after which the degreased surface should be treated with metal wax.

Conservation:

- Limited to cleaning.
- Periodically a fine protective film with wax detergents should be applied to eliminate porosity produced by wear.
- They can also be stripped in order to eliminate the worn out protective layers.
- There are vinyl floorings on the market which are protected with polyurethanes which need no protective or stripping treatments.

Positive aspects:

- Dent and wheel resistance of a similar level to that of ceramic or terrazzo floors.
- Good acoustic absorption.
- Reasonable price.
- Elastic capacity for denting, without any permanent deformation occurring.
- Because they are so light, they are suitable for structures where the load will not be increased.
- Because they are fine, they can be laid over existent flooring.

- Their flexibility means that continuity over large surfaces can be obtained. Plus, when rolls are used, there are fewer joins.

Negative aspects:

- Because this flooring is not very thick, the final look is closely connected to the surface on which it is laid, which needs to be levelled if it is not absolutely flat.
- They cannot be buffed or ground when signs of wear appear. When rolls are used, replacing only one part becomes more difficult.
- Exposure to sunlight can affect the surface and produce ageing and an increase in dust absorption.
- In some countries, because of the demands of recycling, regulations prohibit their being stuck directly on to the mortar of the supporting surface. Floating floors are a solution to this problem.

## Wood

The evolution of wood is not based on the material, but on its transformation processes. That is why a direct relation between the type of wood and its behaviour cannot be established without taking into account the industrial process used in its commercialization.

Protection and improvement techniques include:

- Press drying to increase density.
- Impregnation with polyester resins by ionization or other methods which can produce up to a tenfold increase in resistance.
- Ultraviolet protection to maintain the natural colour.
- Anti-decay treatment. Currently, the most common application is copperisation, which consists of extracting the air from the cavities and filling them with a liquid whose main ingredient is copper salts, improving the mechanical capacities.

Types of flooring woods:

- Solid wood.
- Particle board.
- Plywood.
- MDF.

## Solid wood

- Maintaining shape/warping problems are controlled these days through regulation in the drying process and physical and chemical stabilizing.
- It comes in planks, paving blocks or parquet of various sizes. (Fig. 11.10).

## Particle board

- Made of wood particles and resins bound together and pressed.
- Smoother surfaces than solid woods, and a more homogeneous mass.
- They can be used as a base for flexible flooring in light structures or directly as flooring. In this case, they must be protected with anti-abrasion treatments or surface coverings which can be walked on.

## Plywood

- Manufacture consists of stacking together sheets of wood veneer with the grains in different directions to make it more resistant and produce a stronger more stable material.
- They come in a wide range of formats and aesthetic possibilities, since the surface layer can be of any species of tree.
- "Floating parquet" is made in this way.
  - This is the most commonly used system in interiors, it is made up of a wear layer of protected natural wood and two of plywood.
  - It is laid on a laminate of polyurethane foam installed on the support, which gives independence to its movements.
  - The word 'floating' does not indicate any specific acoustic qualities. To stop impact noise, thicker than normal layers must be used.

## MDF

- This uses techniques used in plywood and particle board production.
- The high pressure used in the manufacturing process makes it very hard and dense, with low water absorption in comparison to the other wood types.

Conservation:

- Only cleaning.
- Materials: Lacquers and varnishes to give it durability and which need to be

reapplied when the walking surface wears down.

- When one section becomes worn, it must be sanded and the protective layers reapplied.
- Exterior flooring:
  - These must be primed with a UV filter oil.
  - This should be done once a year, without it needing to be smoothed.

Positive aspects:

- Low thermal conductivity.
- Good aesthetics.
- Significant useful life.

Negative aspects:

- Delicate.
- Noisy.
- Poor resistance (varies depending on type of wood).
- Both sanding and application of protective films when it wears down need all documents to be protected, and the spaces to be left unused for several days.
- High price.
- Inflammable: fireproofing needed.
- Susceptible to insects and fungi: treatment needed.
- Direct sunlight can change the colour if it is not protected.
- Wood is hygroscopic so it can warp and expand.  
For exteriors, if tropical wood is not wanted, the easiest choice is pine, which needs treatment to make it weather-resistant.

## Laminate and veneer flooring

### Laminate

Made from various laminates fused together.

This flooring appeared fairly recently, but has well-known forerunners: the decorative furniture and wall laminates known by their brand name ("Formica").

### Veneer

The same basic concept, but it is a high-tech product which can withstand more aggressive usage.

- Both are formed by a transparent surface layer which is highly resistant to foot traffic and ultraviolet rays fused to wall paper, a sheet of wood or a

thin decorative element. All this is bonded to a plank of high density wood fibre, and then finally to a stabilizing layer made to absorb the irregularities of the surface.

- These can be laid fixed to a base, or as a floating system. The joins are dovetailed.

Conservation:

- Limited to cleaning.

Positive aspects:

- Dent and wheel resistance very similar to that of ceramic tiles and terrazzo.
- Easy to lay.
- Variety of looks depending on the decorative laminate.

Negative aspects:

- Noisy.
- Very marked joins which gather dirt easily.

## Continuous flooring

Practically all interior flooring is based on laying pieces supplied by the market, and one rarely comes across a shape, colour or finish which is not from the catalogue. The joins between the pieces create a general pattern or texture for the total floor which influences the look of the whole.

"In situ" flooring creates an abstract presence which turns the floors into practically non-existent surfaces, a solution which fits in perfectly in architectural projects where the non-existence of recognisable references is the predominant theme.

Types of continuous flooring:

- "In situ" terrazzo.
- Industrial flooring.

### "In situ" terrazzo

- Difficult execution.
- The main problem is controlling shrinkage of the mortar, which needs to be cement-rich to have a minimum of scratch resistance.
- Need for mortar shrinkage joints. The most recent solutions are synthetic resin mixtures allowing there to be no joins.
- Like all thin, rigid flooring they are

susceptible to warping when the support is flexible.

#### Industrial flooring

- Neither the texture nor the colour of the final look is completely homogeneous.
- Joins can be avoided through the use of mortar containing anti-shrinkage additives.
- The use of acrylic or polyurethane resins adds possibilities for colours, although they produce excessive shine.
- Types of industrial flooring:
  - Self-levelling:
    - ▶ Made with cement mortar with added flux and surface finish aggregates. They are 2 to 3 cm thick.
    - ▶ They can also be made of epoxy or polyurethane resins with added powder colour, with a total thickness of 2 to 3 mm.
    - ▶ Strengthening meshes can be inserted.
    - ▶ They are a good solution for restoration or protection of deteriorated concrete, terrazzo or ceramic floorings.
    - ▶ They are antistatic and have low porosity, good hygiene and withstand aggressive use well.
  - Multilayer:
    - ▶ Made from transparent polymeric resins and colorants, with a total thickness of 1 or 2 mm.
    - ▶ Various aesthetic results can be obtained by the use of aggregates of different granulometry.
    - ▶ They are waterproof, they withstand light foot traffic and are scratch and cut resistant.
  - Painted:
    - ▶ Made from epoxy and polyurethane resins which are highly resistant to scratches, chemical spillage and weather.
    - ▶ Waterproof and elastic, resistant to light foot traffic with anti-dust finish and good colour and shine stability.
    - ▶ Less than 1 mm total thickness.

#### Conservation:

- Repairs, repositioning or new layers

to replace worn ones are done with the same materials.

#### Positive aspects:

- Scratch resistant.
- Durability, if laid correctly.

#### Negative aspects:

- Added difficulty of execution when laying floor in reduced spaces and tight corners/acute angles.

#### **Most suitable materials depending on kind of activity**

With so much on offer, the usual process is to choose a flooring which suits the use. Various demands mean that certain materials are associated with certain activity areas.

#### Access and circulation area

*Stone – Artificial agglomerates – Continuous flooring.*

- Hardwearing, durable and easy to clean comes before acoustic absorption. Ramps and stairs need anti-slip treatments.
- Building access:
  - Metal grilles – natural or synthetic mats – exterior carpet flooring.*
    - Outside there should be solid paving to avoid dirt being carried in.
    - At every building entrance elements should be installed to act as filters (dust, mud, water, etc.). A calculated 80% of floor dirt comes from outside. For that reason, an efficient access system needs three filters in the following order from outside to inside:
      - ▶ Heavy matting or other ridged element to get rid of the most solid dirt.
      - ▶ Lighter matting.
      - ▶ Carpet flooring to get rid of small particles and water.
    - A small eave over the doors can contribute towards ease of cleaning and conservation.

#### Public activity areas

*Stone – Artificial agglomerates – Light floorings – Continuous floorings - etc.*

- Comfortable, silent, insulating and resistant materials.
- Given that all these properties cannot

be found in one material, the choice must depend on the type of activity and the volume of public the library expects.

- Light floorings (PVC, linoleum, etc.) are a reasonable compromise between the demands of comfort and the cost of installation, cleaning and maintenance.
- As a general criterion, carpeting and wood are not recommended. Having said that, their good thermal and acoustic behaviour, means they could be acceptable if the cleaning and maintenance needed can be ensured.
- Spaces for children:
  - *Carpet flooring – Light floorings - Wood - etc.*
  - Areas for children must have warm floors, particularly for corners for informal reading or storytelling, where children normally sit on the floor or on cushions. Being comfortable and warm is more important than being long-lasting or easy to clean.
  - Other spaces have the same requirements as any other public activity area.
- Conference room:
  - *Carpet flooring – Light flooring, etc.*
  - Silent materials with adequate acoustic absorption.
- Multi-purpose rooms:
  - Must have flooring suitable for the activities anticipated.

#### Internal work areas

- Offices:
  - These can have the same flooring as the public activity areas.
- Workshops and storage areas:
  - *Granite – Artificial agglomerates – Continuous flooring.*
  - Scratch-resistant, durable, hard, and easy to clean materials.
  - As they are restricted areas which do not have much traffic, they do not need high comfort levels.
  - Computer and magnetic material storage must have antistatic treatment.
    - *Rubber – Other appropriately treated light floorings - etc.*
  - In closed storage areas, an anti-dust treatment is recommended.
    - *Appropriately treated light floorings - etc.*
- Staff rest area:



**11.11**  
False ceiling of natural pressed fibre with galvanized steel borders.

- These can have the same flooring as the public activity areas.

#### Logistics areas

- Cleaning equipment spaces:
  - *Stone – Artificial agglomerates – Ceramic tile – Continuous flooring.*
  - Damp resistant, easy to clean materials.
  - The floor should slope towards a drain.
- Installations rooms:
  - *Artificial agglomerates – Continuous flooring.*
  - Scratch resistant, long-lasting hard materials.
  - Computer and telephone installation rooms should have antistatic treatment.
    - *Rubber – other appropriately treated light floorings, etc.*
- Parking/Loading and unloading zone:
  - *Artificial agglomerates – continuous flooring.*



**11.12**  
False ceiling of plasterboard with galvanized steel borders.

**11.13**  
Fixed ceiling of perforated panels, guaranteeing good acoustic absorption.



- Scratch and damp resistant, long-lasting and easy to clean materials.
- The floor should slope towards a drain.

#### Toilets

- The same requirements as the cleaning equipment areas.

Environmental recommendations for types of flooring:

- Material:  
At the beginning of this chapter, the environmental behaviour of the most important materials was explained.
- Laying:  
When using materials of different natures, it is recommended that systems are used which allow the separation between the finish surface and the support (floating system, mechanical fixtures or dry joints). When the materials are of the same nature, the joint could be solid as they can be recycled together.

**11.14**  
Fixed ceiling of perforated panels, guaranteeing good acoustic absorption.



## WALL COVERINGS

As these surfaces react to light, temperature and noise, methods used must be adapted to this behaviour, as well as aesthetic questions and the inevitable financial circumstances.

Recommendations:

- Anticipate installing corner protection up to a minimum height of 2 m., especially in the foot traffic areas.
- Avoid plaster-based materials in places susceptible to being knocked or dented or getting damp, etc.
- Walkways:  
These will undergo major wear from being rubbed against. Therefore materials with a resistant finish are recommended, such as exposed brickwork, stucco lustro on plaster, stone or ceramic cladding, plywood, laminates, etc.
- Designated activity areas:  
These can be plastered and painted if that is most convenient. In such cases, regular repainting must be expected.
- Conference room:  
Materials with good acoustic behaviour.
- Toilets:
  - Coverings all the way up must be impact resistant, waterproof, rot-proof, non-porous and easy to clean with water.
  - Laminated doors.
  - Anti-graffiti finishes, particularly in the cubicles.
- Workshops and storage areas:  
Materials whose behaviour suits the use.
- Technical areas:  
Coverings of plaster and paint type are recommended.

## CEILING COVERINGS

The type of covering is closely related to the following questions:

- Installations:  
Air conditioning, lighting and cabled installations need inspection access.  
When they pass through the ceiling, this should be as practical as possible, at least in the areas where

people walk and where there is the possibility of putting new ones in, whether connected to the level below or the floor of the level above. (Fig. 11.11).

- Acoustic control:  
Because this is a library with certain acoustic needs, the ceiling is the best element for absorbent material placement, not so much for the noise outside but for the absorption of the interior acoustics (reverb time).

Ceiling systems:

- Exposed plain concrete ceilings are noisy, but far less so if composed of recyclable coffers.
- Plasterboard finishes have medium acoustic behaviour. (Fig. 11.12).
- Tiles using absorbent materials and perforated panels have good acoustic behaviour. (Fig. 11.13 and 11.14).
- In damp areas (toilets, technical offices, etc.), damp-sensitive material is not recommended (e.g. plaster, plastered surfaces or plastified fibre glass).

When there is a suspended ceiling on metal supports, the possible rusting of these supports must be considered.

Environmental recommendations for types of coverings:

- The flat slab suspended ceiling system means that the materials can be recovered.
- For the finishing panels, the best solutions are local wood and plaster.
- The most highly recommended systems of support are galvanized steel sections, which are light and easy to manipulate and to recover. When wooden sectioning is used, the process needs close checking. In most cases, as it is seen as an auxiliary element, second rate woods are used, either treated or untreated, which have no guarantee of durability.



## KITTING OUT THE SPACES

*Installations for the comfort and safety of the users and the collections*

*Installations needed for the library to function*

*Air treatment – Air conditioning*

*Lighting*

*Acoustic conditions*

*Fire protection system*

*Cable-fed installations*

Comfort, user and staff safety, collection protection and specific installation quality all have a direct influence on the way the library is used.

In general, current regulations govern fire safety and the maximum and minimum levels of comfort, affecting ventilation, air conditioning and soundproofing. On the other hand, there is not usually a rule which indicates maximum levels for the rest of the installations, and most projects are based on a series of recommendations from different national and international groups.

A number of technical aspects and recommended levels is set out below which could serve as a basic guide for the implementation of library projects.

For the kitting out of library spaces, there are two types of installation:

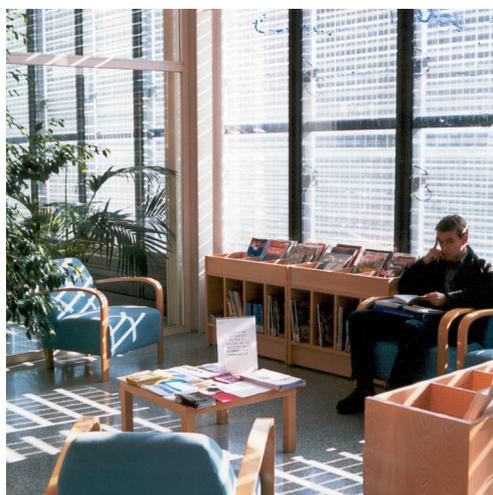
- Installations for the comfort and safety of the users and the collections.
- Installations needed for the library to function.

### **Installations for the comfort and safety of the users and the collections**

To reach an adequate level of ambient comfort, the building needs to be fully kitted out, for which it can be divided into two types of spaces:

- Documentary deposits.
- Designated activity areas.

The first type have requirements regarding conservation which specifically determine the types of installations needed. For activity areas, the characteristics are similar to those of any public building.



**12.01**  
*Pompeu Fabra  
 Library (Mataró,  
 Barcelona).*  
*Architect:  
 Miquel Brullet.*

Even so, in most libraries there is a contradiction between the desire to have show open access collections on show, and the desire to conserve and protect them both from wear and tear and from abuse and theft.

Elements to be monitored:

- External agents:
  - Insulation.
  - Temperature and damp.
  - Pollution, dust and contamination.
  - Outside noise.
- Interior elements:
  - Temperature and air quality.
  - Inside noise.
  - Fires.
  - Theft.
  - Degradation and vandalism.

### **Installations needed for the library to function**

- Electricity.
- Computer.
- Telephonic.
- Audiovisual.
- Anti-theft system.

### **Generals recommendations for all installations**

- Specification during the first stages of the project.
- Adaptation to the architecture of the building.
- Consultation with specialist technicians:  
The programmer will need advice to define exactly what the library needs programme should be. Based on the programme requirements, and due to the complexity of the installations, the architect will need advice from specialist technicians who can provide solutions to all the demands and give him the information affecting the architectural project work (quantity of cable channels, placement of distribution boxes, etc.).
- Advisability of specifying the layout of the furniture:  
Much wiring, mainly that specific to library services, terminates at a piece of furniture. Knowing about the types

of furniture will enable all the connections to be seen to.

- Defining the connections, distribution boxes, main control panels and wiring by the following criteria:
  - Generous estimates.
  - Ability to take on an anticipated increase in lines.
  - Systems that can be enlarged and adapted.
  - Adequate physical space for the installation.
  - Accessible for inspection – not sacrificing the space organization.
- Placement of the distribution boxes:
  - Inaccessible to the public.
  - Placement which avoids the ductwork (for air, information, electricity, etc.) being too long, with consequent loss in power.
- Possibility of making certain sectors independent, depending on the number of users passing.
- Application of anti-noise transmission techniques.
- Sufficient budget to cover the needs defined in the programme.
- Incorporation of the following information:
  - Estimate of operation costs.
  - “Maintenance programme”  
In the section “Sustainability and Maintenance” in the chapter “Basic criteria for the architectural project”, the maintenance programme structure is given in detail.
- Choosing a system with sustainability and maintenance criteria:  
Experience has shown that an installation which is simple and limited but does not need much maintenance is more efficient than an over-complex system which is hard to maintain because of budget limitations.
- Incorporation of centralized control systems with IT media.
  - Most common types of control:
    - ▶ Management, area coverage and programming of temperature.
    - ▶ Selective tripping of electrical currents.
    - ▶ Management of the night rate.
    - ▶ Anti-intruder security.
    - ▶ Safety in use.
    - ▶ Detection of leaks.
    - ▶ Motion sensors which trip

- lighting and air-conditioning units.
- ▶ Remote control for the equipment (depending on hours of opening, cleaning times and so on).
- ▶ Remote control of different facility buildings.
- ▶ Information about energy consumption.
- ▶ Maintenance-related information (state of filters, times the equipment is functioning and so on).
- Advantages:
  - ▶ Rationalizes consumption.
  - ▶ Availability of a results assessment system allowing adaptation and improvement for future projects.

## KITTING OUT THE SPACES

To offer comfort, safety and quality of library service the building needs all kinds of installations. But there must also be actions and criteria which go beyond the conventional building level.

This chapter is dedicated to analysing all the aspects connected with the quality of the library, and it is not easy to separate the installations from the actions needed, as two independent groups. Even so, the best way of looking at them is thought to be the following division:

- Air conditioning.
- Natural and artificial lighting.
- Acoustic conditions.
- Fire protection system.
- Cable fed installations:
  - Electricity.
  - Installations specific to the library:
    - ▶ Voice and data.
    - ▶ Audiovisuals.
    - ▶ Equipment for the conference room.
  - Anti-theft system.

## AIR TREATMENT – AIR CONDITIONING

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In this section, we will be, looking at the “treatment of air” in order to reach certain comfort levels within the library. The generic term “treatment” can be called

“conditioning” when connected with user comfort, where needs are very different from document conservation.

Needs for document conservation vary according to the format. Incompatibility with open access collections means the demands have to be played down depending on patrimonial interest, and the kind of access system used in each type of library.

Factors determining the climate inside the building:

- Air temperature.
- Relative humidity.
- Air renewal.
- Pollution, dust and contamination.

### General considerations

- The most suitable type of air-conditioning for each building is never obvious, and for the most sustainable solution, one needs to know the building’s climate-control-free behaviour during summer and winter. With this information, it would be easier to find a system which regulated the differences between the actual climate and comfort levels.
- It makes energy-saving sense to have exterior walls able to maintain certain temperatures during the night and periods of inactivity which are compatible with the conservation of the library materials – both the furniture and the documents. The building’s passive influence on thermal conditions inside is connected to the following areas:
  - Thermal insulation.
  - Thermal inertia:
 

The thermal stability of the actual mass of the building, directly connected to energy accumulation, makes it possible to balance the thermal changes caused by the climatic variations outside and the conditions of use inside.
- Types of user activity, with temporary and dynamic use of the library, produce certain demands for comfort which differ from those required by a permanent workplace. Given that a large part of the thermal loads come from people, equipment must be used which can constantly be adjusted to variations in these partial loads.

- Intensity of use of the main door means a thermal barrier should be installed on it in order to limit the interior/exterior thermal differential losses. This solution would also reduce the amount of dust getting in.
- The different climatic situations of the walls between each space mean that the temperature and humidity are not constant or uniform across the whole floor area. The air-conditioning layout must take these imbalances into consideration.
- The incunabula collections require very specific control. High humidity and temperature accelerate cellular decomposition and encourage fungal and bacterial growth. Interior conditions, therefore, must be kept between fixed minimums and maximums, 24 hours a day, every day of the year.  
The need for constant control means an air-conditioning system independent from the rest of the library.
- Sustainable architecture means dealing with air-conditioning with energy-accumulation systems. These systems are not yet included in good energy practises, because of the difficulty in finding accumulation systems.
- Experience shows that in most cases climate control calculations are not very thorough, causing major problems in lack of comfort. This situation is most evident in weathertight buildings, where natural ventilation is not viable.

### Temperature

Because of our climate, and the intention of expanding opening times / days, climate control (heat and cold) installation becomes a necessity. Apart from that, regulations dictate that temperature differences between the inside and the outside of the building be controlled.

### Humidity

Relative humidity is the most complicated and expensive aspect to control. Comfort level fluctuates between

45 and 65%. Ambient humidity in our climate very often exceeds those figures. Documents in storage need the humidity level to be kept constant. The main difficulty is in the variety of requirements according to format. Relative humidity limits should not differ with respect to the average outside humidity in oscillations above  $\pm 5\%$ . This requirement adds a considerable amount to the costs of the installation.

### Air renewal

The temperature and hygrometric level of a place are not enough to ensure comfort, hygiene and health. Air which gets in through gaps in doors and windows, or through purpose-built grilles, might ensure some air renewal, but this natural ventilation is random, and varies depending on interior/exterior temperature difference, or how well sealed the openings are. Intake of outside air should be planned for, so that the stale inside air gets replaced through pressure.

Designated activity areas:

- A person needs 32 m<sup>3</sup>/hour of clean air.  
Regulations should demand this renewal of fresh outside air, especially in weathertight buildings. This target is not met in most climate control installations.

Book deposits:

- This requires a renewal of 0,5 of the space's volume every hour.
- Aeration of the collections also depends on the furniture it is stored in. Movement of air within the shelving system must be ensured when there are no aisles between them. With compact systems, it is recommended that the shelving only has a support structure, or that punched panels for anti-theft protection.

### Pollution, dust and contamination

These are degrading agents for the collections and can also cause allergy problems for the users. Preventative measures:

- Weathertight mechanisms for all the building's openings.
- Non-dust retaining, antistatic finishing materials.
- Filters in the air-conditioning and exterior air inlets.
- Regular cleaning.  
Apart from the daily cleaning, thorough cleaning must be scheduled for the whole library, including both the visible material (furniture, documentary collection and so on) and difficult access places (corners, undersides of fixed furniture and so on.).

### Recommended comfort levels

See table 12.02.

### AIR TREATMENT SYSTEMS

There must be a dual feed circuit: a continuous one for the documents, and another for people, which changes according to the library's periods of occupation.

Broadly speaking, climate conditions can be controlled through fairly basic equipment:

- Heating-cooling:  
This facilitates temperature adjustment and mechanical intervention in hygrometry.
- Ventilation:  
This facilitates the increase in air-renewal, level of air purity and temperature increase / decrease.

### Energy sources

#### Diesel oil, paraffin and other fossil fuels

- Non-renewable.
- Economic.
- They need storage deposits and ventilation ducts from the boilers.
- All of them, to a greater or lesser extent, produce pollutants.

#### Gas

- Non-renewable.
- Reasonable cost and reliability.
- Low pollutant energy.

#### Electricity

- Cleanest energy source.  
This feature refers to the point of consumption. At the point of production, there is major environmental impact.
- More expensive than others mentioned.  
When the production system is a heat pump, the resultant savings bring the price into line with gas.
- Economy of initial installation, particularly of independent appliances (radiators and convectors, air conditioning units, etc.).
- Unlike the others, and particularly because it is an energy source which is always necessary in any building (lighting, etc.), electric climate-control avoids the need for further subcontracting.

#### Renewable energy

This means energies of unlimited availability .

<b>Recommended comfort levels:</b>			
PLACE	AMBIENT TEMPERATURE (°C)	RELATIVE HUMIDITY (%)	AIR RENEWAL (m <sup>3</sup> /h/pers.)
Book deposits	From 15 to 18 (±1)	From 45 to 65 (±5)	Minimum (0,5 volume of the space per hour)
Spaces for public use	From 19 to 21 Summer: from 23 to 25 Winter: from 19 to 21	From 45 to 65	32
<b>Environmental conditions for various formats:</b>			
FORMAT	AMBIENT TEMPERATURE (°C)	RELATIVE HUMIDITY (%)	
<i>Paper</i> <i>Vinyl</i> <i>Photographic</i> <i>Magnetic</i> <i>"Microforms"</i>	<i>From 15 to 18</i> <i>From 20 to 22</i> <i>From 10 to 20</i> <i>From 14 to 18</i> <i>From 18 to 20</i>	<i>From 45 to 65</i> <i>From 65 to 70</i> <i>From 30 to 40</i> <i>From 40 to 50</i> <i>From 30 to 40</i>	

12.02

Types of renewable energy:

- Solar energy (thermal and photovoltaic applications).
- Aeolic energy.
- Hydraulic energy.
- Biomass.

The first two are recommendable for reasons of energy and ecology, but not economy. Currently they can be economically viable for the production of hot water. For any other applications, to be viable they would need subsidies or political backing.

As new cost-reducing technological advances come into play, their application will become more commonplace, given that the absence of any energy costs in application will balance the initial installation costs.

### **Production systems**

Given the enormous effect that this kind of installation necessarily has on the architecture (exterior image of the building, ductwork, etc.), this is a choice which needs to be made in the early stages of the project.

#### Boilers

Only for heating.

#### Combined cooling and heating machines

Types of machines:

- Cooling plant (cooling).
- Heat pump (heating and cooling):
  - Pumping of cooled or heated air through the heat pump.
  - Recommended for high occupation spaces.
  - The functioning of the system has a COP (coefficient of performance) of up to 300%, with the resultant energy saving.

One single installation could solve questions of heating, cooling and natural ventilation, as it is compatible with the intake of pretreated outdoor air.

The possibility of having mechanical ventilation during certain periods of the year without either cooling or heating the air, brings energy consumption down considerably.

#### Solar panels

Only for heating.

### **Emission systems**

#### Radiation and convection

- Only for heating.
- Independent radiators or centralized systems with closed water circuit.
- The possibility of using heat accumulation systems with the resultant energy savings through application of night rates.
- Depending on the outside temperature, it may be difficult to reach desired temperatures. In such cases it is recommended that they be combined with other systems.
- Radiators take up a lot of wall space and make it difficult to put up shelves.

#### Radiant floor

- Heating and cooling.
- One particular thing about this system: because the user's perceived temperature is an average between the temperature of the outside wall and the air of the room, there is a large naturally cooled surface (the floor) which means the ambient air does not need so much treatment, resulting in an energy saving of up to 10%.
- Types of radiant floor:
  - Electric element mesh (heating only).
  - Water pipes (heating and cooling).
- Possibility of using heat accumulation systems.
- The radiant floor is invisible and frees up all surfaces, horizontal and vertical.

#### Fan-coils

- Heating and cooling.
- Air treatment through a machine where cooled or heated air circulates.
- One option is a mixed system consisting of fan-coils plus the intake of primary pretreated air.

#### Climatizers

- Pumping of cooled or heated air in a climatizer.
- This enables large volumes to be climatized quickly.
- The "free-cooling" system is recommended. This is a mechanism which, when the outside temperature nears the comfortable level, the system stops functioning as a climatizer and uses outside air. With our climate, climatizers can be done

without for about 40% of the time, and, given that the cost is 20% higher, investment is recuperated in a short time.

## LIGHTING

### Light

#### Radiant energy or electromagnetic energy

This is a type of energy created by means of rays, which is to say, periodic disturbances in the electromagnetic state of space.

The speed of propagation in a vacuum is 300,000 km/s.

Types of electromagnetic energy:

The usual classification is based on wavelength.

- Gamma rays.
- X-rays.
- Ultraviolet rays:  
These activate chemical reactions.
- Visible rays:  
Any electromagnetic radiation able to produce vision.
- Infrared rays:  
These produce heat.
- Hertzian waves.
- Very low frequency waves.

#### Light

This is electromagnetic radiation with wavelengths around the visible spectrum, including those superior (infrared) and inferior (ultraviolet).

Vision: everything we see is reflected light. For this reason it is not the characteristics of light themselves which interest us so much as the effects on the surfaces it illuminates and which, in turn, illuminate them to us.

### Basic magnitudes

MAGNITUDE	UNIT	SYMBOL
Luminous flux	Lumen	O (lm)
Luminous intensity	Candela	I(cd)
Illuminance	Lux	E (lx)
Luminance	Candela/m <sup>2</sup>	L (cd/m <sup>2</sup> ).

#### Luminous flux (lm)

This is a characteristic magnitude of the

light source, and refers to the amount of light emitted by a source in one second, in all directions.

#### Luminous intensity (cd)

This is the amount of light emitted from one source in one second in a specific direction. It indicates the shape in which light from one source is distributed in space.

#### Illuminance (lx)

This is the characteristic magnitude of the illuminated object. It indicates the amount of light incident on a surface unit of the object when it is illuminated by a light source.

The level of Illuminance is inversely proportionate to the square of the distance from the light source. In libraries, the amount of light is calculated on the basis of the work surface height, which is normally 70 cm.

#### Luminance (cd/m<sup>2</sup>)

This relates the light source to the feeling produced in the observer, and measures how bright the illuminated objects will appear to the observer's eye.

### Illuminance

A building and all the walls which separate it from the outside are enough for natural illuminance if they allow the level of illuminance needed for an activity inside to be carried out.

These are some levels of illuminance produced by natural light:

– Exterior space on a clear day	From 100,000 to 500,000 lx
– Exterior space on an overcast day	5,000 lx
– Exterior space, at night with a clear moon	0.7 lx
– Interior space, without direct sunlight, near a window	2,000 lx

The layout of the walls and artificial light are the elements which create the comfortable lighting level needed all day long.

## Recommended illuminance

ACTIVITY	ILLUMINANCE (lx)
Precision work activities	From 600 to 2,000
Drawing	From 500 to 800
Exhibition spaces	From 500 to 700
Reading - counter - offices	From 500 to 600
Open access shelving area	From 400 to 600
General lighting (foyer etc.)	From 250 to 400
Bibliographic deposits	From 200 to 300
Activities which require no special attention to sight	From 200 to 300
Working with a computer	From 150 to 300
Circulation areas	From 150 to 300
Conference room	From 100 to 300
Toilets	From 100 to 200
Incunabulum deposits and unprotected graphic formats	50

## Reflection coefficient

This is the amount of incident and reflected light on a surface as a result of its dark or light tone.

The colours of the wall coverings, both inside and outside, play a major role in light diffusion. The reflection coefficient of some colours is:

White	0.8
Very light colours (cream and off-white)	From 0.5 to 0.7
Light colours (pastels)	From 0.3 to 0.5
Medium colours (bright light colours)	From 0.1 to 0.3
Dark colours (browns, bright dark colours)	From 0.1 to 0.3
Very dark colours (black and dark brown)	Less than 0.1

Apart from the walls coverings' influence, the various surfaces in a space reflect the light depending on how they are placed. The following reflection factors are recommended:

Ceiling	Over 70%
Walls	From 30 to 70%
Floor	From 20 to 40%
Furniture	From 30 to 40%

## NATURAL LIGHT AND ARTIFICIAL LIGHT

- "Natural light" is taken to mean light emitted by a natural light source (moonlight, starlight, sunlight etc.). The commonest and most useful is from the sun, which changes position depending on the time of day, the season, climate conditions and geographical situation. On the other hand, artificial light can be used as one wants in space and time, but with an energy cost which differs greatly from that of natural light, which is free. Apart from climate control, the main energy consumer in a library is artificial light.
- Both have the same requirements as far as the need to achieve a certain level of illumination without the discomfort of blinding / dazzling.
- High illumination, which mainly comes from ultraviolet rays (both from the sun and from artificial light), can cause damage to the collections. As generic data, it is calculated that the maximum exposure for incunabula is 50 lux per hour for eight hours a day - around 150,000 lux a year. Anything above this could damage the material so it is necessary to control the level of illuminance and the exposure time.
- With artificial light some of the variables which define light can be manipulated at source, such as colour for example, (not all colours of artificial light are suitable for all activities). We have to know the keys which determine both the use and the energy efficiency.

## NATURAL LIGHT

### Aspects to consider

- Natural light contains infrared rays, which cause heat, and ultraviolet rays, which cause chemical reactions.
- Direct sunlight changes the properties and colours of documents, flooring and furniture.
- Controlling natural lighting has two crucial aims:
  - Energy saving:

- ▶ Achieving the light level needed for each activity.
  - Visual comfort:
    - ▶ Avoid direct sunlight onto shelving and furniture.
    - ▶ Avoid reflected light which can dazzle and make it difficult to work.
    - ▶ Adapt the various lighting levels to the speed of traffic within the library.
- Our climate is very variable as far as light intensity is concerned and the human eye needs a certain amount of time to adapt to sudden changes in intensity. (Fig. 12.03).



12.03

it is unlikely that the permitted volumetry be sacrificed solely so as not to affect (or to overshadow) the surrounding elements.

### Elements determining the level of natural light

- Climate.
- Orientation of the walls.
- Buildings and other elements surrounding the library.
- Shape of building.
- Incoming light.
- Interior walls.

#### Orientation of the walls

- South-facing walls have huge solar contributions in winter, and moderate ones in summer. This orientation means easy protection against solar rays at midday, and a reduction in exposure to the sun in the morning and the afternoon which is more difficult to avoid.
- East or west-facing walls get a similar amount of solar exposure in winter. The east gets the sun in the morning, and the west in the afternoon. However, west-facing walls must minimize the number of openings, as afternoon summer sun usually causes overheating towards the end of the day.
- Northern orientation means all the advantages of natural light without the inconveniences of heat and ultraviolet rays.

#### Buildings and other elements surrounding the library

The responsibility of ensuring that buildings are not obstacles for neighbouring constructions or land, falls mainly on the urban planners, given that

#### Shape of the building

This is the variable which can totally dominate the architect when he is planning the project. The shape of the building and its spaces has an absolute influence.

Even if there are windows all the way up the walls, from seven metres in, the level of natural light will begin to be lower.

The incorporation of certain light inlets will mean that those areas away from the walls can be illuminated.

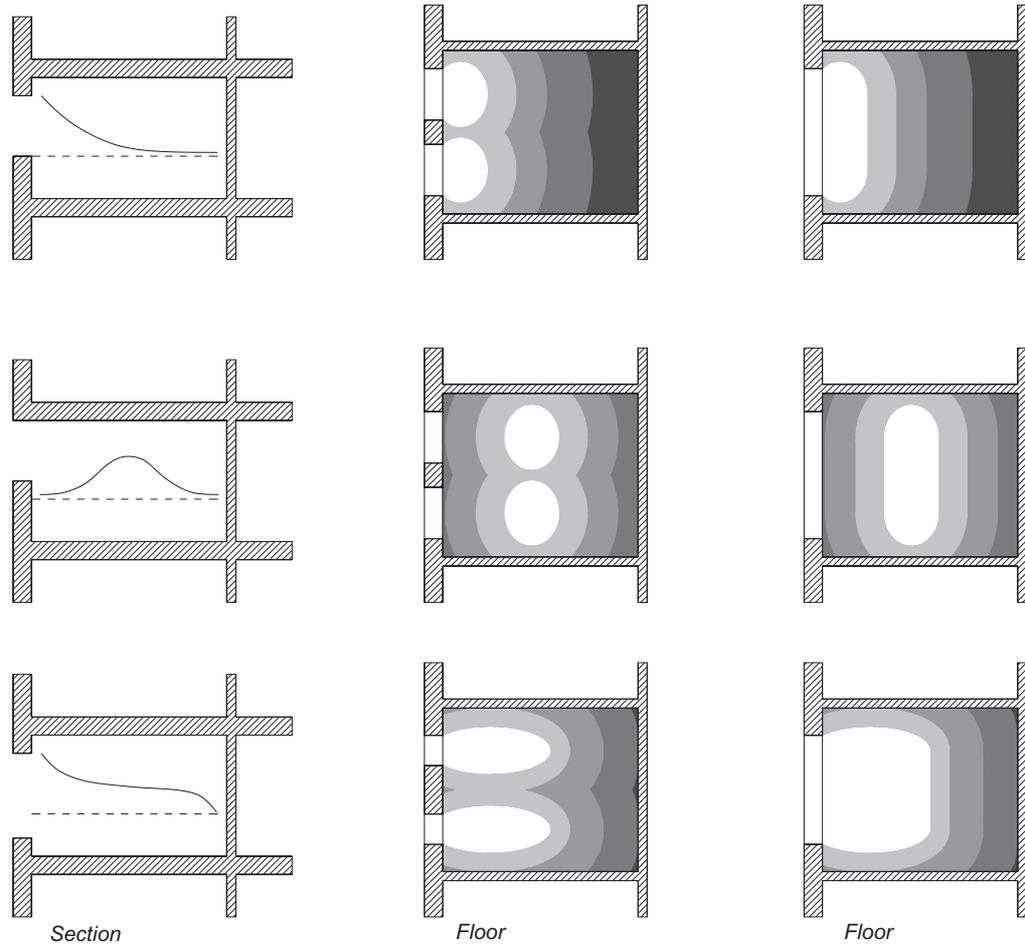
#### Ingoing light

There are three groups of architectural components connected with natural light:

- Lightways.
- Daylight distributors.
- Light control elements.



12.04

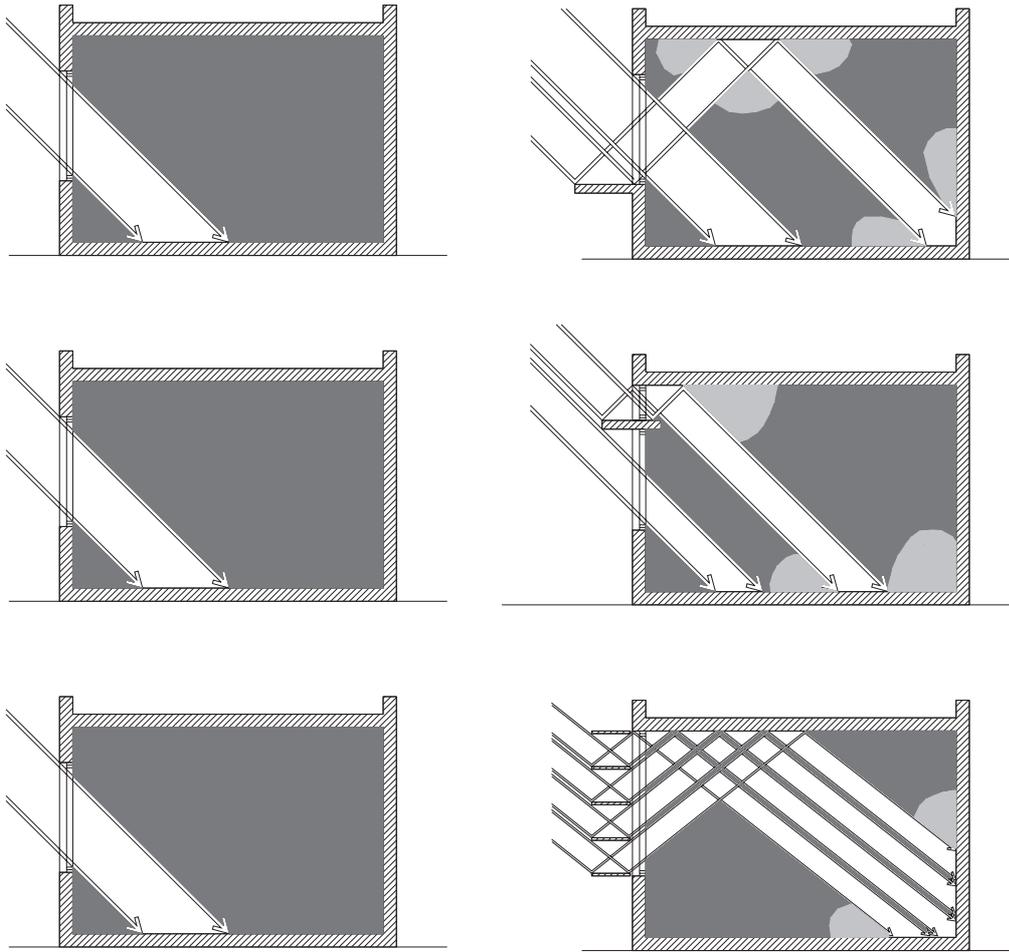


**12.05**  
Diagram of light distribution depending on opening.

- Lightways.
    - These are structural elements which connect two daylight areas allowing the passage of light from one to the other. They include various types of glazed openings, and divide into:
      - Windows.
      - Curtain walls.
      - Translucent walls and floors.
    - Skylights and roof lights. (Fig. 12.04). Their characteristics depend on size, shape and proportion, position and orientation.
- Influence of the position of the lightways: (Fig. 12.05).
- Side windows:

12.06  
12.07  
12.08





**12.09**  
Window reflecting systems.

Only lets in 50% of the sky's light. (Fig. 12.06).

○ Dome light:

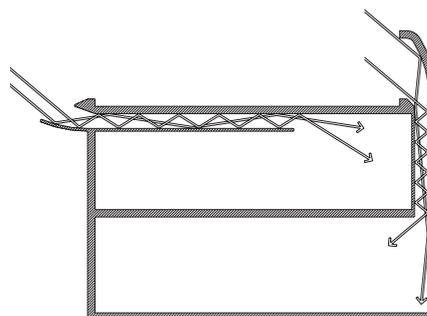
- ▶ Lets in 100% and provides more uniformity than side windows.
- ▶ In ceiling openings, thermal radiation control in summer must be considered. This is why they must be designed so that they do not allow direct sunlight in, but rather that the light is produced via reflecting surfaces.

The elements which adapt best are north-orientated vertical or saw-tooth roof lights. (Fig. 12.07 and 12.08).

● Daylight distributors

These are spaces which trap and distribute light directly or indirectly in the interior, such as glazed galleries and porticoes, glasshouse structures, glazed patios and sun pipes/light tunnels. (Fig. 12.10).

- Light control elements. These are devices enabling the passage of light to be controlled. They can be divided into:
  - Separating elements (glass panes and carpentry).
  - Flexible screens (awnings and curtains).
  - Rigid screens (sunshades and mullions).
  - Solar filters (blinds, slats and surface-treated glass).



**12.10**  
Sun pipes. These channels – open towards the sun and designed to capture direct sunlight coming in at various angles – work by creating multiple mirror reflections inside a conduit directed towards the place to be lit.

- Solar blocks (shutters). (Fig.12.09).

In most cases, for reasons of orientation, fixed or mobile solar light modulation mechanisms need to be put in place (cornices, eaves, shutters, curtains, brise-soleils, laminate filters, etc.).

The chosen system needs to be resistant and easy to clean and maintain. If they are mobile protectors, the electrics should be controlled only by library staff.

In the antique book deposits, the percentage of ingoing light with respect of the whole façade cannot be over 10% for East or West orientations, or 30% for North orientation.

If an excess of light creates a need for shading elements, mobile systems which do not guarantee efficient control and protection must be rejected.

#### Interior walls

The elements which determine how much natural light there is are the colours of the coverings and the surfaces' reflecting factors depending on their situation.

### **ARTIFICIAL LIGHT**

Artificial light is obtained through the transformation of electric energy into light energy.

12.11



There are a number of advisable but at the same time contradictory factors in artificial light:

- Favourable for all activities in spaces of different sizes and heights.
- Able to offer intensity of light adapted to the visual comfort of the public and the staff, and for the conservation of the collections.
- Allows for the movement of furniture.
- Provides a generally welcoming atmosphere.
- Energy saving awareness.

Differentiated solutions need to be found which also facilitate flexibility of use. These demands make the question of library lighting very complicated, and often undervalued. It needs special attention, and both the positive and negative effects of the chosen solution have to be considered. (Fig. 12.11).

#### **Aspects to consider**

- Creates the possibility of graduating light intensity without losing the characteristics of the light at full intensity. For much of the time, it can function at half-power, with the resultant energy savings.
- Independent circuits depending on the anticipated activities and the location of the spaces with respect to natural ingoing light.
- Switches which can only be reached by staff, mainly for libraries with a variety of public.
- Light source:
  - Research into artificial light is normally focused on increasing lighting output, improving the quality of colour rendering and giving new shade options, paying attention to the cost of light source, consumption and maintenance.
  - The main requirements are:
    - The initial cost of installation.
    - Resistance and durability.
    - Lighting design which facilitates changing of bulbs.
    - Luminous efficacy (ratio of amount of light to energy consumed).
    - Quality of colour rendering.
- Placement of light sources:
  - Accessible locations which facilitate replacement.

Maintenance must be done by ordinary means.

- Objective evaluation of advantages and disadvantages when deciding the relation between light source and furniture.

There are two options:

- ▶ Placing light sources independently:  
Possibility of modifying the layout of the furniture, the main advantage of which is flexibility of use. (Fig. 12.12, 12.13 and 12.14).

Choices include a uniform lighting system, or various light sources, which create different ambiances.

In this case, a network of electrified tracks allows changes both in model and in placement of light sources, with the resultant increase in flexibility and variety of lighting conditions. (Fig. 12.15 and 12.16).

- ▶ Lighting built into the furniture:  
Flexibility is reduced, but it does mean more differentiation in ambience, which in the case of study stations could help concentration.

Apart from that, the appropriate lighting level can be provided at the work surface without needing to provide the same level in all spaces, which saves energy. (Fig. 12.17).

On the other hand, since they are connected to an electrical outlet, the movement of the furniture is limited and there are higher maintenance costs in cases of breakdowns or vandalism.

This option is particularly inadvisable in central spaces, where lower furniture is desired so as to make monitoring easier, and lights connected to furniture make any spread of vision difficult.

Finally, there is the possibility of marrying both options. The decision will depend on the type of library.



12.12



12.13



12.14



12.15 and 12.16



12.16

### Lighting conditions

Components of good lighting:

- Focus on quality, intensity, direction and balanced contrast of light.
- Avoid dazzling.
  - This depends on the specific design of the lamps providing light. Lights must illuminate the working surface but not shine in the eyes of the worker.
- Provide the appropriate colour of light.
  - The colour of light is fixed by the choice of bulb. Cold lights are those with high “colour temperature” (blues, greens, etc.). Low colour temperatures create warm lighting (reds, oranges, etc.).
  - Warm light colours are appropriate for lighting areas and creating welcoming ambiances. On the other hand, they deaden cold coloured objects.
  - Cold colours, which are closer to

natural light, are recommended when one wants to increase the lighting level of a space with natural light without the contrast between the two light sources being too noticeable.

Relation between the colour of the light and colour temperature:

COLOUR OF LIGHT	COLOUR TEMPERATURE (degrees Kelvin)
Natural white	6,000 °K
Neutral white	4,000 °K
Warm white	3,000 °K

- Avoid shadows, reflections and sudden changes in intensity.
- Have uniform lighting over the working surface.
- Create variety of ambiances, which can influence the following:
  - Orientation of the public towards the various functional areas.

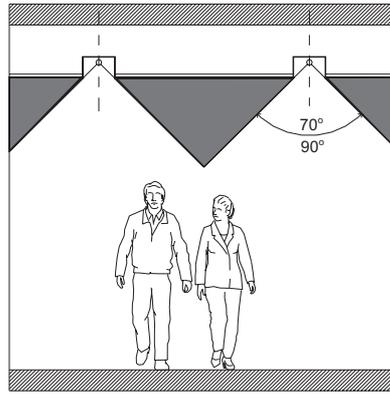
12.17



- Specific conditions for each activity.

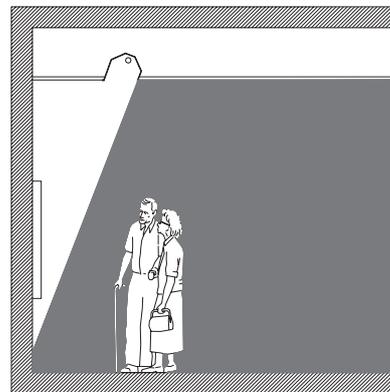
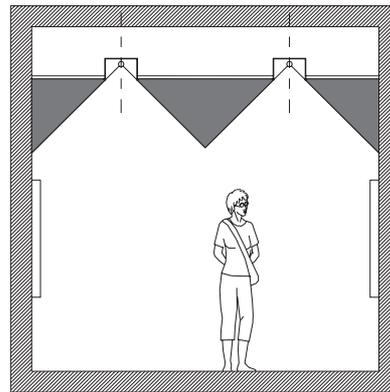
Lighting conditions of main library spaces

- Multi-purpose room, conference room and exhibition room:
  - Flexible directional lighting adapted to the different uses and an intensity regulation system.
  - In the exhibition areas, lighting which bathes the walls is recommended.
- Counters:
  - Lighting focused on the working surface will make identification by the user much easier.
- Study stations and tables:
  - Flat intense lighting onto working surfaces.
  - Long tables, usually fixed to architectural elements such as exterior or partition walls, need a light source placed so as not to cast shadows.
- Work with a computer:
  - There can be no direct natural light playing onto the computer screens. They should therefore not face any daylight apertures.
  - There should also be no artificial light reflected. The light source must be placed behind the computer at a higher level. Indirect lighting is the most efficient solution.
- Shelving:
  - In order for the maximum amount of the shown collection to be seen, both the upper and the lower shelves should receive the amount of light suggested above. The most effective solution is linear lighting, parallel to the shelves so that the light bathes the vertical plane and perfectly illuminates the book spines.
  - This effect can be achieved by lighting built into the shelves, or strategically fixed depending on the location. The first option reduces organizational flexibility and also increases costs. The second demands a certain rigidity of installation to achieve maximum effect.
  - A more flexible solution could be an arrangement perpendicular to



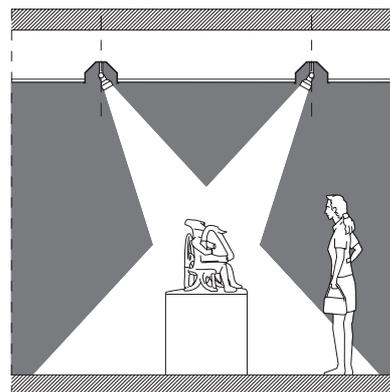
1. Direct symmetrical lighting

2. Wall washer. Direct lighting.

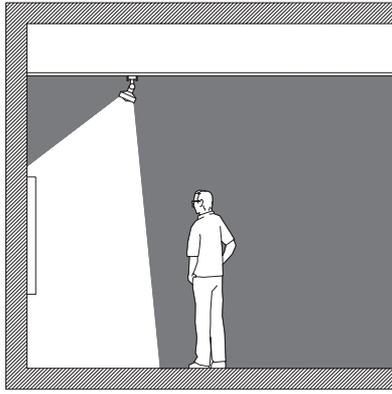


3. Wall washer.

4. Directional projector.

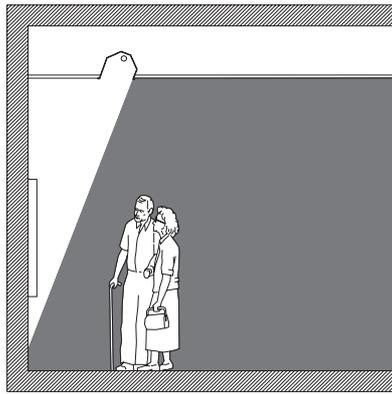


12.18a  
Types of lighting in interior spaces.



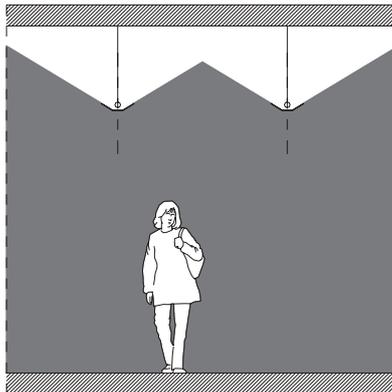
5. Wall and floor washer on electric track.

6. Wall washer on electric track.

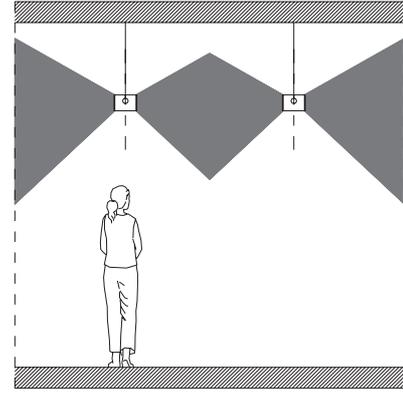


7. Projector on electric track.

8. Indirect lighting.

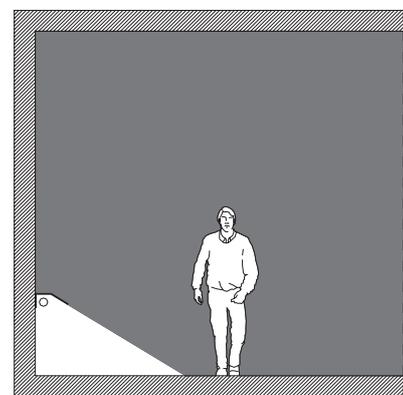
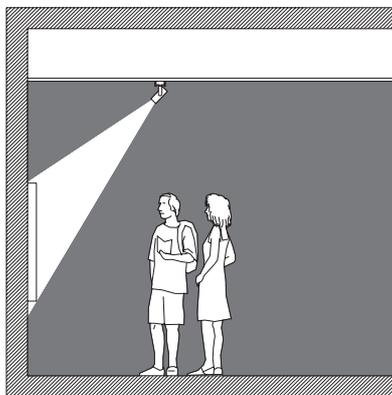
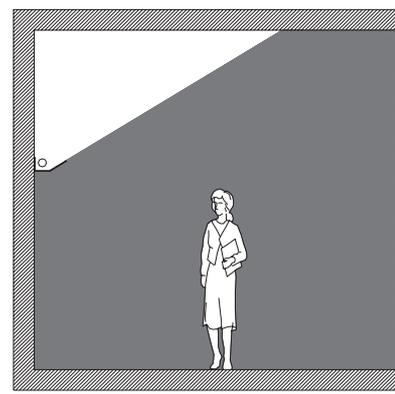


**12.18b**  
Types of lighting in interior spaces.



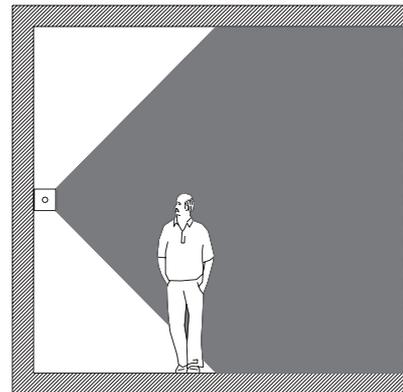
9. Direct and indirect lighting.

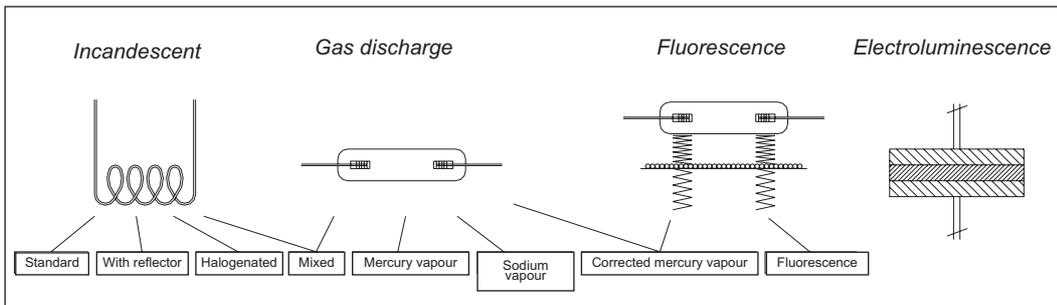
10. Ceiling washer.



11. Floor washer.

12. Wall lights. Direct and indirect lighting.





**12.19**  
Electricity-based  
artificial light  
generation systems.

the shelving with some distance between the lights guaranteeing an adequate level of light.

- The problem of getting the right level of light on the lower shelves can be reduced by reflecting the light produced by the material and the colour of the flooring.
- Ultraviolet or infrared filtering devices must be provided, depending on the light source, so that collections are not damaged.
- **Storage:**
  - Fluorescent lighting with ultraviolet filters is recommended, as this kind of lighting does not produce heat.
  - In compact shelving, where the working aisle is variable, linear lighting perpendicular to the shelving is recommended.

architectural elements are to be highlighted. However, indirect light creates flat spaces and is unsuitable if three dimensional areas are to be emphasized. (Fig. 12.18a and 12.18b).

### Artificial light through electrical energy generation systems

These can be divided into four large groups:

- Incandescent.
- Gas discharge:
  - Fluorescence.
  - Mercury vapour.
  - Metal halide.
  - Sodium vapour.
  - Mixed light.
- Electroluminescent.
- Fibre optics. (Fig. 12.19).

### Types of lighting for interior spaces

Depending on the proportion of light that plays directly onto objects, the following types can be described:

Direct	From 90 to 100%
Semi-direct	From 60 to 90%
Diffused	From 40 to 60%
Semi-indirect	From 10 to 40%
Indirect	From 0 to 10%

- **Direct lighting:**
  - Recommended for general lighting of work spaces, conference rooms and circulation areas.
- **Indirect lighting:**
  - This is characterized by the clarity and absence of dazzle.
  - The lighting must be adapted to the form of the ceiling.
  - Highly recommended for meeting areas and places where

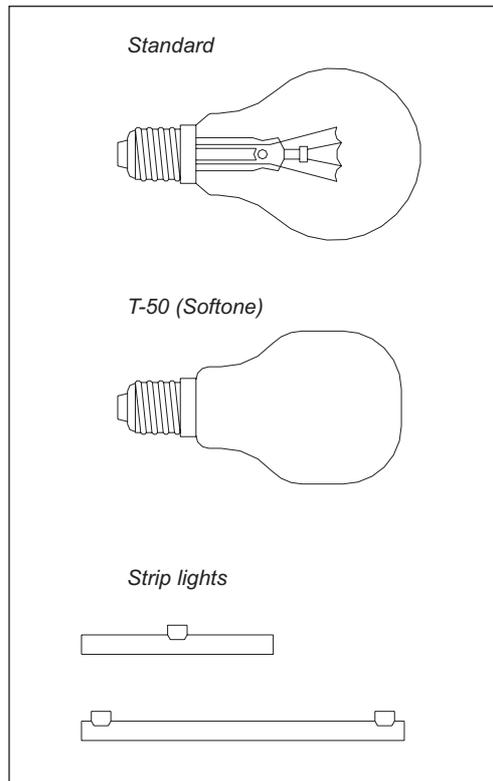
### Characteristics of the main types of light generation

#### Incandescent

- This is thermally originated light which is generated when an electrical current passes through a filament inside an enclosing bulb.
- The spectral emission of light is continuous, which is to say rays are emitted through the whole of the visible spectrum.
- They can achieve colour temperatures of between 2,700 and 2,900 °K.

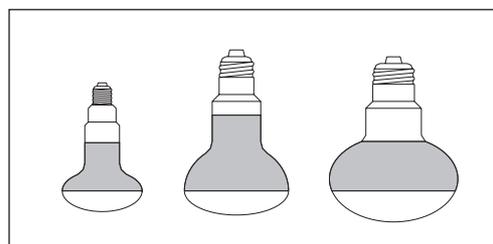
Advantages:

- Warm light.
- Visual comfort.
- The type of light given makes it possible to create different ambiances in the same space.
- Excellent colour reproduction.



**12.20**  
Incandescent.

- Variety of models of bulbs which are easy to install in all lights.
- Low acquisition cost.
- Easy to install and manipulate.
- Instantaneous on/off.



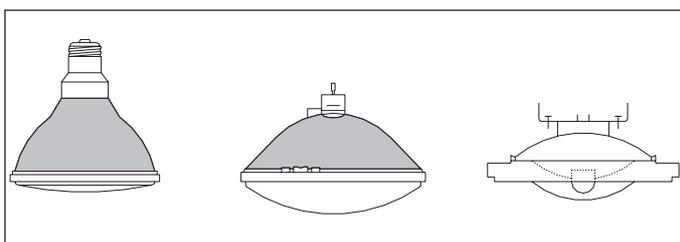
**12.21**  
Blown glass reflector lamps

- No auxiliary equipment needed.
- Function in any position.

Disadvantages:

- High energy consumption.
- Low luminance output (from 8 to 25 lm/W).
- High heat generation.
- Only 5% of the electrical energy

**12.22**  
Moulded glass reflector lamps

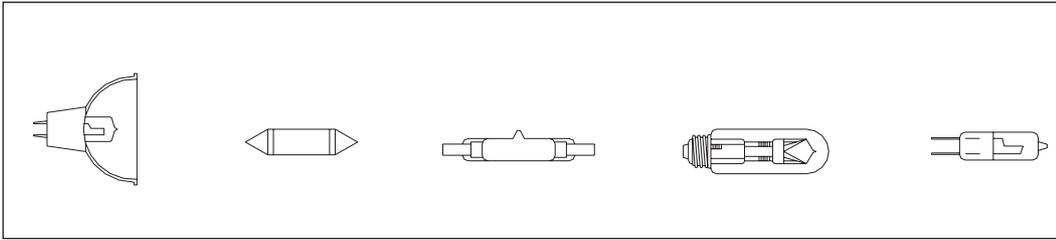


becomes light. The rest produces heat, which is an added problem in summer.

- Short average lifespan (1,000 hours).
- Irregular light distribution (creates light cones and areas of shadow).

Characteristics of certain types of incandescent bulbs:

- *Standard.*
  - Low cost of acquisition and repositioning.
  - The matt model reduces dazzle and reduces the formation of shadow and shine. (Fig. 12.20).
- *T-60 (Softone).* Similar to the previous ones, though higher priced, these have an electrostatically opalized finish which improves dazzle control but reduces luminance output. (Fig. 12.20).
- *Strip lights.*
  - Compared to standard ones, these give a diffused light and do not dazzle.
  - The negative side is too warm a tone and a high cost. (Fig. 12.20).
- *Blown glass reflector lamps.* These have a parabolic or elliptic shape and the interior surface is coated with a reflective (usually aluminium) surface allowing the light to be directed. (Fig. 12.21).
- *Moulded glass reflector lamps.*
  - The bulb is made up of a parabolic shaped piece, and a lens which the light beam opening depends on.
  - They use the technology of halogen incandescence bulbs and so have a longer average lifespan of up to 2,000 hours.
  - They are known as PAR lamps, which a number is added to (36 - 38 - 56 - 64) indicating the maximum diameter of the bulb in eighths of an inch.
  - Advantages:
    - ▶ Highly polarized light.
  - Disadvantages:
    - ▶ Large and heavy.
    - ▶ Expensive. (Fig. 12.22).



**12.23**  
Halogen  
incandescence.

### Halogen incandescence

The envelope bulb is filled with a halogen gas (usually iodine) so more light is created, and it lasts longer. (Fig. 12.23).

#### Advantages:

- Smaller in size which means more precise control of the light beam.
- Visual comfort.
- Perfect colour rendering.
- A pleasant tone giving a glow to objects it illuminates.
- Medium cost of acquisition and repositioning.
- Easy to install and handle.
- Instantaneous on/off.
- No auxiliary equipment needed, except for those in low tension, which need a transformer.

#### Disadvantages:

- High energy consumption.
- Low luminance output (25 lm/W).
- High heat generation.
- Short lifespan (2,000 hours), although longer than the family of standard incandescent bulbs.
- Auxiliary transformers needed for low tension versions.
- Only work in horizontal position with maximum inclination of 10°.

The version known as “dichroic” is characterized by the fact that the

reflector allows infrared rays through. For this reason, heat is emitted to a large extent through the rear section.

### Gas discharge

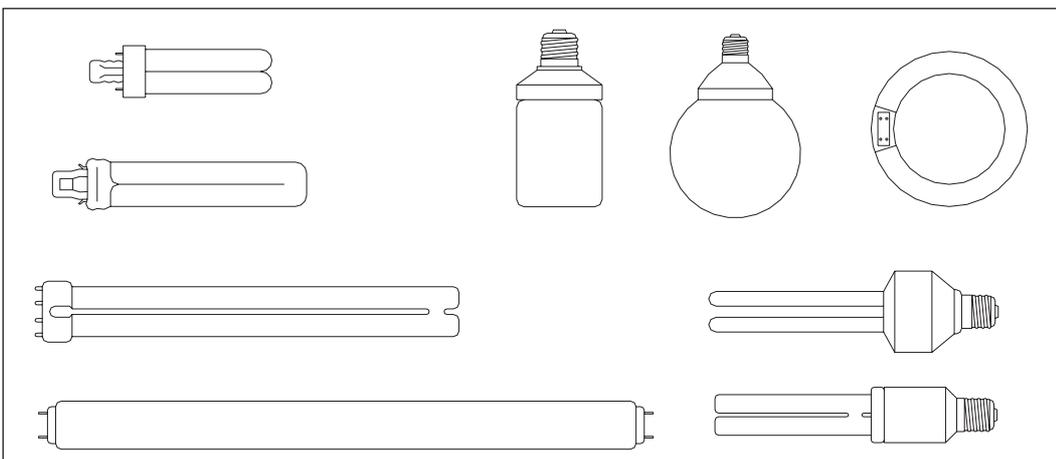
- This is based on the production of light through a gas discharge. The bulb contains a gas or vapour and two magnetic electrodes, between which an electric discharge is produced once switched on via a separate auxiliary device.
- The spectral emission of light is discontinuous, and visible rays are only emitted at certain wavelengths.

### Fluorescence

- Fluorescent substances absorb invisible rays (usually ultraviolet) and turn them into visible rays.
- Current models tend to incorporate electronic reactants, which eliminate the characteristic stroboscopic (flickering) effect, lengthen the lifespan with constant output and allow the regulation of light flow. (Fig. 12.24).

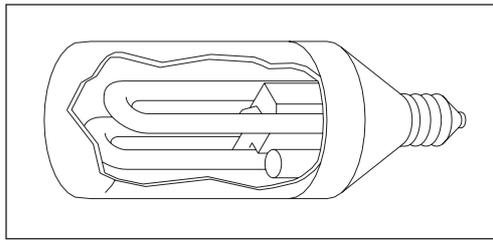
#### Advantages:

- Gives uniform light (no shadow areas).

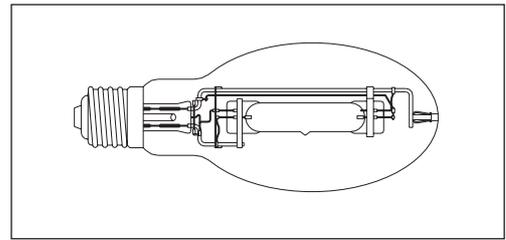


**12.24**  
Fluorescence

12.25  
Compact.



12.27  
Mercury vapour.



12.27

- Low energy consumption.
- High luminance output (from 65 to 100 lm/W).
- Very low heat output.
- Average lifespan: over 6,000 hours.
- Large range of formats and sizes.
- Variety of tones.
- Practically instantaneous on/off.
- Easy repositioning.
- Variable acquisition cost depending on model chosen.

Disadvantages:

- Cold light, despite the number of tones.
- No contrast.
- Need auxiliary equipment (except for the compact E-27).
- Dimensions which make the control of light spread difficult (except for the compact ones).
- Tension changes reduce the luminance output and the useful light.
- If there is no electronic reactance, the stroboscopic effect is produced and diffusers are needed which means a reduction in luminance output.
- With fluorescence, colour temperatures between 2,700 and 7,000 °K can be obtained. The various tones of white are given the following names:

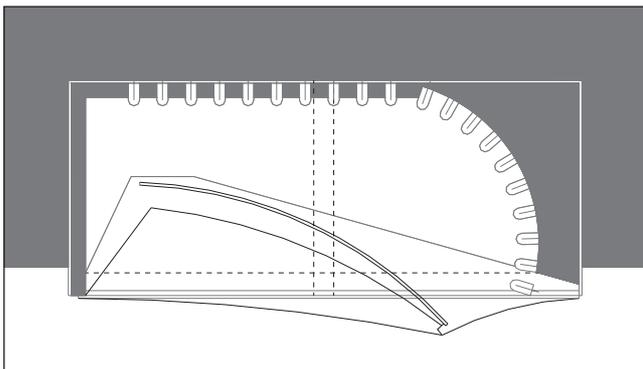
Natural white (6,000 °K)	"color 36"
Neutral white (4,000 °K)	"color 84" or "daylight"
Warm white (3,000 °K)	"color 83"

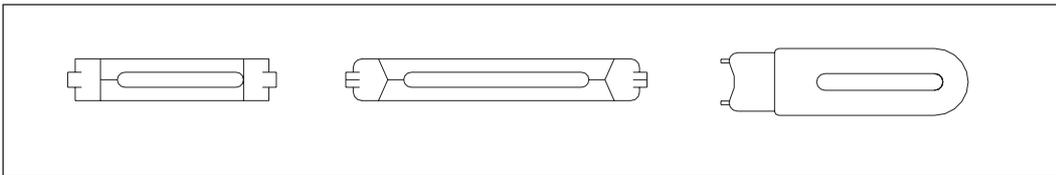
This is most recommended for a library when fluorescence's advantages are placed above the warmth of the lighting.

Types of fluorescent lamps, by size and shape:

- *Conventional.*  
Linear strip lights of different strengths, diameters and lengths: these can be divided into three types:
  - 38 mm diameter:  
These are the most typical. Luminance output from 65 to 80 lm/W.
  - 26 mm diameter (T8):  
Have the highest luminance output (80 to 100 lm/W), better colour rendering and longer useful life(10,000 hours).
  - 16 mm diameter (T5):  
Electronic power supply offers the following advantages over the other types:
    - ▶ Energy saving.
    - ▶ Useful life of up to 12,000 hours.
    - ▶ Instantaneous switch-on.
    - ▶ No stroboscopic effect when switched on.
- *Circular.*  
Used for decorative reasons.
- *Miniature.*  
With compact fluorescents on the market, the use of this model has reduced.
- *Special radiation.*  
For specific applications such as lighting plants, ultraviolet radiation colours, etc.

12.26  
Variable light.





**12.28**  
Sodium vapour.

- **Compact.**

The most common are those with the same covering as traditional incandescence lamps (E-27).

Despite being more expensive, they can replace incandescence for the following reasons:

- Their luminance output is at least four times higher.
- They last eight times as long.
- They have the same warm quality of light, as they have colour temperatures of between 2,700 and 4,000 °K.
- They have good colour rendering.
- The E-27 light socket means that incandescent bulbs can be directly substituted.
- Elements needed for functioning (switch and reactance) are incorporated in the light itself. (Fig. 12.25).

*Variable light.*

- Recently a biodynamic lighting system called “variable light” has appeared on the market, which consists of a programmable lamp which can be personalised with specific sequences and produces a light that changes intensity and colour as time passes.
- It has been shown that natural light, with its continuous and cyclical variations, affects human behaviour depending on the variations on colour temperature, intensity and quantity of natural light.  
This means that a made-to-measure programme can be set up which could even design the most appropriate annual, monthly, weekly or daily cycle for given ambience, climatic features, etc.
- The system is made up of a ceiling light containing fluorescent lamps and a diffuser, and electric control and a group of electronic power supply feeds. (Fig. 12.26).

**Mercury vapour and colour corrected mercury vapour**

- The discharge, because of the excitation of the mercury atoms, immediately produces light, which is white. (Fig. 12.27).
- The former have flawed colour rendering for the objects it illuminates. The corrected version with metal halogens can achieve warmer colours and have better colour rendering.

**Advantages:**

- High luminance output (from 40 to 60 lm/W).
- Average life of over 8,000 hours .
- Good light flow emission:
  - These are a good solution, both for exterior and interior lighting.
  - They can illuminate from very high up.

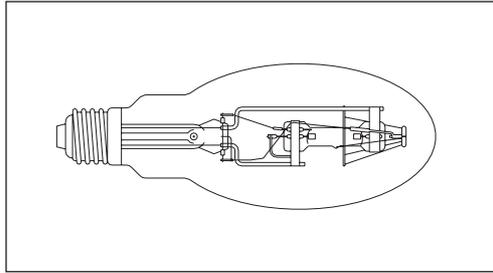
**Disadvantages:**

- The warmest light colour (colour temperature of 3,400 °K) can only be found in corrected mercury vapour lamps.
- Frequent switching on has a negative effect on the life of the lamp.
- Non-instantaneous switch-on and energy consumption far above normal functioning ones.
- As in all discharge lamps, there is a stroboscopic effect.
- Auxiliary equipment necessary.
- High installation costs.

**Metal halogens**

- The main feature is a reduction in size compared to the original models.
- The possibility of using smaller lights makes them recommendable for interior lighting.
- Advantages of mercury vapour:
  - Better luminance output.
  - Higher light flow, and they can take reflectors which can give a

**12.29**  
Mixed light.



- more exact light at a longer distance.
- Warmer light. There are models with a colour temperature of 3,000 °K.

### Sodium vapour (high and low pressure)

- The discharge immediately produces an orange light.
- These are the light sources with the highest currently existent luminance output (from 100 to 180 lm/W).
- The light given is very monochromatic, and so has a very limited application to large exterior areas.
- Low pressure ones are usually installed in urban areas. High pressure ones, with worse colour rendering, are the typical motorway lights.
- The voltages are above 400 V which means autotransformers are needed as are sockets which can take that high a voltage. (Fig. 12.28).

### Mixed light

- The light spread comes simultaneously from a discharge tube like those in mercury vapour lamps and a filament identical to those in incandescent bulbs.

#### Advantages:

- Direct connection to the mains with no need for limiting elements.
- Life of over 6,000 hours .

#### Disadvantages:

- Voltage and vibration variations have enormous effect on the output, energy consumption and life of the lamp.
- Low luminance output (from 20 to 30 lm/W). (Fig. 12.29).

### Electroluminescence

These are even simpler and function by the excitation of a luminescent substance through the action of alternating electronic fields.

### Fibre optic

- Fibre optics are made up of a glass or plastic filament in a protective tube which guarantees that light will be guided along its full length. The glass filament has better light transmission than the plastic, but cannot be cut on site. The individual optics are bundled together and covered in PVC to ensure their protection and flexibility. The diameter of the group varies from 4 to 6 mm and is called an "optical waveguide".
- A typical installation is made up of the fibre optics, a connecting element which can join up to 12 optical waveguides together and a light-emitting element. The emitter has an optical system situated in front of the lamp to allow direction of the light flow towards the connector, whence the light is transmitted by the filaments to the other side.
- The main feature is the great distance which can exist between the light source and the emission point. Therefore, the heat produced by the lamp never reaches the illuminated object.

#### Advantages:

- Elimination of infrared rays (which produce heat).
- Excellent colour rendering.
- Possibility of very low levels of lighting without any loss in colour.
- Easy installation.
- Straightforward maintenance, as one lamp can feed up to 12 light points.
- Fibre optic apparatus produces light with a constant spectrum at all frequencies.
- Lenses can be incorporated to concentrate the light beam transmitted by the optical waveguide, as can colour filters and colour temperature and luminance intensity correcting filters.

- The advantages mentioned above mean the fibre optics solution is ideal for lighting delicate objects.
- At the moment they are not seen as a suitable solution for lighting spaces.

- Normally, sounds are various sounds of different frequencies all mixed and added together ad infinitum.
- If this group of sounds is made up of a disordered mix of all frequencies, it is normally called “noise”, although it can be said that any unwelcome sound is a noise.

## ACOUSTIC CONDITIONS

The silence needed for reading or working in peace will depend to a large extent on the capacity of the building for insulation from outside noise and control of inside noise.

The battle against noise consists, on one side, of avoiding its transmission and, on the other, in absorbing it.

### Sound and noise

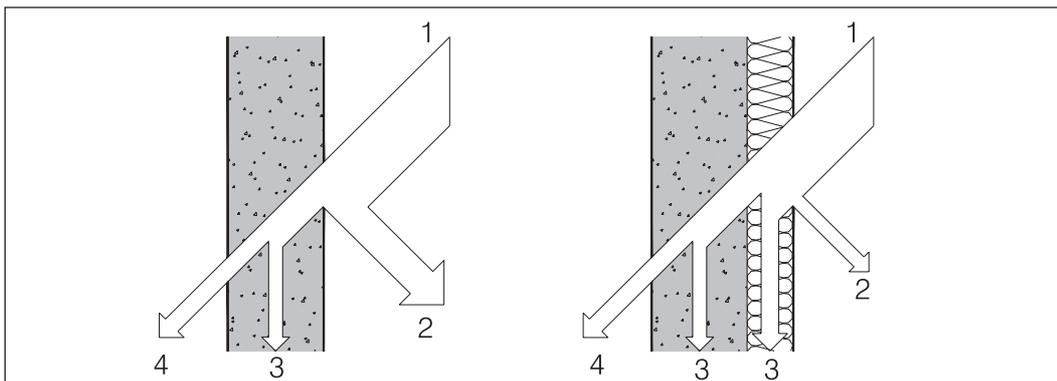
- Sound is a vibratory movement of air made up of tiny instantaneous variations in atmospheric pressure, in the form of compression and depression waves, which is emitted at a speed of 340 m/s.
- When a sound is produced, the air pressure surrounding the ear fluctuates a certain number of times per second and produces the sensation of hearing in that organ.
- A sound can be characterized by basic references:
  - Intensity:
    - Magnitude of the variation of pressure.
    - Measured in decibels (dB).
  - Frequency or tone:
    - Number of times per second that this pressure variation is produced.
    - Unit of measurement is the Hertz (Hz).

### Architectural acoustics

This is the group of techniques used to obtain the acoustic quality needed in a place.

In architectural acoustics, two types of sound are differentiated:

- Air-borne sounds:
  - They originate in the air and are carried by it, although they must pass through solid objects (walls and floors). Can come from both outside and inside.
  - Outside noise:
    - Produced by elements surrounding the building (colleges, industries, heavy traffic, etc.).
  - Inside noise:
    - Produced by user activity and by equipment (lifts, air-conditioning, photocopiers, etc.).
- Impact noise:
  - Made by knocking, objects falling, shoes on the floor, etc. It is transmitted through solid objects.
  - The transmission of impact noise is more intense than air-borne noise, as the knocks use greater energy.
  - It may be more difficult to solve, but it needs more control.
    - ▶ Noises from the installations:
      - They are characterized by their varying ranges, and are transmitted simultaneously through the air and through solid objects.



12.30  
Diagram of noise distribution.

- ▶ Random noises:  
These are not constant and are usually produced on the floor.

### Measurements which determine dimensions of the sound

#### Level of intensity or sound level

- These are measured in decibels (dB), obtained by a sonometer which measures the instant variation of air pressure when a sound vibration passes.
- Conventional levels state that the threshold of hearing is at 0 dB, and pain begins at 120 dB.  
Even so, the effect of noise on people depends on the intensity and the distribution across the scale of frequencies: the ear is more sensitive to high than low frequencies.
- The unit used in architectural acoustics is the dB A, which correctly assesses the auditory sensation of each person.
- Noise levels in dB or dB A have a logarithmic character, being neither added nor subtracted linearly.
- When two noises have very different levels, the louder one masks the weaker one, so the end result is the louder level.

#### Reverberation time

- A noise which begins in a place with reflecting walls continues to be perceived for a fraction of time after being produced. The successive reflected waves continue to arrive at the ear according to the path that they have had to take.
- If the walls of the place are covered with absorbent material, this time is considerably reduced.
- Reverberation:  
This is the energy produced by multiple sound wave reflections off the interior surfaces of a place.
- Reverberation time:  
This is the time from when the source of the noise ceases and its intensity level falls to 60 dB.  
This value drops depending on the acoustic absorption level of the place in question.

### Acoustic insulation and acoustic absorption

#### Acoustic insulation

- This is the capacity the construction materials have to “reduce transmission” of noise.
- By extension, insulation can be understood as all the procedures taken to reduce or avoid noise transmission from one place to another and from the exterior to the interior, with the aim of achieving a specific acoustic quality.
- Insulation depends on the properties of the materials, of constructive solutions and the architectural context.

#### Acoustic absorption

This is the property the materials have to absorb acoustic energy and “reduce the reflection” of incidental sound waves.

- If the sound source and the receiver are situated in different rooms or spaces, the reduction is produced by acoustic insulation. If they are in the same room, acoustic absorption comes into it.
- When a sound wave arrives at a surface, part is reflected, part is absorbed by that surface, and the rest is transmitted somewhere else.
- An absorbent material would reduce the reflected part in the place where it is installed, but would have no effect on the part transmitted elsewhere. That value depends on the insulation of the material which the surface is made of. (Fig. 12.30).

### Acoustic correction and acoustic quality

#### Acoustic correction

This is achieved through control of sound energy reflected off the walls of an environment. In this way, reverberation can be reduced, listening quality can be improved and, generally, the overall average sound level of the environment can be reduced.

#### Acoustic quality

This depends simultaneously on two factors:

- Insulation, which impedes

disturbances caused by noise inmission from other environments or the outside.

- Acoustic correction, which allows adequate diffusion of acoustic energy in the interior of the place.

### Recommended levels of acoustic comfort

- Comfortable levels, which vary from one country to another, condition the usual building habits. In general terms, Germanic countries have stricter regulations than Mediterranean ones, which usually have fairly basic demands.
- It is advisable to go for a kind of architecture which can defend itself against the acoustic aggression of the urban environment.

<i>Recommended levels of acoustic comfort</i>			
LOCAL	SOUND LEVEL (dB A)	REVERBERATION TIME (s)	VIBRATION
Deposits	50	1.5	K = 5
Offices	40	1	K = 5
Reading areas	35-45	1	K = 1
Communal areas	50	1.5	K = 5
Multi-purpose room	40	1	K = 1
Technical areas	55	< 1.5	-

The conference room will be the subject of a specific independent acoustic study depending on the maximum volume needed for the programmed activity.

<i>Acoustic insulation recommended for the dividing elements</i>	
Walls: solid parts	45 dB A
Walls: façade unit	35 dB A
Roof	45 dB A
Isolation between floor structure beams	45 dB A
Zonal isolation between different reading areas	35 dB A
Interzonal isolation	30 dB A
Isolation of the communal spaces	45 dB A
Isolation of the installation rooms	55 dB A

### Acoustic insulation systems

The solutions go hand in hand with project decisions: building location, volume of the spaces, structural solution, proximity of noisy places, covering materials, etc.

#### Previous criteria

##### Placement:

- A double aim has to be considered: reducing the overall noise against the exterior walls and creating calm outside spaces.
- If there are no walls or acoustic protections, the building can protect itself by situating the minimum possible exposed wall space towards the noisiest areas.

##### Layout of the building:

- Regroup the noisy activities. Within the library there are zones which produce noise (children's area, loan area, etc.) and zones which require silence (study rooms, researchers' areas, etc.). The sound environment of each of these sections must be sufficiently isolated from the others.

##### Façades:

- The façades which are most exposed to noise must have a higher solid proportion, given that glazed areas are weaker from an acoustic point of view.

#### Other recommendations

- Avoid acoustic bridges caused by the following situations:
  - A continuous suspended ceiling which is common to areas of different activities.
  - Rigid connections in double walls and technical floors.
- Installations:
  - Motor power which can function with fewer revolutions.
  - This solution is highly recommended because motors and ventilators are the main causes of installation noise.
  - Soundproofing technical areas with high density partition walls, double access doors with intermediate chamber and absorbent interior treatments to avoid acoustic bridges.
- Air conditioning:

- Soundproofing the conduits with muffling, absorbent elements.
- Accurate calculation of the speed of air outlet.
- Correct placement of air intakes.

### Acoustic isolation for air-borne noise

Air-borne noise, which is transmitted through the air and passes through solid elements, can be isolated with the following solutions:

- Single walls:
  - Made of one single layer of material, or several layers of materials bonded together.
  - Noise reduction is governed by the law of masses, necessitating the use of very heavy structural elements.
- Double walls:
  - Basically, a double wall consists of two single walls separate by an elastic centre, which acts as a spring, muffling the acoustic vibrations.
  - They offer more reduction for less weight.
  - For more effectiveness, it is recommended that the two single walls are of different thickness or density.
  - Horizontal surfaces: For acoustic isolation, elastic materials must be used.
  - Vertical surfaces: In many cases, air itself can be used as the separating element.

### Outside air-borne noise

Acoustic isolation will depend on the type of materials used in the building envelope.

- Façades:
  - The façade as a whole must have isolation of 35 dB A.
  - Solid parts: These could be heavy walls or double walls.
  - Openings:
    - ▶ Isolation will vary depending on how much of the surface is glass. When there is 25% gaps, they must have a minimum isolation of 29 dB A. If the percentage increases to 50%, then it must be above 32 dB A.

- ▶ The quality of windows particularly must be monitored, since that is where the noise will get in. Air-tightness helps acoustic isolation, although it can also have a negative effect on natural ventilation. Only if there is air-tightness should the idea of more windows be considered.
- ▶ 6 mm single glaze windows isolate between 25 and 30 dBA, and with 6+6 mm double glaze, between 29 and 34 dBA. With an acoustic resin laminate between the two panes, isolation of 40 dB can be achieved.
- ▶ The window fastenings should not cause vibrations.
- ▶ The blinds' valances inevitably form an acoustic bridge. Improvement of air-tightness and interior absorption level are recommended.
- ▶ The entrance doors must have a wind-proof screen or an automatic opening system to minimize incoming noise.
- Roofs: Light roofs generally cause acoustical problems, which need to be solved with double walls and use of insulating materials.

### Interior air borne noise

The isolation of single walls is proportional to their weight. Usually insulating layers have to be used to achieve the levels recommended for each space.

### Acoustic isolation for impact noise

Impact noise is carried by solid elements, which are better transmitters than air. Experience shows that an increase in the mass of a structural element, within tolerable construction limits, does not solve the problem of transmission of this type of noise. Therefore, insulation must aim at avoiding contact or direct transmission.

Recommended acoustic solutions:

- Soft floor coverings: Their effectiveness comes from their

softness eliminating impact noise. These coverings are not so much insulators as noise inhibitors.

- Tiles or floating floors:  
These separate the impact noise-causing zones of the building from the structure.  
The vibration generated on the floor is transmitted to the floor structure with low intensity because of the muffling effect of the elastic medium. Because of this, the floor structure does not vibrate much or produce air-borne noise in the floor below.

### Acoustic correction systems

Calculations of these corrections must take into consideration that the furniture and the collections reduce the spread of noise. Shelves full of books against the walls create an acoustic barrier. Control of reflected sound energy is done by using acoustic materials at the following points:

- Ceilings:
  - Ceiling panelling and false ceilings, as they are out of reach, can be used for absorbent materials.
  - These covering materials do not increase the isolation of the air-borne sound from walls and floors. All they do is reduce the sound level of the reverberation field.
  - To increase the total absorption surface, suspended screens can be inserted.
- Vertical surfaces:  
Wall panelling, acoustic curtains, partitions, etc.
- Floors:  
Floating floors and soft coverings.

### Absorbent materials and insulation devices

In the area of acoustic and thermal insulation, a clarification is necessary:

- Acoustically, any material which can form a wall might be considered insulation, because with little mass it is always possible to get a 15 or 20 dB reduction.
- Thermically insulations do require some specific features to have appreciable effect.

From the acoustic point of view, it is best to talk about insulation devices or major insulation procedures such as materials which are in themselves light and ineffective as acoustic insulation, but with correct installation act as vibration isolators or as elements which increase absorption.

Most typical systems:

In general terms, porous materials absorb high frequencies better, while the absorption of low frequencies increases with the thickness of the material. Materials which give off particles and ones which are hard to clean are not recommended.

- Mineral wool (glass or rock):
  - Elasticity and a high acoustic absorption coefficient at the same time.
  - Placed within a wall, it increases the power of the mass-spring-mass system.
- Pressed fibre and cement panels:
  - The whole surface is absorbent.
  - They come in panels.
  - They cannot be painted because the absorption is not through the gaps or the slots, but through the material's micropores.
- Perforated panels:
  - The noise enters through the perforations, where the sound wave is broken.
  - Absorption increases with the number of perforations.
  - They can be painted.
  - There are many different designs and finishes on the market (wood, plasterboard, etc.), as well as removable panels and panels stuck to the wall with a continuous finish.
  - These improve acoustic correction when another absorbent material is attached to the reverse side.
- Textiles, foam etc.

### FIRE PROTECTION SYSTEM

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- This applies only to "deposits" and "document storage" since the other spaces in a library are no different from any public space, having some

certain protection requirements in the relevant regulations.

- However, one observation should be made: regulations demand the installation of fire-extinguishers, hoses, alarms, detectors, emergency lights and specific signage for each section of floor surface. Given that the number of these elements might make furniture placement more difficult, it is recommended that they be grouped together if possible in small areas strategically placed around the walls.

### **Detection systems**

Detectors currently on the market are classified by the phenomenon which activates them:

- Smoke.
- Temperature.
- Radiation.

The most appropriate type in each case will be chosen depending on the type of fire anticipated and the easiest phenomenon to detect. Technical specifications of the commercial firms contain enough information about the surface affected by each kind of detector.

### **Extinguishing systems**

The main extinguishing agents are:

- Gas.
- Water.

#### Gas

- These function by a procedure of displacing oxygen, stopping combustion.
- This is an expensive system, not because of the nature of gas, but because they are patent protected.
- Only recommended for small airtight spaces. Large volumes represent a huge cost for every discharge and cannot guarantee a level of airtightness sufficient for the required concentration of gas needed to inhibit combustion.
- Halon:  
The prohibition of this gas because of ozone layer depletion has caused doubts about the choice of other gaseous extinguishing agents. For the moment there is none which really

combines efficiency and price, the most popular substitute being NAF III.

- Argon:  
It has not been around long, but is already making its mark as a halon substitute, although it is prohibitively expensive.
- CO<sub>2</sub>:  
This is cheaper, but is more dangerous as it displaces the oxygen and inhibits breathing. This can be used in deposits with no staff if delay alarms are installed which allow occasional visitors to the area to get out.

#### Water

- For its price and effectiveness, this is the most commonly used system.
- The available systems - classified by how the water exits and how the sprinklers spray it - cover all possible risk areas in the library.
- Control mechanisms must be in place to ensure that the minimum of damage is done to flooded collections.  
A balanced system might be to organize the sprinklers so that they do not completely soak the documents, through a system of dry tubing which does not come on unless there is absolute certainty of real fire.
- Another system is powdered water which does not damage the documents.  
This creates 100% humidity and inhibits combustion. Its effectiveness depends on expelling the whole volume of powdered water in a maximum of ten seconds.

### **CABLE-FED INSTALLATIONS**

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Libraries have and will continue to have more and more equipment connected to a wiring system. These technical installations, despite not being considered part of the building's organics (ventilation, air-conditioning, lighting, etc.), are numerous and increasing enough to have a major effect on the project's architectural concept.

The architect's job is to design a network of ducts which allow cabling to reach

every part of the library to feed the following installations:

- Electricity.
- Specific installations:
  - Voice and data.
  - Audiovisual.
  - Conference room equipment.
- Anti-theft system.

All this should be of sufficient size and accessibility, and have connecting systems adaptable to possible changes that might take place in the future.

General recommendations:

Apart from those mentioned at the beginning of the chapter for all installations, the following are particularly recommended:

- Make a generous estimate of the installation. When the work starts, it is fairly cheap to install a lot of sockets. On the other hand, it is expensive and difficult to add them once the building is up and running.
- Understand the types of connections, as well as the ways of activating them, and maintenance of the circuits, to establish a physically logical installation criterion.

## DUCTWORK

The idea is to set out a system of passes where the wiring runs, connecting the peripheral equipment to the distribution boxes.

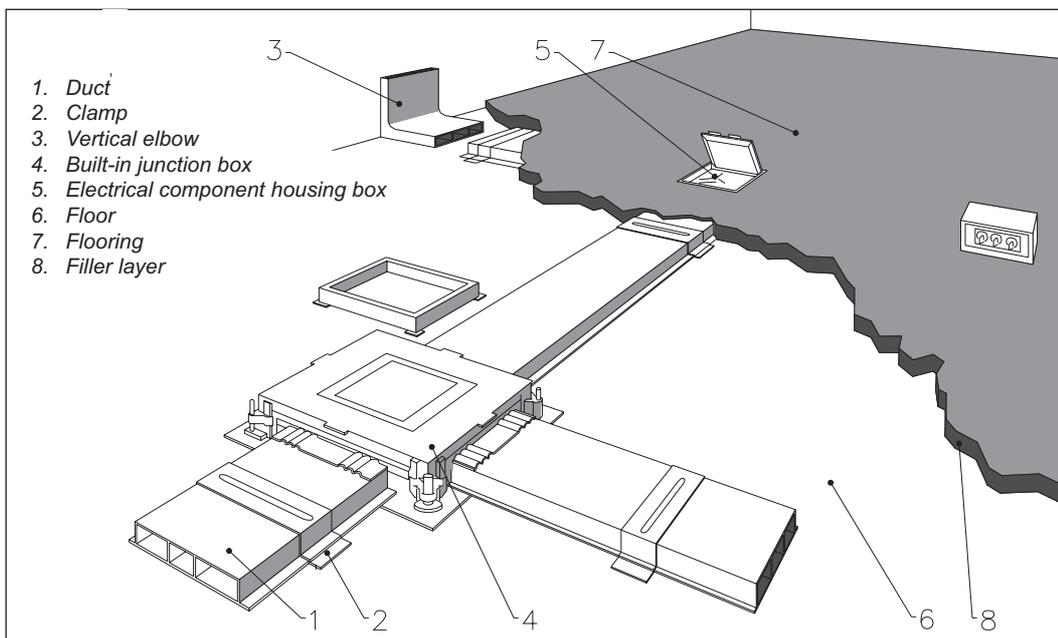


**12.31**  
The design of a section of flooring which coincides with the connection box creates a unified finish.

There are two kinds:

- Vertical:
  - The project must include a vertical conduit, close to the distribution boxes if possible, guaranteeing the distribution of horizontal ductwork to any point in the building.
  - Bundled wiring passing through the ducts uses up little space. The most appropriate place must be found to avoid their being longer than necessary, or opt for distribution in various strategically placed conduits.
  - Vertical wiring conduits must be accessible.
- Horizontal:
  - Horizontal ductwork needs more detailed planning. The chosen solution will have a direct effect on the architecture and the budget of the building.

Experience has shown that in most cases sufficient attention is not paid to



**12.32**  
Built-in ductwork between the floor structure and the flooring.

this part of the work, either because of a lack of criteria at the moment of the project, or budgetary restrictions.

### Horizontal ductwork

Depending on where it is placed, it can be divided into the following types:

- Ductwork between the floor structure and the flooring.
- Ductwork in the suspended ceiling (below the floor structure).
- Visible ductwork.

### Ductwork between the floor structure and the flooring

Made up of the following basic elements:

- Ducts for the wiring to pass through.
- Junction boxes.
- Inspection covers.

There are various options which must be decided during the project:

- Depending on the type of flooring:
  - Visible network of surface mounted inspection covers.
  - Concealed installations with occasional junctions.
- Depending on placement of wiring:
  - Built-in ductwork between the floor structure and the flooring.
  - Technical flooring.

Depending on the type of flooring:

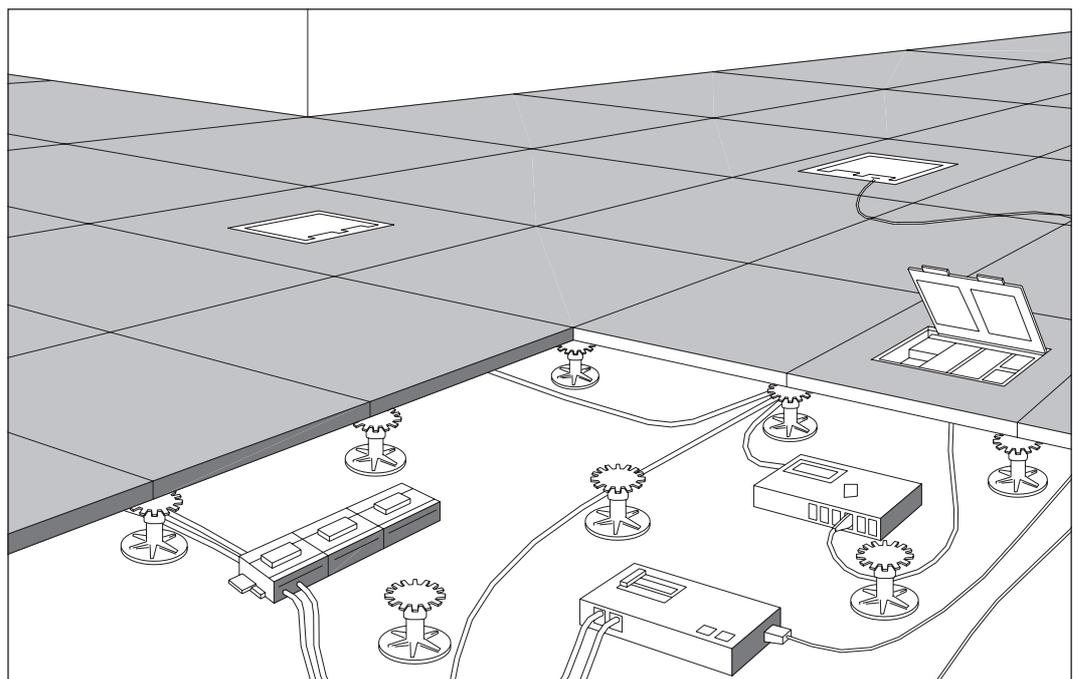
### Visible network of surface mounted inspection covers

Placement of equipment is dependent on the layout of this network.

Aspects to be considered:

- Because of the existence of the connection cover, distribution should depend on the exploded view and the material used in the flooring.
- The covers must be flush with the rest of the flooring to avoid any accidents. Although they may be hidden by furniture, any changes in distribution might result in their being in foot traffic areas.
- The opening mechanism of the covers must be compatible with the method of floor cleaning. There are different shapes and sizes on the market which can be adapted to the flooring finish. When liquid cleaning products are used, the covers must be watertight so the installations are not affected, which means an increase in budget.
- Despite the importance of safety and maintenance, in most cases, the choice is for inspection cover plates which are above the level of the flooring and are not aesthetically pleasing. When the budget is not sufficient for the right covers, it is advisable to design a piece of flooring matching

12.33  
Technical flooring.



the junction box which is easily accessible and fairly watertight and which also matches the general finish. (Fig. 12.31).

#### Concealed installations with occasional junctions

- At each specific junction point, which must coincide with the passage of a cable, a hole is made in the flooring. The connecting mechanisms between the wiring and the equipment are installed in the furniture where the equipment is placed.
- This solution is compatible with technical flooring, but presents problems with built-in ductwork.

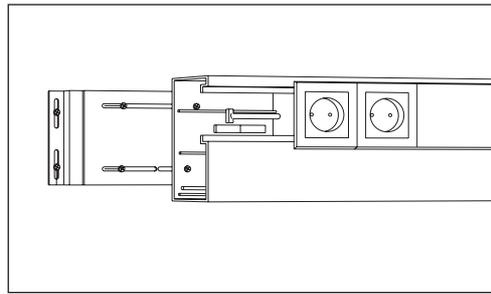
Depending on placement of wiring:

#### Built-in ductwork between the floor structure and the flooring

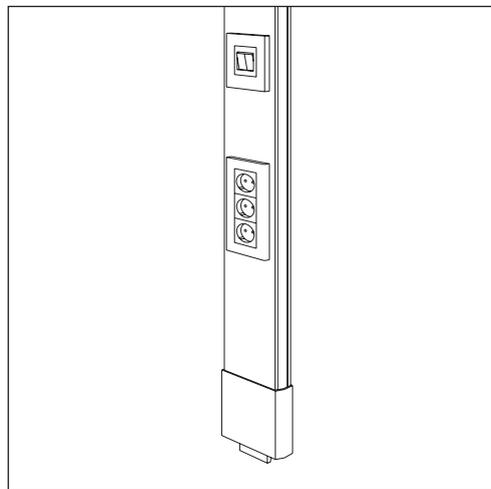
- This is a ductwork grid built into the filler layer where the wiring passes through with some predefined inspection points.
- It is not a very flexible solution, being one where the placement of the equipment is subordinate to the layout of the grid. In these cases, it is a good idea to overestimate the prewiring so it can absorb any increase in equipment.
- There are various systems on the market with straight sections, horizontal elbows, vertical elbows which can join to wall ducts, junction boxes and accessible boxes for switches/power point installation. (Fig. 12.32).
- Aspects to consider:
  - When the flooring is not very resistant, the ductwork and boxes need to be able to take the weight of the shelves and other furniture with no give.
  - One option is to leave the necessary junction boxes visible, and conceal the rest under the flooring. This option would mean boring precisely into the duct or the box for each new connection, with the risk of boring into the existent cabling.

#### Technical floor (double floor)

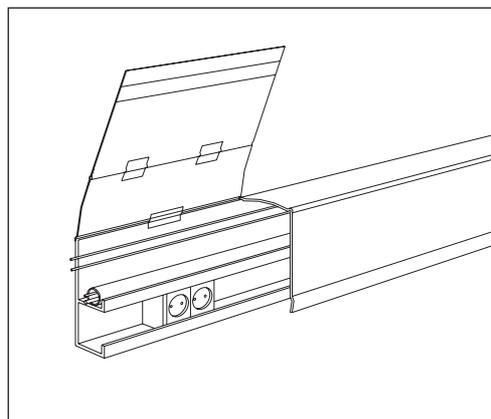
- This is a system of adjustable feet on the base floor structure, with support plates on which the flooring rests. (Fig. 12.33).



**12.34**  
*Front channel.*



**12.35**  
*Column.*



**12.36**  
*Front channel with flip-up cover.*

- This system's accessibility means the installations can be expanded without needing a predefined network of ducts and junction boxes.
- This is the most flexible solution: the unnecessary junction boxes can be concealed and new ones can appear at any point with complete freedom of placement. All this with the simple removal of the appropriate piece of flooring.
- Connection to the equipment can be through an electrical component housing or directly to the furniture with a hole in the flooring.
- Aspects to consider:
  - The technical floor supports must be able to take the weight of the shelves and other furniture.
  - The choice of this system depends very much on the type of flooring chosen for the library:
    - ▶ A technical floor is not guaranteed to be watertight. This is why the most highly recommended finishing material is carpet, as it is cleaned by vacuum cleaner. Other floorings need liquid cleaners and it is difficult not to affect the ductwork and junctions.
    - ▶ One option could be light floor tiles whose butt-spliced joints do not coincide with the support plates, as long as the liquid product cleaning is done carefully. This option is not recommended for libraries which have a non-specific maintenance contract.
    - ▶ Other materials demand more separation between the parts.
    - ▶ The balance between the number of wired installations, the density and type of public and the anticipated cleaning system will determine this decision.

#### **Ductwork through a suspended ceiling (below the base floor structure)**

- This is a good solution to get a feed to the equipment on the floor above.
- If the ceiling is accessible, or it has been decided to leave the installation

visible, the wiring runs through trays suspended from the steelwork. This option means great flexibility, both for equipment placement and for enlargement of the system.

- Connections to equipment are done by a hole in the floor through which the wiring passes. The connecting mechanism can be in the floor or in the furniture where the equipment itself is.
- This type of ductwork is not possible where the floor structure is in contact with the ground or where the suspended ceiling is not accessible. Difficulties might also occur with waffle slabs if the connection point needs the solid parts of the floor deck or composite floor deck to be bored.
- When there is little usable height, there are very costly 7cm suspended ceiling systems where the wiring can be concealed.

#### **Exposed ductwork**

This is suitable for restorations and changes in the use of already existing buildings, where it is difficult to conceal the ductwork.

Advantages:

- Flexibility.
- Accessibility throughout the installation.
- Wide range on offer of all kinds of finishes.

Disadvantages:

- Visual image. All the ducts and the mechanics are visible.
- Difficult to place furniture. Ductwork takes up a lot of space, generally along walls.

Various possibilities on the market:

- Front channels on the walls. (Fig. 12.34).
- Electric rails.
- Columns:

When the installation passes through the ceiling, and the junction box is not close to walls or pillars, these columns, fixed to the floor and the steel work above, can conceal wiring and place the connection mechanisms near the workplace. (Fig. 12.35).

- Multiple components to facilitate the passage of cables of differing tensions and the installation of the mechanisms.
- Wide range of materials (PVC, plate or aluminium) and colours, with different sizes, both in width and depth.
- Accessorizing elements to incorporate other installations (continuous ventilation grills, etc.).
- Devices which are adaptable to the dimensions and the finish of the duct.
- Flip-up covers:  
The mechanism installations are concealed under the covers, so it is unnecessary to use mechanisms of the same design as the ductwork. (Fig. 12.36).

## ELECTRICITY

The building's total electric load must be determined by the level of lighting, the air-conditioning installation, the electric power points and other needs set out in the project.

Aspects to consider:

- The need to install a transformer station (TS) will depend on the overall power and the electricity supply company's requirements.
- Above a certain contracted power, a study to assess the usefulness of a high tension supply could be advisable.  
High tension supply will require the installation of an independent transformer station.
- The specific installations will mean an exclusive electric grid for the feeds to the computers connected to a central UPS (Uninterrupted Power Service).  
This grid will enable an established tension and frequency to be reached in the connected charges, and at the same time, if there is a power cut, a battery will maintain the feed during a predetermined period (usually 10 minutes).

Power points:

- In public libraries' children's areas, the plugs must be placed and protected according to the regulations.
- Apart from those specified in current

legislation, it must be possible to connect electrical equipment at the following points:

- Counters.
- Self consulting audiovisual points.
- Users' work spaces (to plug in personal computers, etc.).
- Study rooms.
- Meeting rooms.
- Photocopy areas.
- Anti-theft control.
- Multi-purpose room.
- Offices and internal working rooms.
- Storage.
- Mobile library parking.

Size of cables:

- This will depend on the number and type of equipment being connected at each point.

## SPECIFIC INSTALLATIONS

Installations specific to a library:

- Voice and data.
- Audiovisual.
- Conference room installations.  
Because of the type of activity, these installations will be looked at separately.

The rapid evolution of information and communications technology means we have to design installations that can be adapted to any unforeseen changes. The planned infrastructure must ensure that:

- All spaces offer the electronic services of the library of today:
  - Administration systems access.
  - OPAC access.
  - CD-Rom network access.
  - Internet tools (e-mail, FTP, Telnet, Gopher, Wais, etc.).
- The needs of the library of tomorrow are covered without any of the building's other structures being affected.

Specialized technicians must define the following criteria:

- The possibility of setting both the central computer and telephone systems up together.  
This means that the same wiring distribution system can be used for

both, with the resultant increase in the installation's flexibility.

- Placement of the two central systems. This is where the outside lines which need to be redistributed through the library must reach.
- Number and type of the library's exterior telephone connections (phone lines, fax, Internet, etc.).
- Ductwork system which guarantees passage continuity between the distribution box and each of the connection points.
- Type of lines which must be used depending on the data density and its transmission speed.
- Placement of the "working points" for the users:  
The various connections in the work area must meet in special devices, called "working points" (junction boxes), which hold the maximum number of connections in the minimum amount of space. When the central computer and telephone systems are set up together, the following composition is recommended:
  - 2 normal sockets .
  - 2 fixed sockets fed by the UPS.
  - 2 POS points:  
Usually one point is used for the computer material as such and another for the distribution of alternative services (telephone, video, TV, etc.).

## VOICE AND DATA

### Wiring

- The installation of the local grid must be planned bearing in mind the following aspects:
  - Wiring system (braided, coaxial, fibre optics).
  - Voice and data communications system:
    - ▶ The telephone network and, increasingly, fibre optics are the channel for these communications.
    - ▶ Fibre optic is the cheapest and fastest communication system. Other advantages include interactivity and its versatility which make it ideal for

adaptation to any future changes.

- Electrical wiring for computer instruments is needed. This line will have independent protection.
- The "voice and data" wiring should use the same passes as the electricity wiring to rationalize the installations. The distribution of the wiring will be independent of the electricity system and far enough away from it not to produce induction.

Approximate cabling dimensions:

- For each terminal, two independent conduits must come from the distribution box:
  - Voice and data: 2 cables of 5 mm diameter each.
  - Stabilized current: 1 cable of 10 mm diameter.Therefore the ductwork coming out of the distribution box could take up a lot of space.
- Cables under 90 m long.

### Hardware

- Distribution box.
- PCs.
- Terminals.
- Printers.
- Accessories (CD-ROM readers – optical guns - modems).

### Distribution box

Made up of the following elements:

- Server.
- "RACK" or "structured grid".  
Approximate measurements:
  - Height: 120 to 200 cm.
  - Width: 60 cm.
  - Depth: 60 cm (+ 15 cm for the connections).
- Telephone central.
- UPS.

- A strategic location depending on the length of the conduits to the various reading points.
- Only accessible for library staff.
- There should be a telephone next to it to report minor problems which the library personnel might be able to fix.
- Space around it which makes it possible to open and work on the distribution box.

## Connections

Telephone and computer connections must be installed at the following points:

- Telephone connections:
  - Counters.
  - Entrance foyer (public phones).
  - Points of public access to Internet.
  - Multi-purpose room.
  - Internal work rooms and offices.
  - Next to the computer distribution box.
  - Storage areas.
- Computer connections:
  - Counters.
  - Catalogue reference points.
  - Self-loan points.
  - Users' work stations.
  - Study rooms.
  - Public internet.
  - Conference and multi-purpose rooms.
  - Internal work rooms and offices.
  - Storage areas.
  - Mobile library parking area.

The installation of the "working points" described above will bring the connections together and increase versatility.

Basic recommendations for connections:

- Observe the distance between the machines to avoid interference.
- The machines must be away from any areas with vibrations.
- The spaces where the machines are installed must be clean and uncontaminated, at the right temperature, without direct sunlight and with lighting which has no contrasts and reflections on the screens.
- The printers installed in public work stations must be low-noise models.

## AUDIOVISUAL

The following audiovisual connections should be anticipated:

- Audiovisual library collection reference.
- TV.
- Public address.

## Audiovisual library collection reference

The audiovisual collection will be available on a large number of formats, depending on the technology used:

- Video:
  - The most common format is DVD.
- Audio:
  - Compact discs (CD), MP3, minidisks, vinyl, cassettes and so on.

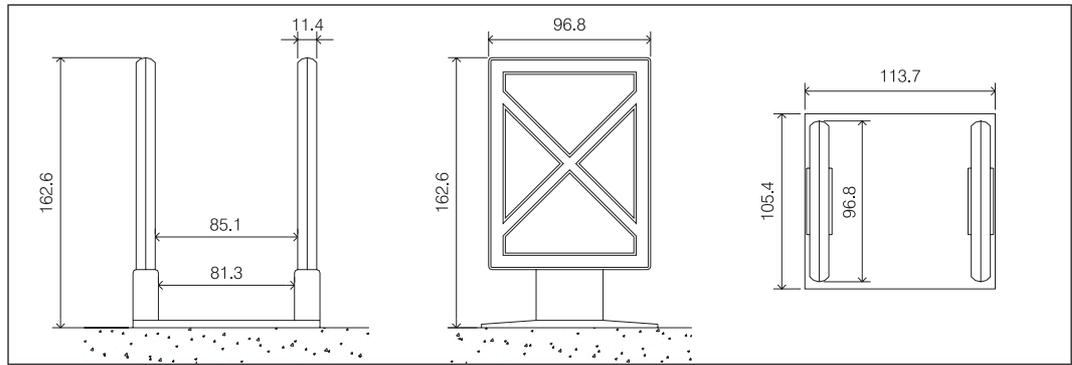
The audiovisual equipment used is connected to the type of structure chosen:

- Individual equipment for self-reference:
  - In the reference points set out in the furniture project.
  - The wiring installation is normal current sockets at the reference points.
- Centralized equipment:
  - The material is reproduced on equipment at the counters, then the video signal is sent to the user's reference point by cable.
  - The wiring installation is normal sockets at the counter and a wireduct, which the cable passes through, connecting the counter to every reference point.
  - Approximate size of the ductwork: 35 mm diameter wire channels for each group of 3 or 4 reference points.
- Robotic equipment:
  - Requests are made at the user's reference point, and automatically an automated retrieval and delivery system for the requested material is accessed.



12.37

12.38



**TV**

Necessary installations:

- Connections at the points where the sets will be placed.
- Aerials:  
A radio frequency (RF) antenna and a dish antenna should be installed. In some cases, other specific aerials might be useful.

Wiring installation:

- Electrical and aerial sockets at the points where the sets will be placed.
- Approximate size of the ductwork:  
16 mm diameter wire channels from each of the television viewing points to each of the aerials.

**Public address**

The public address installation must make it possible to transmit both music and spoken messages.

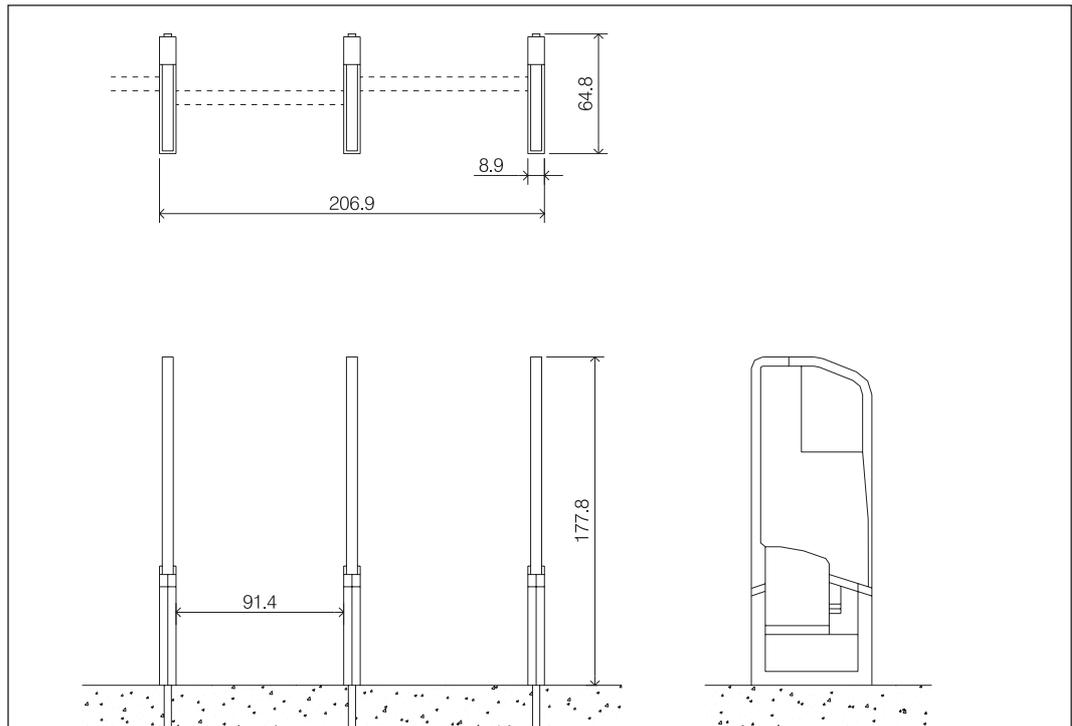
Wiring installation:

- Electric sockets at the transmission points to connect up the equipment (microphone, music, etc.).
- Approximate size of the ductwork:  
Conduits of 16 mm diameter from the equipment to each of the loudspeakers.

**CONFERENCE ROOM EQUIPMENT**

The necessary ductwork must be anticipated for the interconnection of all,

12.39



the equipment and the subsystems specified in the functional programme.

Systems that should be considered for the equipment of a conference room:

- Projection and video.
- Sound and audio.

#### Projection and video

- Possible signal sources:
  - Video recorders.
  - Cameras.
  - Computers.
  - Overhead projectors, slide and solid object projectors, etc.
- Video projectors should be selected according to the technology being used and the signals.
- The video projector can be installed frontally, suspended from the ceiling or for back-projection. The latter system eliminates the effect of ambient light on the projected signal, but it needs space for the video projector behind the screen.
- The conference room should have natural and artificial lighting controls to eliminate the contrasts on the projected signal.

#### Sound and audio

- This must be designed according to the size of the room.
- Possible signal sources:
  - Video recorders.
  - Microphones.
  - Simultaneous translation systems.
  - Audio players, etc.
- Necessary elements:
  - Loudspeakers.
  - Amplifiers.
  - Equalizers.
  - Mixers, etc.

### **ANTI-THEFT SYSTEM**

The material a library contains needs the installation of an anti-theft system when there is no public and access control when the library is in use.

#### **Security when there is no public**

The most common systems are volumetric sensors in different spaces and window contact sensors.

These two systems must be interconnected and linked, via the communications network, to a private or institutional CCTV service.

#### **Security when the building is in use**

##### Spaces without monitoring staff

Exhibition rooms, photocopy machines and other spaces which might be out of the staff's sight, need surveillance systems to avoid theft, misuse and damaging of the materials and other acts of vandalism. Strategic placement of mirrors or video cameras is a recommended deterrent.

##### Electronic detection of library access

The loan service and open access to documents call for controls to avoid users leaving the library with materials which have not been checked out. In most cases, these installations are connected with the computerized administration of customer transactions. The most commonly used systems are:

- Magnetic archway.
- Radiofrequency or radio wave detection.

#### **Magnetic archway**

- The material in the collection has a small magnetic strip which is deactivated when given on loan.
- The most common detectors are two parallel archways with a walkthrough of about 90 cm. When there are a lot of users, systems of three archways with two walkthroughs can be installed. (Fig. 12.37).
- They can be mounted on bases or sunk directly into the floor.
- When the users come out of the library, they have to pass through the magnetic field between the arches. If they are carrying material that has not been demagnetized, the visual and sound alarm is activated.

Wiring installation:

- These systems run on electricity, and they need a socket close to one of the arches and a duct to connect to the other.
- The electronic cable between the

arches can be sunk into the floor or concealed beneath a platform, which would mean a step. This would make the walkthrough more difficult and spoil the uniform level of the floor.

Advantages:

- The system also makes it possible to count the library visitors, thus providing data for statistics connected to the efficiency of the library service.
- Magnetic strips mean loaned material can be activated and deactivated as often as necessary, with a very low cost.

Disadvantages:

- High cost of equipment.
- Current systems cause interference when placed near computer equipment or metallic elements.
- The maximum width between the arches cannot exceed 90 cm, which causes problems with the fire evacuation regulations. (Fig. 12.38 and 12.39).

### **Radiofrequency or detection by radio waves**

- Each document has a label with an electronic circuit. The user must hand the document in at the loan counter where the staff member, once s/he has recorded the loan, hands it back on the other side of the detection system.
- If the user leaves with an unchecked library document and passes between two detecting antennae, it modifies the emission frequency and an alarm is set off.
- Labels with different frequencies can be used which means routes within the library can be determined by type of document.

General considerations for both systems:

- The physical presence of the detectors, both their size and their look, mean they should be considered as another element in the architectural project.
- The effectiveness lies in the sound made when a document which has not been through the loan control is taken out. To make it possible to

react, the detectors must be installed near the loan counter or the central counter.

The placement is closely connected to the general organization of the library's walkways, showing once again the advantages of having strategically placed entry/exit.

- Both systems have limited effectiveness, as a document can be demagnetized and a radio label can be cancelled. The document can also be taken apart and the unmarked part removed.

Even so, statistics recommend the deterrent effects of anti-theft systems, with a very favourable balance between the cost of the system and the drop in the amount of material stolen.

- The anti-robbery treatment of documents adds an extra task to the processing of the collection.

### **Emergency exits**

- The regulation emergency exits present a problem for monitoring the users, since the anti-panic door-opening system means that people can leave the library without going through the entrance's anti-theft detectors.
- Recommended solutions range from installing sound alarms at the emergency exits which are set off when the door is opened, to remote control devices which open if there is a fire.

The second option is dependent on regulations which demand the physical presence of a monitor who, according to a very strict emergency plan, has to guard the exit in case of emergency.

### **Heritage collection deposits**

Depending on the value of the collection, these spaces can be protected along with the rest of the library, or by independent systems.

# INTERNAL ORGANIZATION

*Organization of information*  
*Typology of formats*  
*Information organization systems*  
*Organization of furniture*  
*Furniture project*  
*Furniture elements*  
*Shelving*  
*Shelving – Compact systems*  
*Counters*  
*Tables and booths*  
*Chairs / Easy chairs*  
*Carts*  
*Display furniture*  
*Storage furniture*  
*Made to measure furniture*  
*Accessories*

In a library, “information” and “people” exist side by side. Internal organization of spaces will consist of:

- Organizing information.
- Providing furniture layout to facilitate the information / people interrelation.

Furniture must allow for storage of information on different formats, as well as making people feel welcome. The people can be divided into two groups, according to activity: those who are looking for information (users), and those who are supplying it (library staff).

## ORGANIZATION OF INFORMATION

### TYPOLOGY OF FORMATS

Libraries have opened up to every available format, and to the concomitant economic effort. There has even been some controversy over what such places should now be called, suggestions including “mediatheque” and “multimedia library”.

Although in Spain the word “biblioteca” (library) is the only one used, the important point is that this is an establishment whose mission is to ensure that information and documents are available in any format whatsoever.

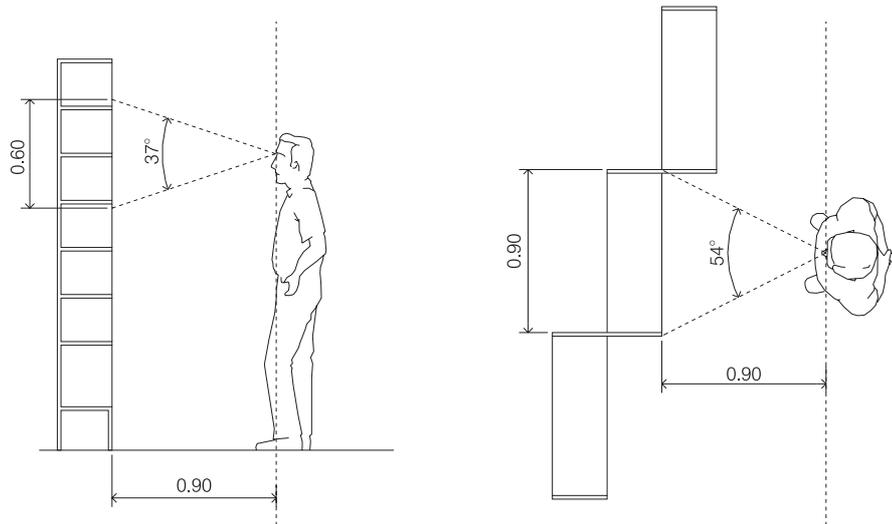
These are the different format types:

- Printed documents.
- Other traditional documents.
- Audi-visual materials.
- Remote Access information.



**13.01**  
 Can Pedrals Library  
 (Granollers,  
 Barcelona).  
 Architects:  
 Artigues & Sanabria  
 arquitectes.

**13.02**  
Optimum angles for vision (vertical and horizontal).



**Printed documents**

- Books: People looking from a technological vantage point have foretold the death of the book, but it seems that the future of the library is not to give up on that particular format, but rather to incorporate other various systems depending on the technological advantages that each of them might offer.
- Periodicals: Mass produced publications, mainly newspapers, newsletters and magazines.

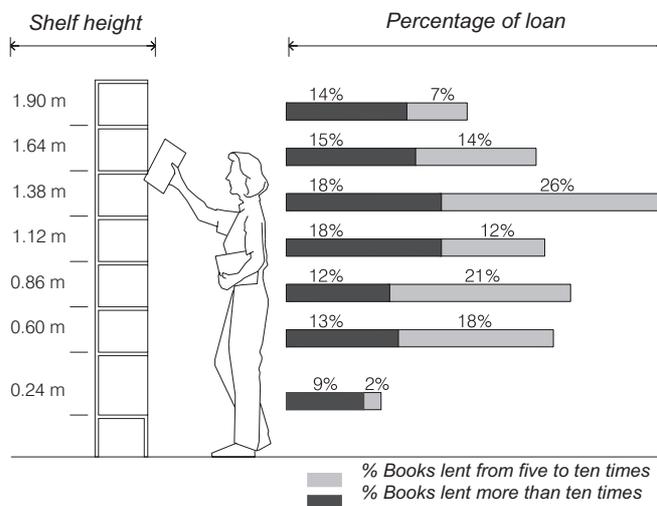
**Other traditional documents**

- Iconographic documents: Photographed and recorded images.
- Cartographic documents.
- Printed music.
- Other documents: Some libraries have collections of coins or other objets d'art.

**Audiovisual materials**

In the documentation sector of libraries, an audiovisual document means any document which needs special equipment to access its audio, visual or audiovisual content.

**13.03**  
Percentage of loan according to shelf height.



Percentage of loan according to shelf height

These days everyone is quite accustomed to sound and vision presentation. The quantity of material in audiovisual formats constitutes an increasingly important sector in libraries, and is an absolutely essential complement to printed text.

These are divided into four groups:

- Sound documents:  
Discs and other formats.
- Still images:  
Slides, transparencies and microforms.
- Moving images:  
Film and video.
- Multimedia documents:  
This includes any group of textual information media – graphic, sound or iconic – used in combination in a communication or educational environment.

The need for specific equipment to consult this type of document means thought must be given to furniture and the organizational system of a library.

- Individual or group use.
- Reading one format or several formats simultaneously.
- Computerized or manual use.
- Possibility of document reproduction.

### **Remote access information**

No library can respond alone to all its public's needs. That is why library systems have to pool their documentary resources in order to offer a wider range of information.

The libraries have to create collective catalogues and have computer terminals available for remote access to the information and data banks.

### **INFORMATION ORGANIZATION SYSTEMS**

It is easy to find your way around a bookshop. Although they are relatively small spaces, they have windows at the front displaying the most important works and special offers. Inside, there are the recent addition shelves, classified in a very straightforward way.

The customer knows where s/he is, and

rarely needs any guidance from the shop assistant to find the most immediate information. Maybe s/he also wants to avoid feeling obliged to buy something.

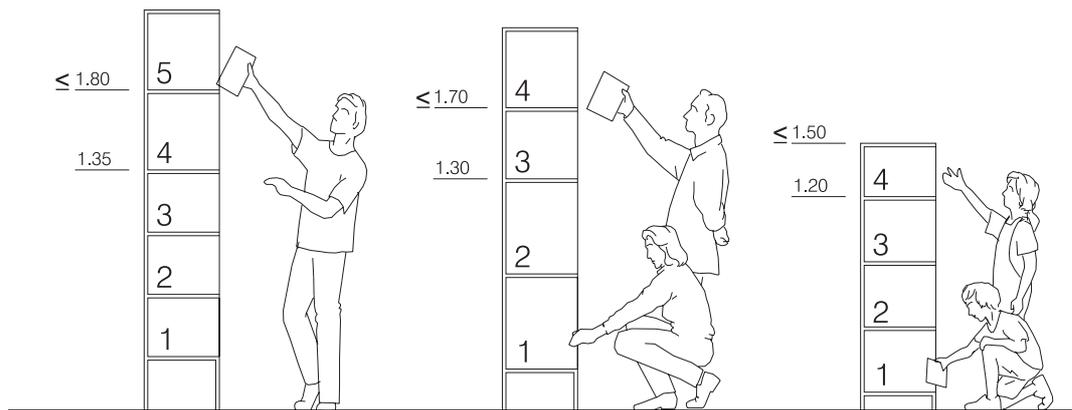
In libraries, which are larger spaces, the variety of documents, and the different reference systems make a clear overall image of the organization more difficult. Maybe the fact that the service is free makes the user less motivated. Maybe s/he does not wish to interrupt the librarian to ask about a specific service. The fact remains that solutions need to be found to make the organization of the spaces and the collections, as well as the access to the information systems, clearer to the user.

### **Basic criteria**

- On the subject of the situation of documents on shelving or other furniture, a series of studies has been made determining the maximum distances and angles for the visual comfort of the users.  
These studies are closely connected to a desire to optimize the amount of the collection on show: a document which does not get consulted because of difficult access is a document which is of no cultural use. If the library's principal mission is information access, placement has to be of primary importance.
- Depending on the kind of library, other aspects more usually associated with the business world could be used in the collection distribution.  
There are various possibilities to make it attractive: from special points of interest, whose function is to attract the users towards other information which the library wants them to see, to strategic placement, helping the user to get away from the oppressive feeling produced by so much information.

Below are some pieces of information which might help to get an idea – however superficial – of the difficulties encountered in organizing a library collection. (Fig. 13.02, 13.03 and 13.04).

**13.04**  
*Lower shelving increases the feeling of spaciousness and makes visual control easier, but access to books becomes more difficult.*



### Organization system

The organization will be founded upon the interrelation of the following systems:

- By discipline or by document format.
- By zone.
- By traditional Dewey classification system or by “centres of interest”.

#### By discipline or document format

Libraries have many document “families”, each with its own peculiarities of presentation, reference and conservation.

Organization can be done in two ways:

- Organization by disciplines, with multimedia - which is to say, any kind of format - presentation.  
 This method means that documents can be grouped by subject and by type of public, but it needs shelving etc. which can take all formats and numerous reference systems in place throughout the library space.
- Organization structured by format type with some subject-based criteria observed.  
 This is technically more feasible and means the furniture can be more homogenous in each space, but it is very obvious, with the progressive inclusion of multimedia formats from all fields of knowledge.

Although many libraries adopt an intermediate solution, it is the type of collection and size of the library which will determine the system chosen.

#### By zone

- Another option is division “by zone”.  
 In this case, the “theoretical”

separation of the collection has a corresponding “spatial” subdivision: periodicals area, music and audiovisual area, loan area, reference and study area, etc.

- This organizational model does not take into account either possible continuity in the use of the various documents or the connection between reference in the rooms and loans. It is also clearly unsuitable for buildings where the spaces are very different.
- In public libraries, where lending is one of the priority activities, the usual thing is to put the lending service at the beginning of the spaces, with shelving groups which make it look like a commercial establishment. Then, as if it were an independent space, come the reference books and work tables.

This organization has advantages and disadvantages:

- Space is maximized, and organization by discipline is more flexible, but the visual image is less flexible.
- The division of spaces, even though it means that the lending area makes a bridge between the noisy entrance and the peace of the working area, does actually make the working area seem less accessible and more oriented towards an elite of users.

#### By traditional Dewey classification or by “centres of interest”

Despite the ideological conflict between the Dewey supporters and the “centres of interest” supporters, a specific organization system must be decided upon which will allow the users to create

their own strategies and to apply a “reading programme”.

- The Dewey system dates back to the 19<sup>th</sup> Century so it is marked by a concept of the world and of knowledge little adapted to present-day reality. Even so, most public libraries still use the decimal classification system because of its clarity, precision and flexibility.
- The argument against organization by “centres of interest”, which corresponds to a more modern concept, is its repetition of classification systems established by the “mediatization” of our society.

#### *The Dewey system*

- Decimal classification, created in 1876 by Melvil Dewey, is a numerical system which enables documents to be classified in a strictly defined way, but which also allows new documents to be inserted into the system indefinitely, without disturbing the order of those already classified.
- The classification numbers are formed by using the ten Arabic numerals, augmented by a certain number of auxiliary signs.
- The sum of human knowledge is supposedly divided up into groups made up of ten major categories, into which all subjects are placed; from general to specific, from whole to part, from genus to species.
- General systematic table:
 

Generalities .....	0
Philosophy and psychology .....	1
Religion.....	2
Social sciences.....	3
Language.....	4
Natural sciences and mathematics...	5
Technology (Applied sciences) .....	6
The arts .....	7
Literature and rhetoric .....	8
Geography and history .....	9

#### **Study of different types of organization (Eliseo Verón)**

To understand the peculiarities of the various options for organizing a collection, it helps to look at the results of studies by Eliseo Verón, a communications strategies consultant, in four French public libraries. The analysis focuses on the adult

lending room, ignoring the other areas, and the public who form a purely instrumental relationship with the library. In order to achieve the relationship between the structuring of the spaces and behaviours, the author of the study distinguishes two global levels of description of “behaviour in the space”:

- The “appropriation context”  
This is the space where the actual technical operation takes place, which in the case of a lending library means looking through books or looking along shelves reading the titles.
- The “progressive spaces”  
These connect the various “appropriation contexts”.

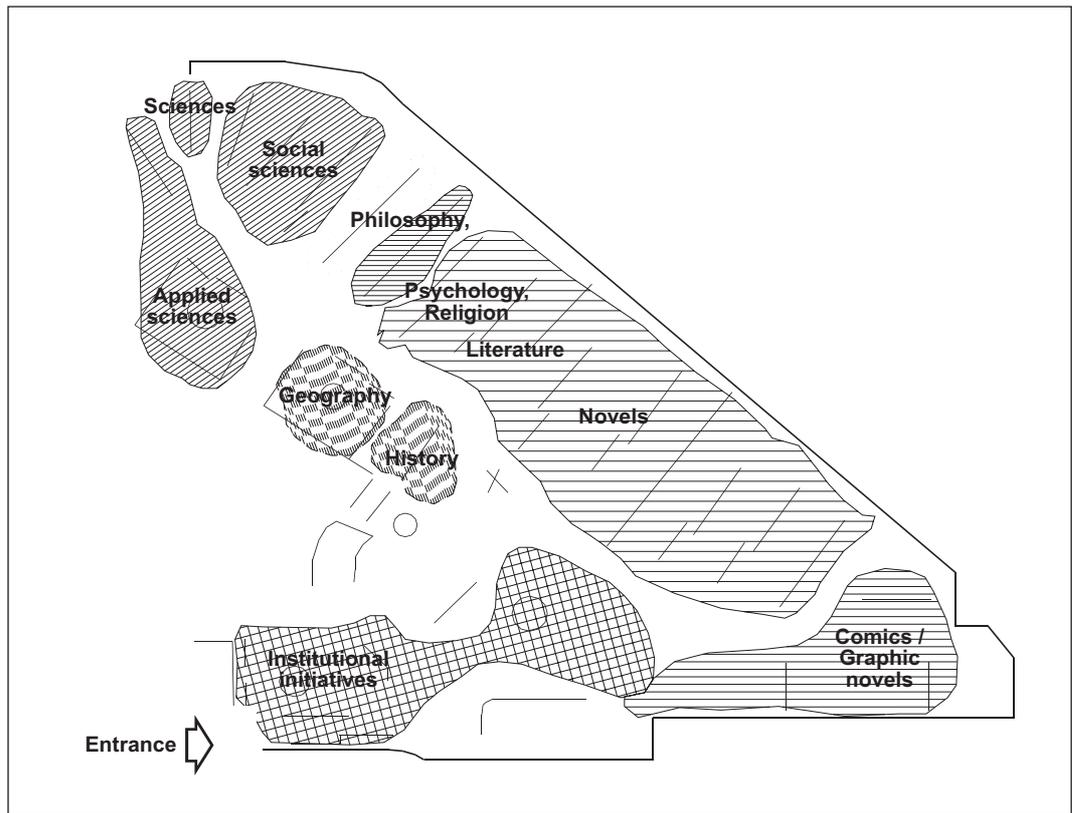
#### Library “A”

- The layout plan shows placement according to the major categories of the Dewey system, and the black lines show the placement of the shelving systems.
- When the user enters the library, s/he has to walk through an “institutional initiatives” space, meaning for documents removed from the general collection for specific reasons. The user is brought into the space through a configuration established by those in charge of the library, and there is an active welcome.
- After this space, the main aisle, a clearly progressive space, leads one obliquely right into the room, where the all the books can be seen together. To the right, the world of fiction, and to the left, the “real” world. Sciences await the visitor at the end of the central aisle.
- The organization is clear and visible right from the start. The first space, with its “initiatives” is part of a strategy aimed at meeting the demands of the public and generating new interests.
- The institutional policy of this library can be summarised with the words transparency, contact and guidance. (Fig. 13.05).

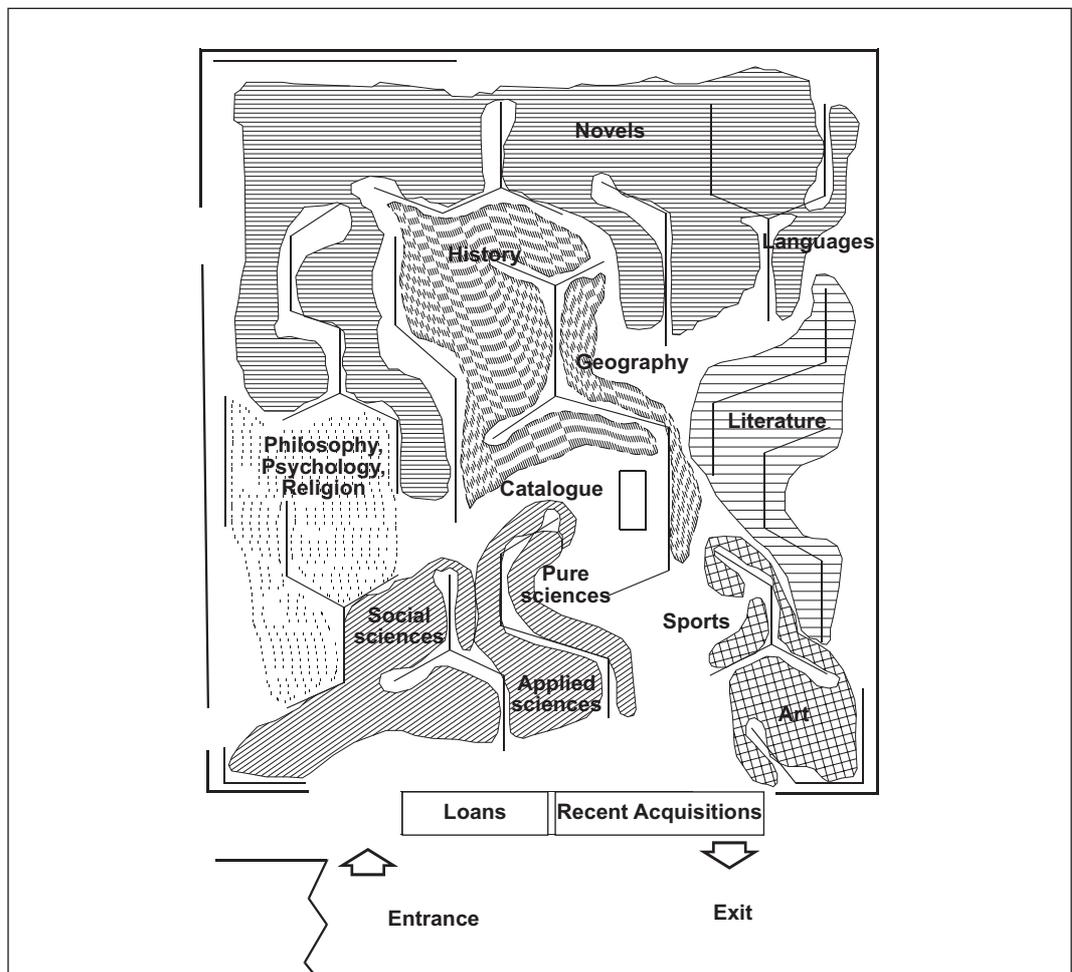
#### Library “B”

- This is a large library with a different specialization form the previous case.
- Wherever the user is in the room, he has no visual perception of the collection due to the height of the shelving and the number of routes

13.05  
Library Diagram "A".



13.06  
Library Diagram "B".



that can be followed from the two entrances.

- The linear sequence of the Dewey system is completely dismantled, and the only reading suggestions put forward by the institution refer to recent additions, which are placed at the entrance and outside the main room.
- In library “A” the user finds the “progressive spaces” inviting him to continue, and some “appropriation contexts” inviting him to choose books.  
Library “B” has winding aisles and there is no spatial differentiation between the act of moving forward and the act of choosing.
- Maze-like, poor visibility, distance, the need to go through other subject areas to get to the novel, the most in-demand section.  
The institution obliges the visitor to wander through the multifaceted heterogeneous world of knowledge presenting a space where it is unclear how to choose between the two types of behaviour referred to above. (Fig. 13.06).

#### Library “C”

- This library, in the heart of Paris’ Latin Quarter and surrounded by universities and further education colleges, has a public which needs no particular guidance.
- The catalogues have pride of place in the entrance, as if to invite you to consult them before looking for your book. There are no subject-based leads or initiatives given, because it is assumed that most of the public already knows what it is looking for.
- There is as much separation as possible between the classification categories, with each one occupying a totally separate and enclosed space for itself.
- Moreover, there is total separation of fiction from non-fiction, each one on a separate floor. (Fig. 13.07).

#### Library “D”

- This is a space which is part of a large public building which covers other activities, with architecture and multimedia equipment aimed at a younger public.
- The overall structure is very

organized and the classification areas are less separated than in library “C”, although sciences and novels are separated in a similar way to library “A”.

- The whole space can be taken in from the entrance, and the central part brings together the audiovisual material and reference section.
- The aim of this facility is to appeal to a young public and this has produced a very different climate from the others.  
The library, regarded as a meeting place, has a very small amount in the loan collection, and 60% of the public do not use it for reading. (Fig. 13.08).

The study shows that the heterogeneity of the public means there cannot be an ideal layout, and the possible profile of the users who come to the library needs to be studied.

#### **A study on different behaviour patterns of the public (Eliseo Verón)**

Eliseo Verón went on to study public behaviour in four French public libraries and came to a curious conclusion: there are no general rules for categorizing behaviour. Even so, the study is interesting enough to attempt a short summary.

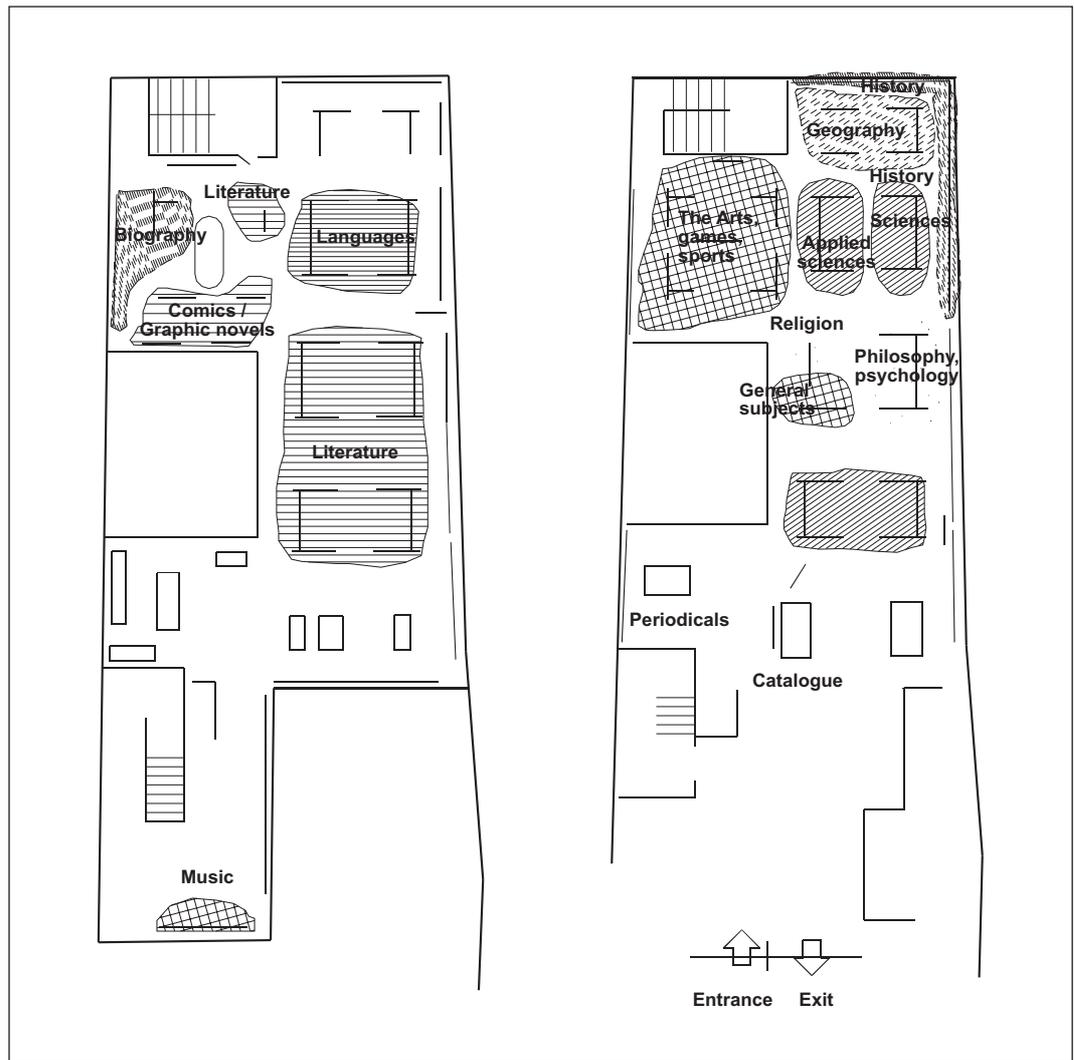
- The user entering the library has six different reading strategies or programmes. These programmes structure the user’s mental space at the moment he crosses the threshold of the library and determine his behaviour towards the use of the space.
- Each of the programmes defines the user’s expectations – meaning the documents he is looking for and the parts of the library he will visit.

Characteristics of each programme:

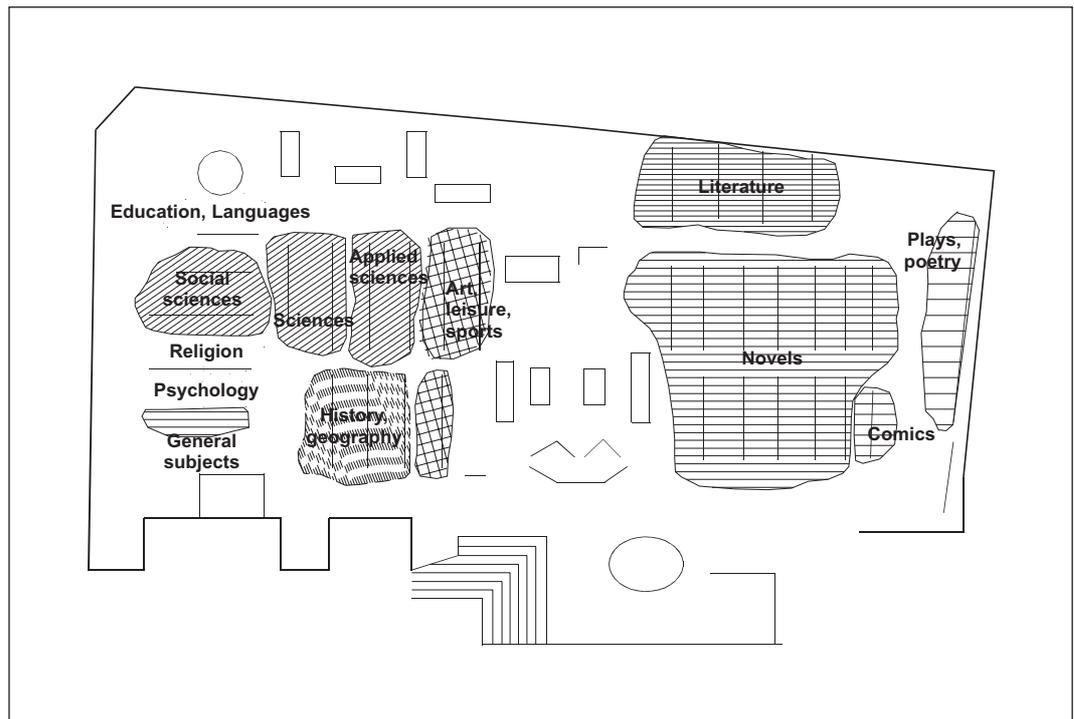
#### Thematic reading

- The thematic reader is locked into one subject which he does not wish to deviate from: his interest will last a long time. His cultural resources are relatively low, and what lies behind this extreme single-mindedness is a fear of getting lost in the world of knowledge.

13.07  
Library Diagram "C".



13.08  
Library Diagram "D".



- The subjects may be very diverse, but what they have in common is the fact that they form part of the “documentary” or “non-fiction” universe. Reading is a difficult activity, a chore more than a pleasure, and s/he tends to undervalue fiction, which s/he considers to be of no help either for training or for information.
- The thematic reader has a very precise and selective perception of the library: s/he knows the place where the information s/he needs can be found very well, and gets disorientated in the other spaces.

#### Reading for a problem

- Reading is based around a problem which does not fit into any particular discipline, and for which there is no specific place in the library space. The problem in question is found at an intersection where different subject areas meet.
- Reading is not a chore as in the previous case. The reader, who has a comparatively high cultural level, is looking for a systematic solution to a problem, and does not want to waste time or get distracted.
- S/he sees the public library as a tool where s/he can study a book before buying it, or where s/he can complete his/her knowledge of a particular aspect of the problem through a book which is not worth buying in its entirety.
- The fact is that the problem reader prefers traditional libraries, with their atmosphere of silence creating the privacy she needs to solve the problem. She criticizes free-access for being like a supermarket for book consumption, as an easy way in, and s/he thinks that the collection is under-stocked.

#### Eclectic reading

- Eclectic readers have insatiable curiosity and see all the subject sections as equally important. Their interests keep building up, because they rarely let a subject go. Reading is pleasure and entertainment, and they consider themselves self-taught.
- They have a very positive perception of the public library because it allows them unrestricted access to culture. They place more importance on

variety than on depth in the collections, and they value user freedom concerning the books on offer.

- The eclectic readers are the ones who know the library space best, and their physical behaviour is walking, turning back and browsing through the aisles. This is why they might be referred to as model readers, the users who come closest to the institutional ideology of the public library.

#### Fiction reading by author

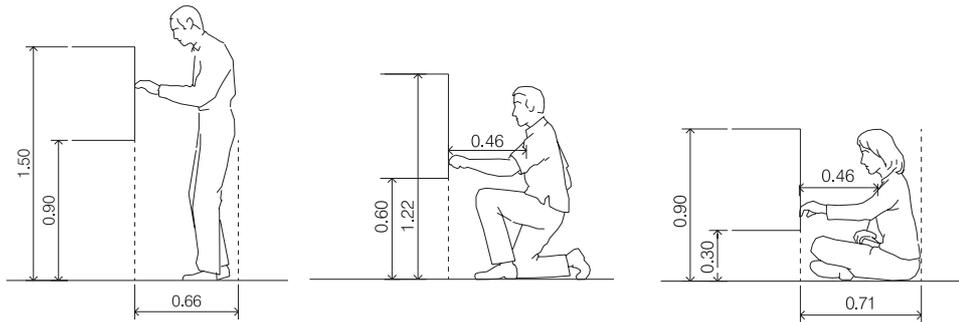
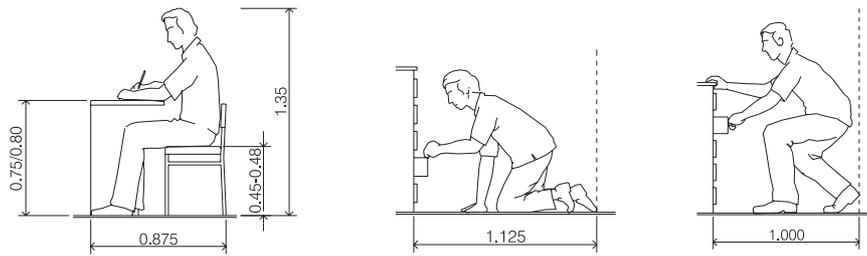
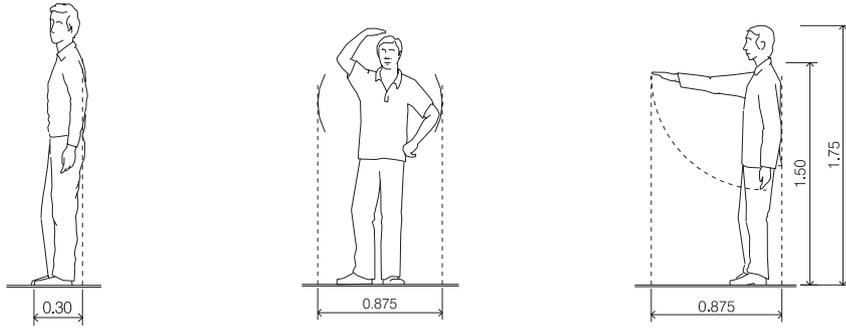
- They come to the library to take out books by specific authors. The readers can claim a certain level of literary culture, are interested in different styles of writing and their interest cannot be reduced to simple entertainment: they see the novel as a tool for understanding mankind and the world.
- Fiction readers use a part of the library which is different from the others, and generally have no knowledge of nor interest in its overall structure.

#### Fiction reading by genre

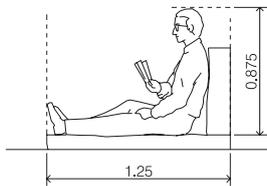
- These readers see reading in terms of distraction, entertainment, escape or relaxation, with a quantitative assessment of cultural consumption.
- What the fiction by genre readers, who are major consumers of the mass media, expect of the library is a response to their reading needs, and they appreciate quantity in the range on offer, although they have already made the choice of genre before their visit, with the help of the media.
- Other library zones beyond the fiction section remain completely unknown to them.

#### Recent additions readers

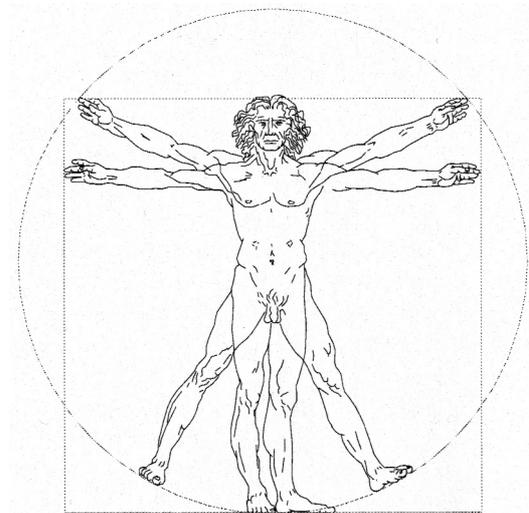
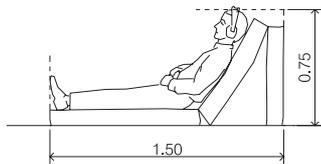
- This reading programme focuses completely on the new, on the desire to know all the current themes.
- Recent additions readers use a number of techniques to identify the books they are interested in. The most simple is to focus on the selection of recent additions which the library is promoting. They might also be influenced by the



**13.09**  
Space occupied by a  
person indifferent  
positions.



**13.10**  
Canon of  
Proportions  
(Leonardo da Vinci).



media, or might simply look at the books that other users are reading.

- Recent additions readers neither know nor care about the spatial layout of the library.

The behavioural study brings Eliseo Verón to a series of conclusions:

- The first time a user comes in to the library, s/he quickly identifies the zones which are important to the functioning of the reading programme which characterizes her/him.
- When the user becomes familiar with the space, the programme activates in connection with one particular part of it, and the initial perception of the space atrophies as time passes.
- Two users who apply the same programme, but go to two different libraries have more in common behaviourally speaking than two users at the same library who use two different strategies.

As a final thought, it could be said that one space is interpreted very differently by each type of public. The organizational policy of the different systems must be based on the users' diverse systems of appropriation. For this reason, it must be an appropriate place for each and every one, with a desire to understand that a space offering something also becomes a place for implicit negotiation between the proposal for use carried out by the creator of the facility and the actual use by the user.

## **ORGANIZATION OF FURNITURE**

The final part in the library creation process is the furniture layout. This is a crucial area because the facility's physical spaces make no sense without furniture, it being the closest element between the document collection and the user, and the one which adapts the space to its function.

In the "Ratios" section of the "Programming and Planning" chapter, the space occupied by information and by people is listed, based on a hypothetical furniture layout. This data is a tool for calculating the "programme floor space"

of a library, indicated in the "functional programme".

The aim of this chapter is to give all information necessary for a real layout, with recommended measurements of furniture and foot traffic walkways for smooth functioning of the library. Although the data used in the "Ratios" section has a very specific use, and gives an impersonal impression of the problems surrounding the furniture project, it is evident that they come from the rationalization of a whole series of possibilities using the basic measurements referred to in this chapter.

Figures needed to ensure the appropriate distribution of various furnishings:

- Space used by a person in different positions and in movement.
- Space between the furniture and other fixed elements used by a person in order to carry out work or to move around comfortably, while at the same time trying to maximize space.
- Space occupied by the collection. (this data is listed in the "Ratios of a public library" section of "Programming and Planning".)
- Dimensions of the furniture. (listed later in the "Furniture elements" section.)

### Space used by a person in different positions

(Fig. 13.09 and 13.10).

### Space used by the disabled

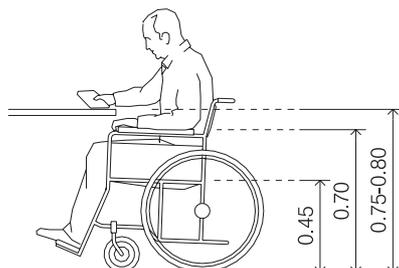
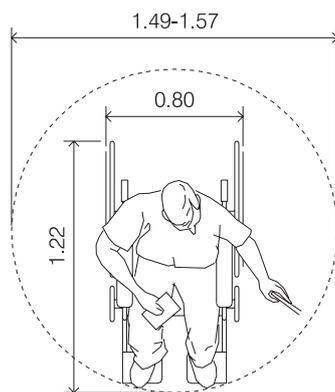
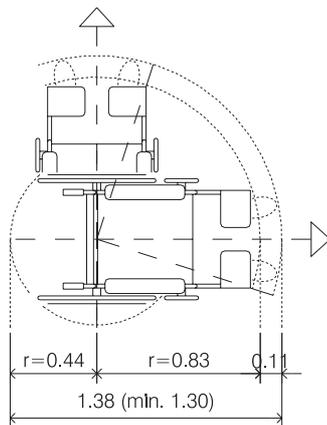
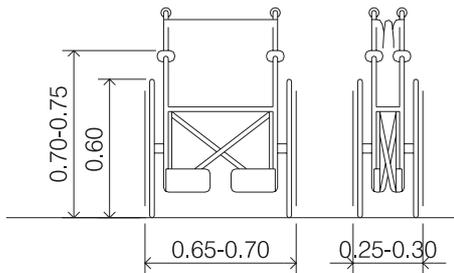
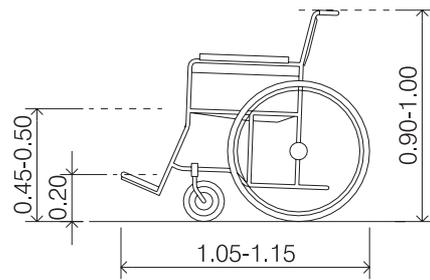
(Fig. 13.11).

### Space used by a person between furniture and other fixed elements

- Shelves. (Fig. 13.12).
- Audiovisuals. (Fig. 13.13).
- Tables. (Fig. 13.14 and 13.15).
- Easy chairs. (Fig. 13.16).
- Conference room. (Fig. 13.17).
- Customer service counter. (Fig. 13.18).
- Internal work. (Fig. 13.19).

## **FURNITURE PROJECT**

Organizing the furniture of a library is a complex matter: it is one thing to place the shelves and tables to create a



general organization of spaces, but quite another to make a detailed layout for the wide variety of furniture needed.

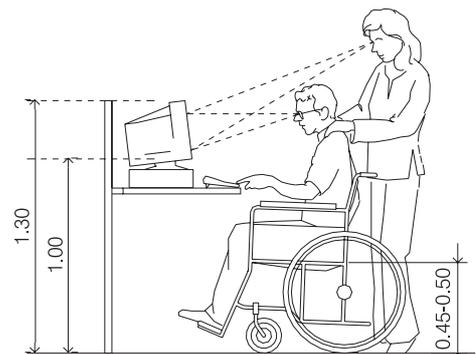
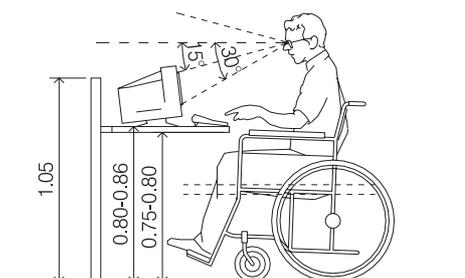
The far-reaching effects of this stage are obvious when you look at a few case studies. In many cases, good layout can make up for insufficient spatial solutions. On the other hand, a good architectural solution can become a poor library due to poor organization of the furniture. The operation also has a considerable price. When one is aiming for quality, it can actually come to about a quarter of the price of the whole building project.

The layout must offer:

- Ease of circulation.
- Ambient variety.
- Room for the document collection and the reference points specified in the "functional programme".
- Working facility for the staff and the users.

As well as this, it can help to strengthen a series of basic concepts which have also been recommended for the architectural project:

- Access: Layout offering a welcoming appearance, easy foot traffic circulation and identifiable spaces.
- Flexibility: Furniture which allows for expansion and changes in layout.



**13.11**  
Space occupied by disabled persons.

- **Organization:**  
To ensure rapid recognition of the zones, and to emphasise the idea of walking using clear routes inviting the user to browse through the collection. To organize sequential routes to access the various zones depending on the type of collection on show.
- **Atmospheric variety:**  
Apart from being architectural and interior decoration tools, furniture can say a lot. Through layout, design and colours, different atmospheres can be created. Obviously the final aim of all this is to bring everything together. (Fig. 13.20, 13.21 and 13.22).

As explained in “Programming and Planning”, furniture is present right from the very start of the process of library creation:

- **Programming studies:**  
These provide information about basic aspects of furniture, the approximate cost and the time needed for completion (administrative process, manufacture and installation).
- **Functional programme:**  
This specifies the number and type of documents for each section, including anticipated growth over a specified period; the main furniture elements, and the number and features of the work stations.

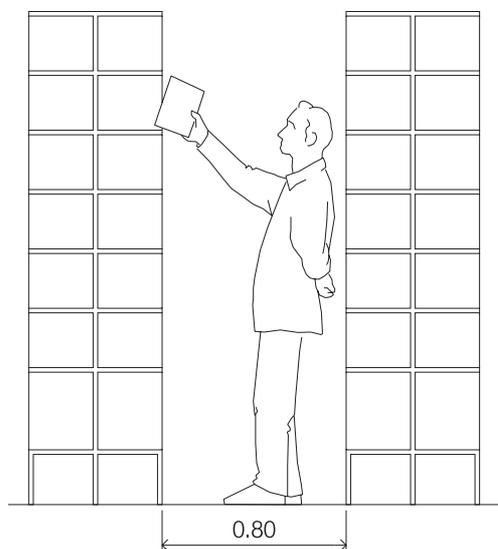
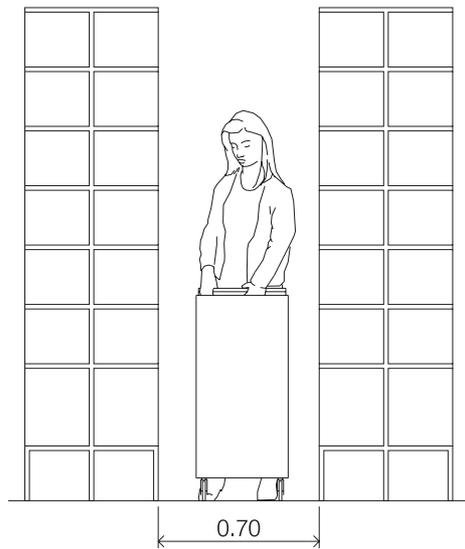
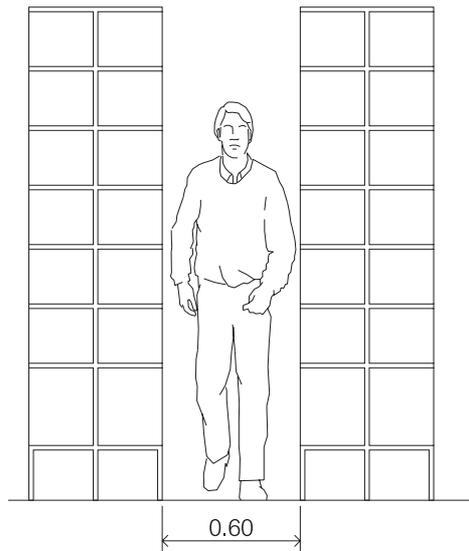
In many cases, this stage is not given the same importance as others in the process. This situation, which is more common than we might like, can create problems:

- When the minimum floor space which the programme says is necessary for a particular area is not respected, it becomes almost impossible to fit into it the whole document collection and the planned work stations. In this case, the choice has to be to reduce the number of elements in order to adapt to a smaller capacity, so avoiding a cramped layout which would doubtless produce functional problems.
- In some projects, furniture installation as a stage gets forgotten, and is given neither economic provision nor deadlines, so that at the end of the project it suddenly becomes very important and urgent.

- When there is no specified person in charge, sometimes professionals from outside have to be called in to make quick decisions without sufficient knowledge of the needs.
- The pressure of other commitments (opening date and so on) mean that this stage has to be gone through with gaps in the service which need short-term solutions.
- It ends up being a facility with badly laid out furniture, costing no less than it would have done had a detailed project been done beforehand.

The importance of this stage calls for these measures:

- Designate an architect who has the time and information to produce a complete project. The kind of requirements demanded illustrate the complexity and specialization of this kind of furniture installation. The advantages of giving the project to the same architect who is doing the building range from the possibility of a global conception of the whole building to facilitating maximum interrelation between building and furnishings. Although flexibility throughout the creative process is recommended, an implementation project for the furniture would be positive both for design purposes and for calculations about the following areas:
  - Floor load.
  - Composition of the facades:  
Placement of exterior openings, the size of the solid sections where the shelving will go and so on.
  - Artificial light:  
Although it is recommended that this is kept separate from furniture, lighting specifically designed to give a particular intensity can produce shadows and other problems when it has been designed without anticipating the layout of the furniture (tables running along the exterior walls, occasional spaces needing a particular type of lighting and so on.)
  - Specific installations:  
Computers, audiovisual equipment and other installations fed by cables terminating at a piece of furniture which the user will connect to. Although some



13.12a  
Shelving.

flexibility in the cable duct work is recommended, knowledge of the layout of the furniture will be positive when designing the installation.

- Unity of the whole:  
Harmony between materials, colours and ornamentation, both of the coverings and the furniture without losing the strictly functional appearance.
- Access to advice from:
  - Library technicians, who really know about movements in a library facility, as well as the systems for optimum organization and display of the collection.
  - Library furniture specialists who can provide the following information:
    - ▶ Technical and functional characteristics of each element and specific solutions in particular situations.
    - ▶ Dimensions recommended from the functional point of view, as well as the standard modulations used by the major furniture companies.
- Establish contract bidding with the following criteria:
  - Provide plans (floor plans and interior elevations, specific furniture, details and so on), measurements and technical specifications detailed enough for the companies to make an accurate estimate.
  - Include all the elements necessary for the completion of the facility.
  - Include an entry for unforeseen expenses to enable the provision of a budget for possible changes (differences between the project dimensions and the actual measurements, adaptation of the modulations set out in the project to those used by the successful bidding company and so on).
  - Possibility of awarding contracts by section to several companies depending on the bidding.
  - Selection process which prioritizes quality, functionality and ergonomics over questions of cost.
  - Other important matters are the guarantee, after-sales service and experience in these kinds of installations.

- Include the following specifications in the clauses of the public bidding contracts:

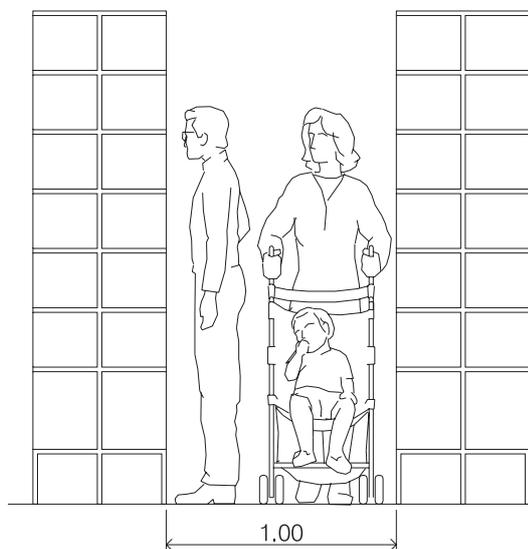
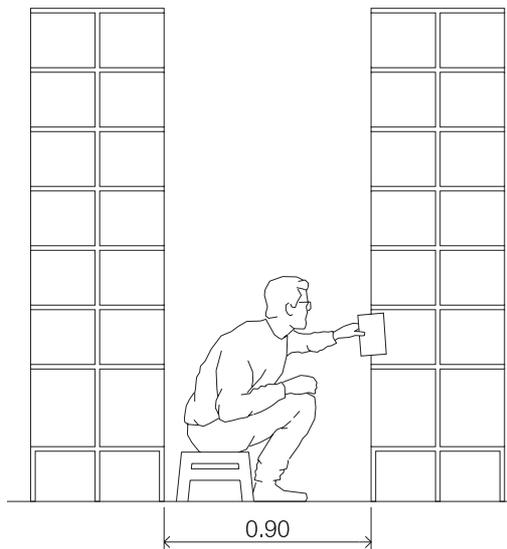
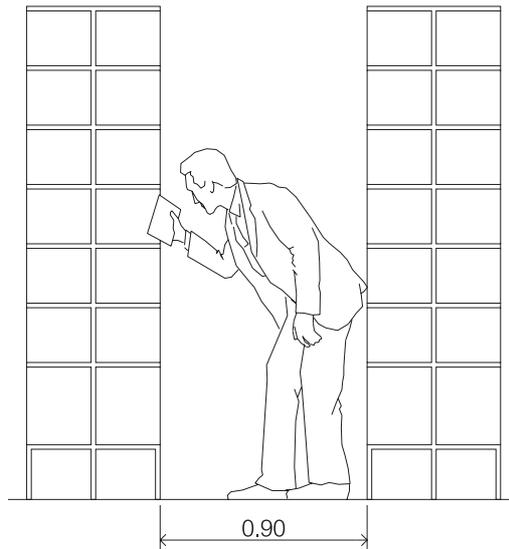
- ▶ Bidders are committed to supplying all elements specified in the measurements. This written commitment ensures the quality of the product even if the bid presented by the company does not specify all the requirements exactly enough.
- ▶ The owners will bill depending on the materials used. This means that modifications can be made during manufacture. Experience shows that at this stage, unforeseen costs arise because of the adaptation of the project to reality (an increase in material for some items, changes in the model chosen for certain furnishings and so on).

- Analysis of various bids evaluated by technical experts in library furniture.

The large number of suppliers, and their tendency to all copy the same models with only slight differences, makes a first-glance assessment of the positive and negative aspects of each bid quite difficult.

A detailed analysis is recommended of the composition and measurements of each element, as well as the finishing materials.

Time is needed for proper study of all the proposals, to compare supply and demand and to have samples on hand which will help with any assessment.

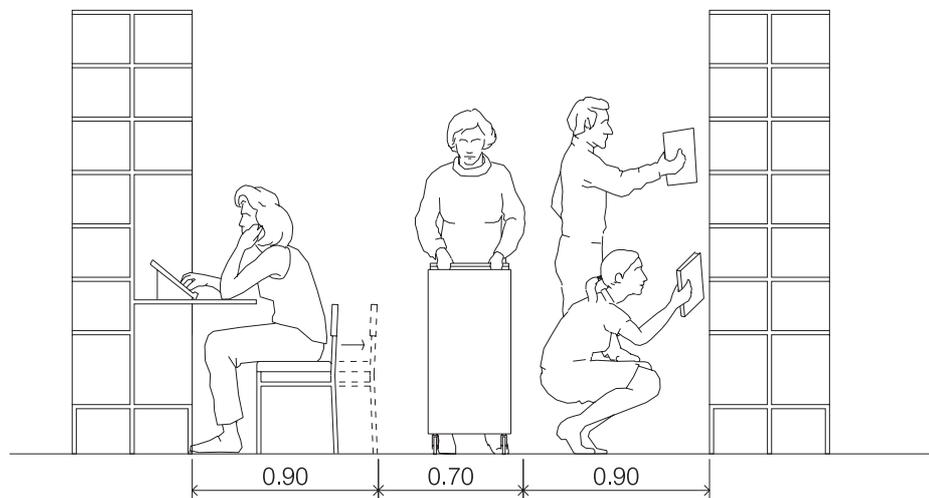
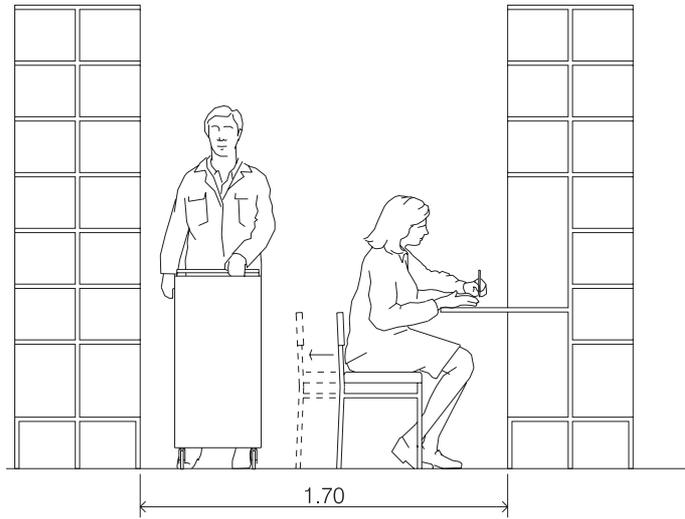
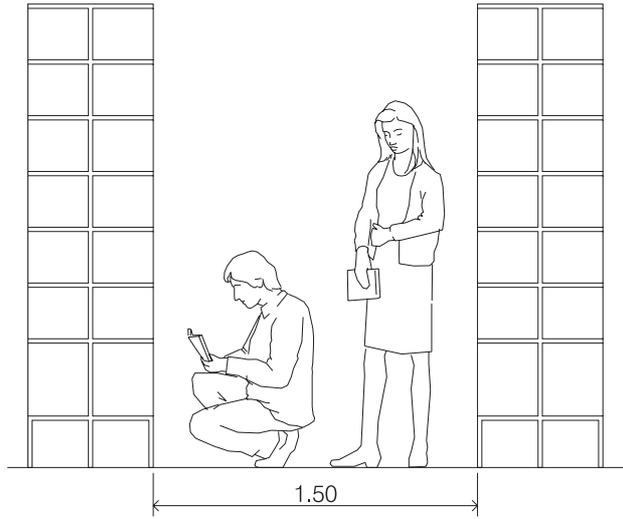


13.12b  
Shelving.

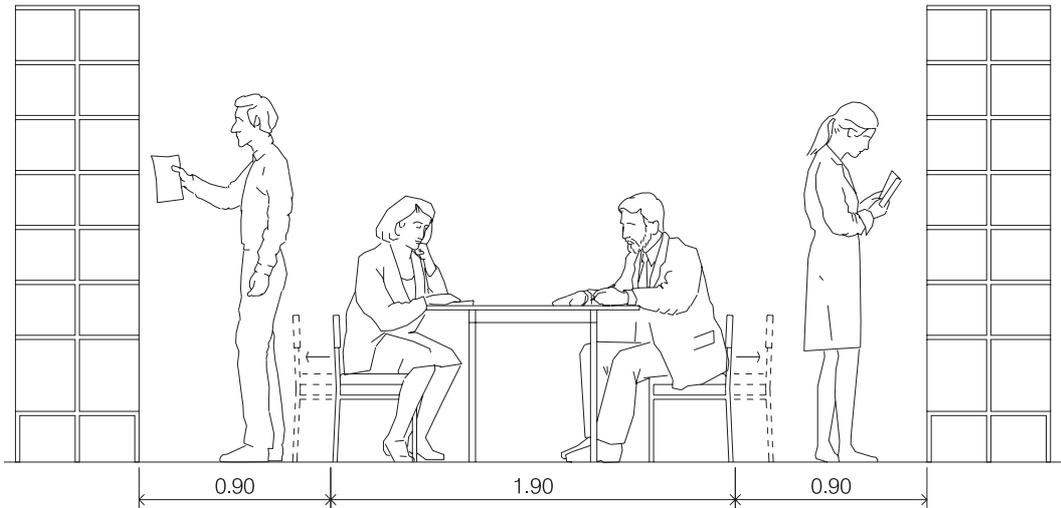
## FURNITURE ELEMENTS

### Basic requirements

- Quality: With reference to materials and finishes, both in thickness and in construction detail.
- Resistance to intensive use.
- Durability.
- Ease of cleaning and conservation.

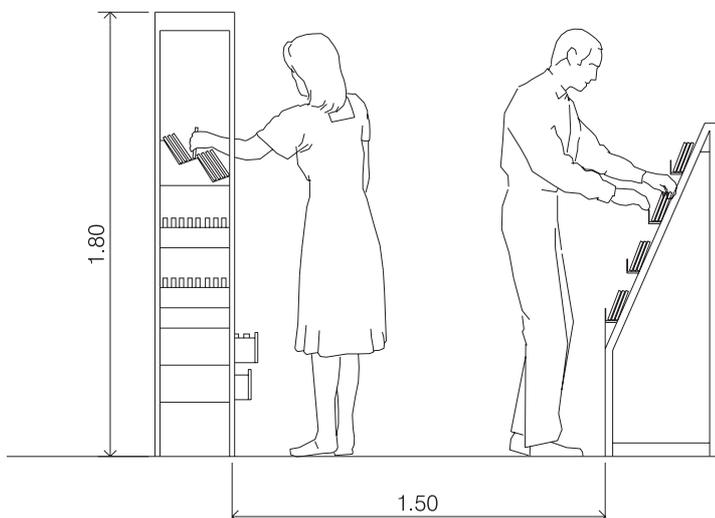


**13.12c**  
*Shelving.*

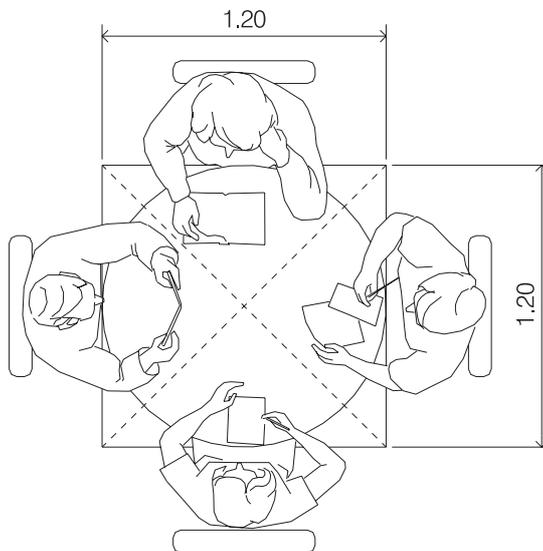
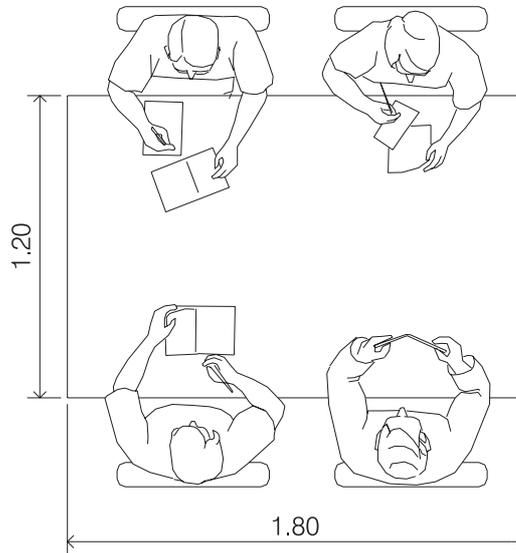
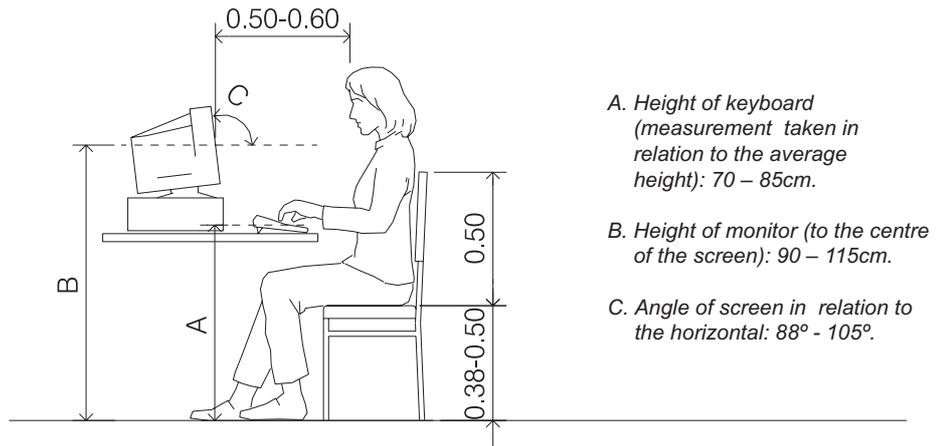


13.12d  
Shelving.

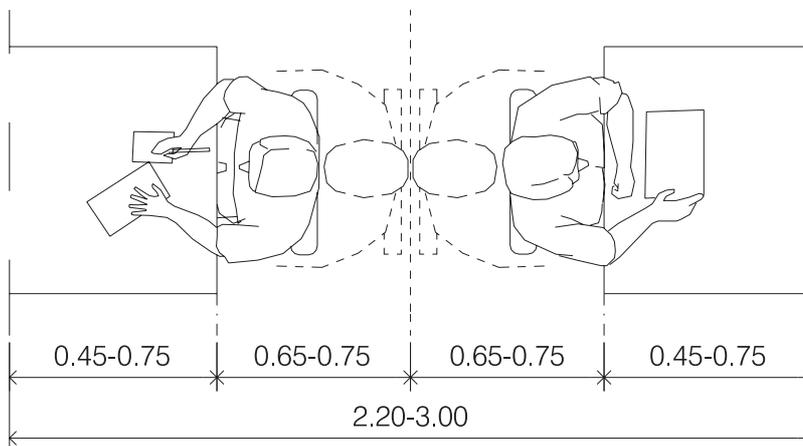
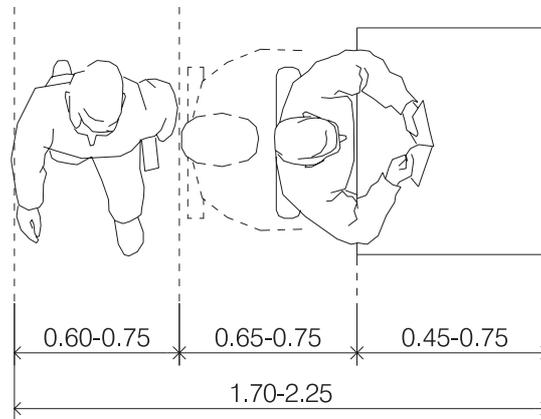
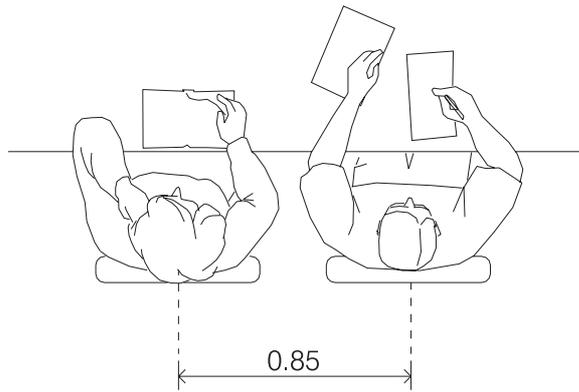
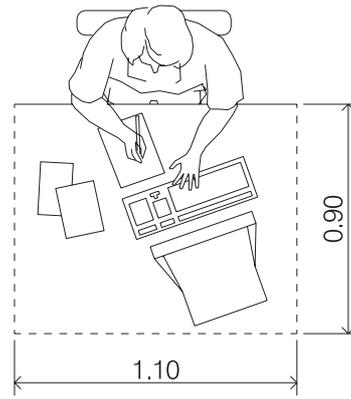
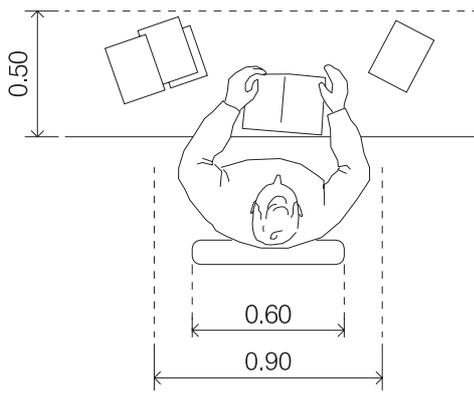
- **Functionality:**  
Adapted to the function they were built for.
- **Mass produced:**  
Made to measure furniture is more expensive and less flexible if changes are needed.  
Even so, carpenters and other specialists will certainly be needed to provide solutions in delivery and other adaptations of standard furniture to specific spaces.
- **Mobility:**  
Ease of movement in order to facilitate change of activity in a single space.
- **Modular:**  
This idea is crucial for shelving systems which are more prone to expansion, and which have to display documentation of different formats and dimensions.
- **Comfort and ease of use.**
- **Ergonomics:**  
Each furniture element is designed for a specific activity. The proportions and structures must be adapted to recommended postures for the human body when it is involved in that activity.
- **Aesthetics:**  
As the aesthetic criterion of choice, prudence should be more highly valued than extravagance. The displayed document collection is interesting enough to obviate the



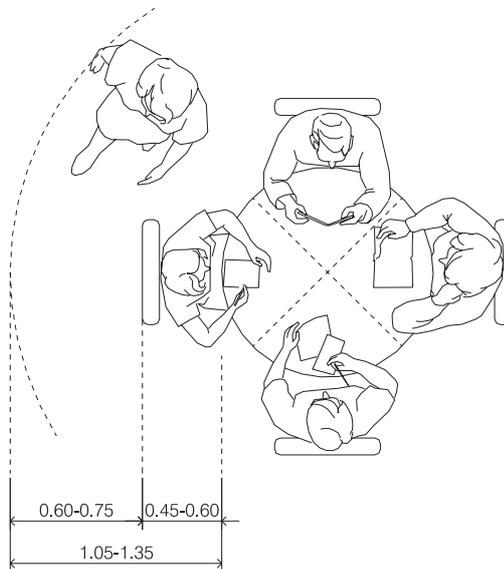
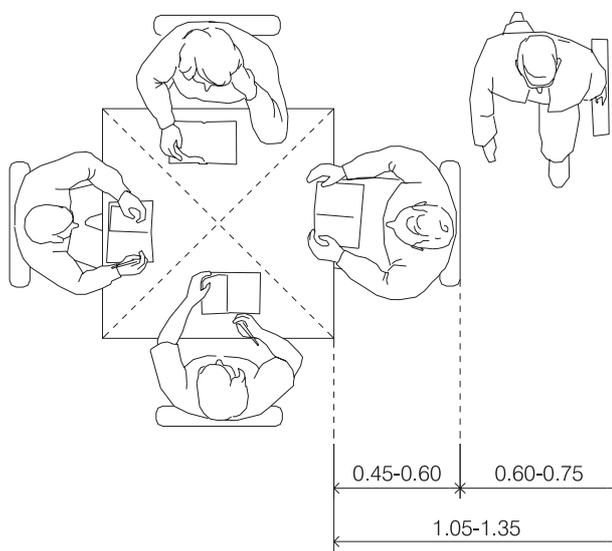
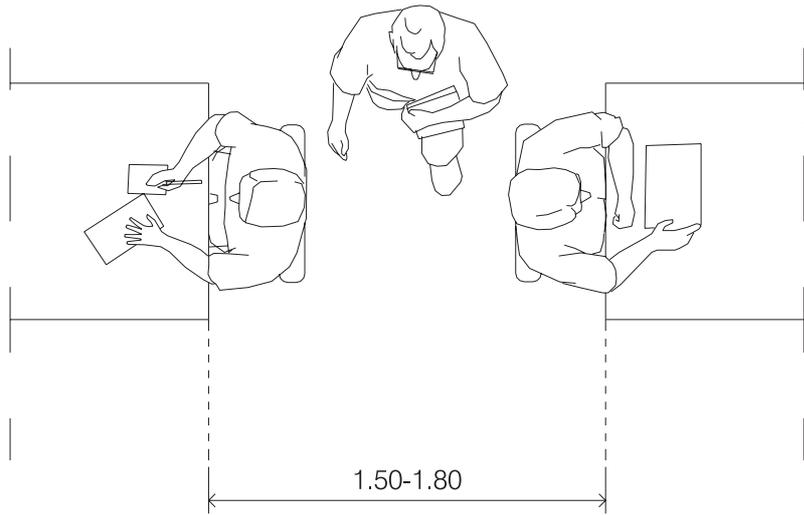
13.13  
Audiovisuals.



13.14 a  
Tables.



13.14b  
Tables.



**13.14c**  
Tables.

need for over- designed elements, which often age badly and add to a feeling of visual overload.

- Specific to libraries:  
Office and house furniture cannot withstand intensive public use. A series of very specific aspects need dealing with (signage, cable duct work, the weight of certain types of collections, display of very varied documents and so on.)

Apart from these requirements, there are several reasons for caution when deciding on furniture models and finishes:

- The constant appearance of rules about ergonomic demands to make work easier (height-adjustable furniture, location of computers based on certain specified distances and so on).
- Adaptation to disabled regulations. Given the difficulty of having totally adapted furniture, a certain number of reference points for the disabled must be anticipated for every library.
- Tendency of certain users to blame public facilities for accidents due to furniture which has the same finishes and the same dangers as domestic furniture.
- The need to pay special attention to

the children's area, where the advantage of using models with no angles which can cause accidents is obvious.

### Furniture by item

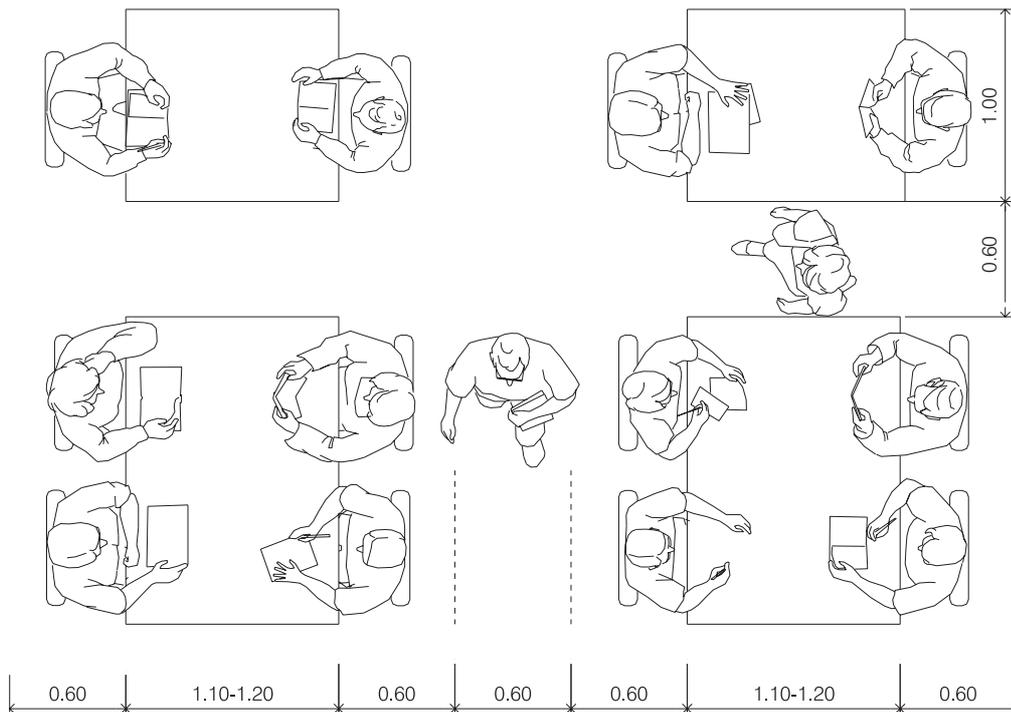
Due to the variety of elements, distributing the furniture by item is recommended. Differentiating in this way makes the awarding of contracts to different companies depending on their bids much easier.

It is not easy to establish items/types which guarantee overall unity, if the contract awarded is not global. However, it is possible to make out a proposal with approximate percentages for the final cost.

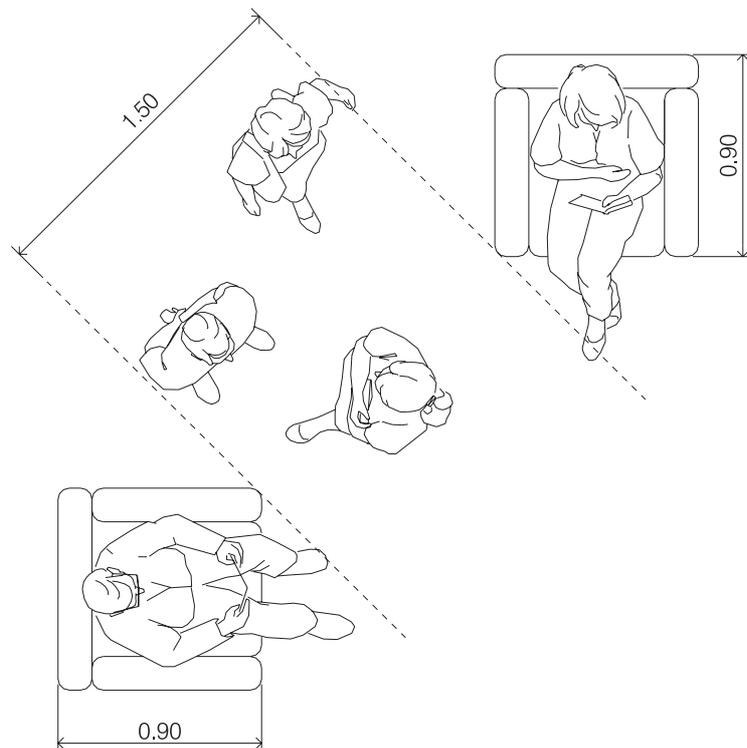
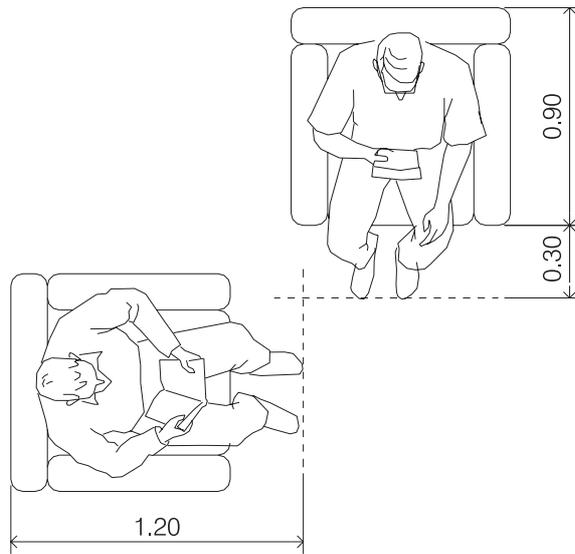
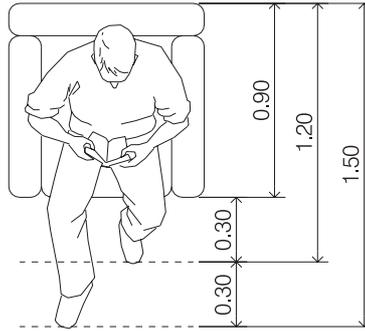
### Shelving

- Shelves.
- Accessories:
  - Shelves of various kinds.
  - Built-in cabinets.
  - Castors.
  - Mobile supports for documents.
  - Sign holders.
  - Finished panels.
  - Display units.
  - Built-in lighting, etc.

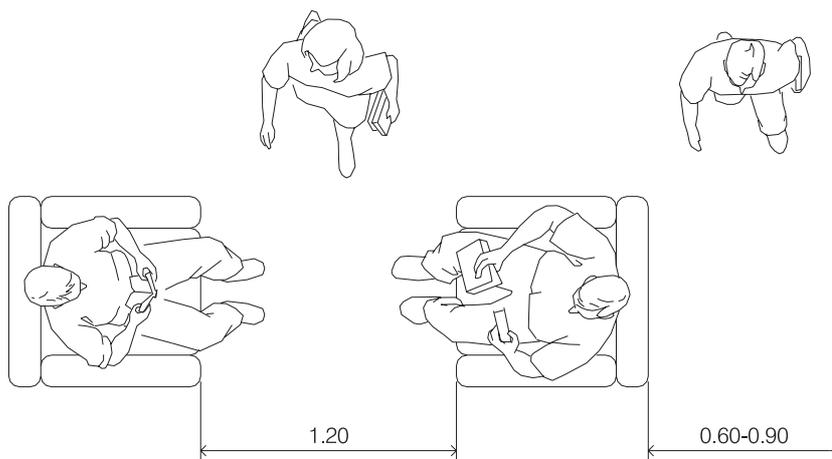
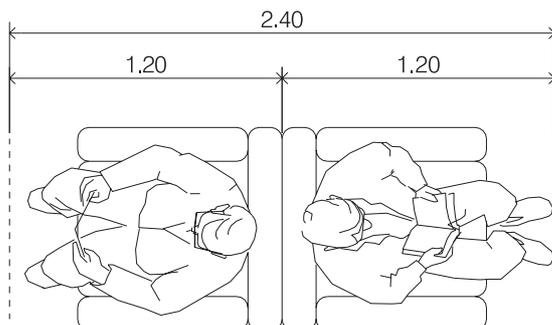
Total for shelving: from 38 to 40%



13.15  
Tables.



13.16a  
Easy chairs.



**13.16b**  
*Easy chairs.*

### Compact shelving

#### Chairs and easy chairs

- Study/easy chairs.
- Chair-transport trolleys.
- Office chairs.
- Armchairs/Easy chairs.
- Stools.
- Outdoor chairs.

Total for chairs and easy chairs from 20 to 30%

#### Tables and booths

- Study tables.
- Informal reference tables.
- Study cubicles.
- Audiovisual reference booths.
- Low auxiliary tables.
- Outdoor tables.

#### Counters – storage furniture

- Counters
- Accessories:
  - Shelves and display areas built in to the counters.
  - Swinging doors.

- Surface for the users' personal effects, etc.

- Storage furniture:

- Files.
- Office material.
- Special format graphic documents (maps, atlases, etc.).
- Audiovisual documents.
- Audiovisual equipment.

- Chests of drawers.

#### Special library furniture

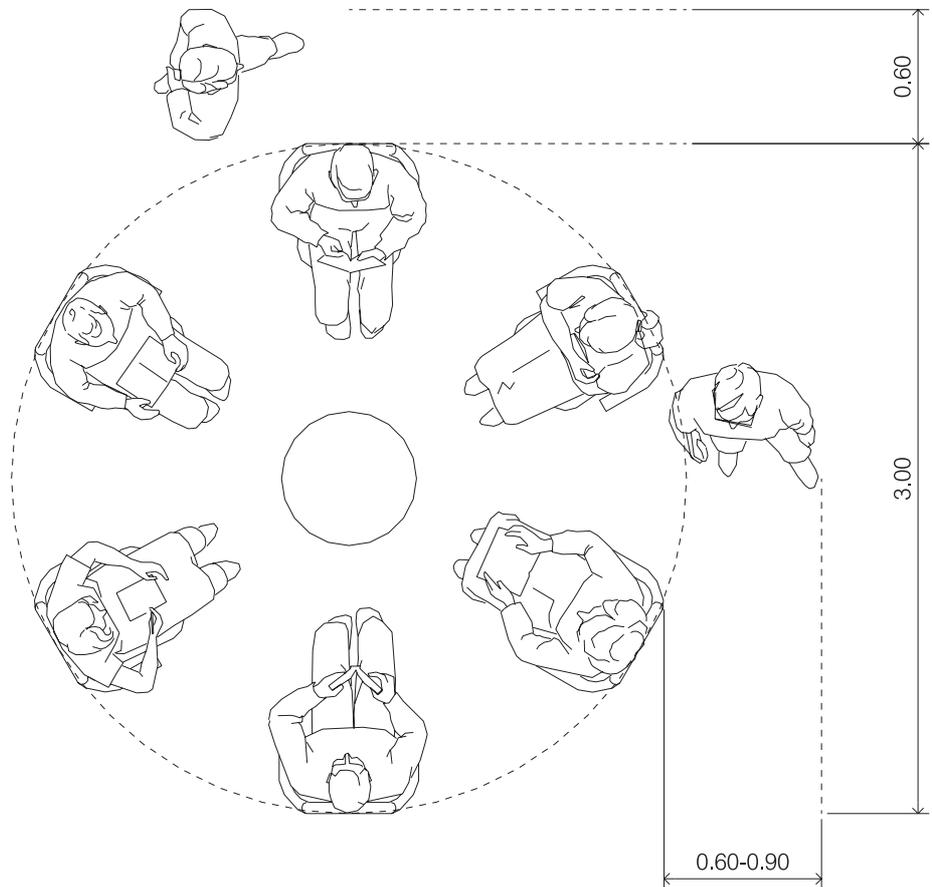
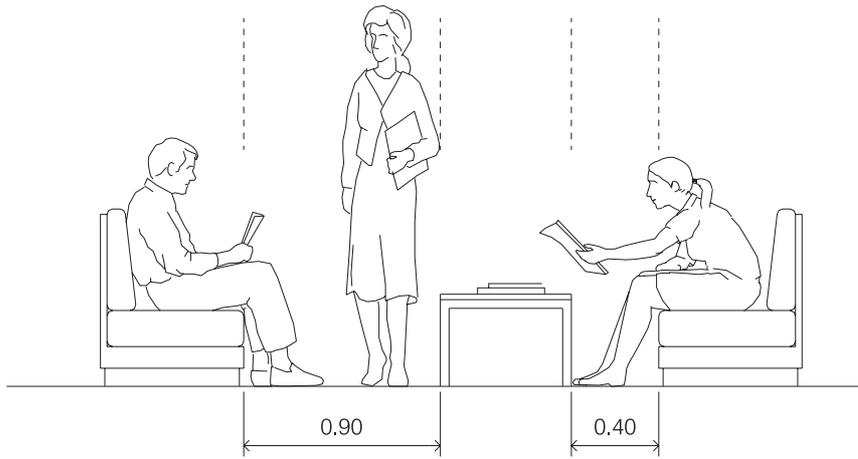
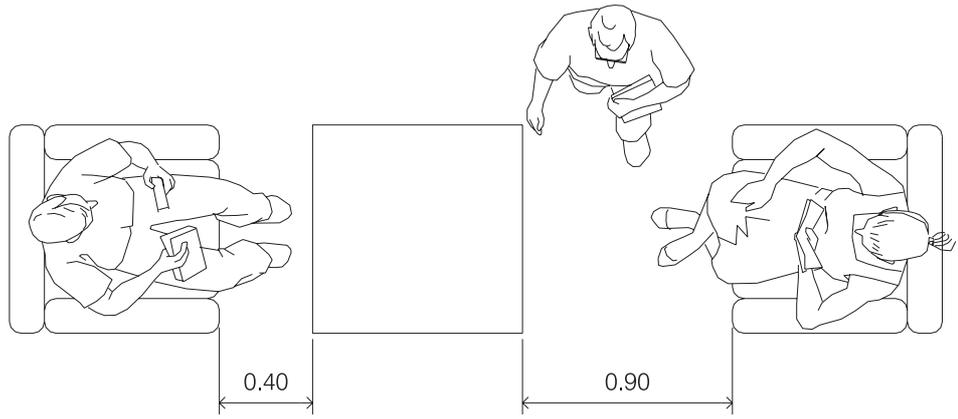
- Display furniture:

- Audiovisual material modules.
- Comics and storybook modules.
- Newspaper display stands.

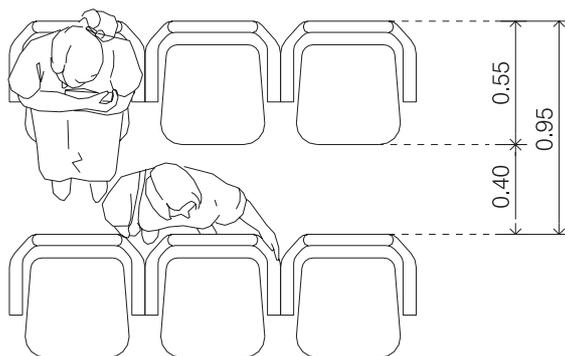
- Carts.

#### Made to measure furniture

- Personal effects lockers.
- Long tables.
- Platforms:
  - Children's area.
  - Multi-purpose room, etc.



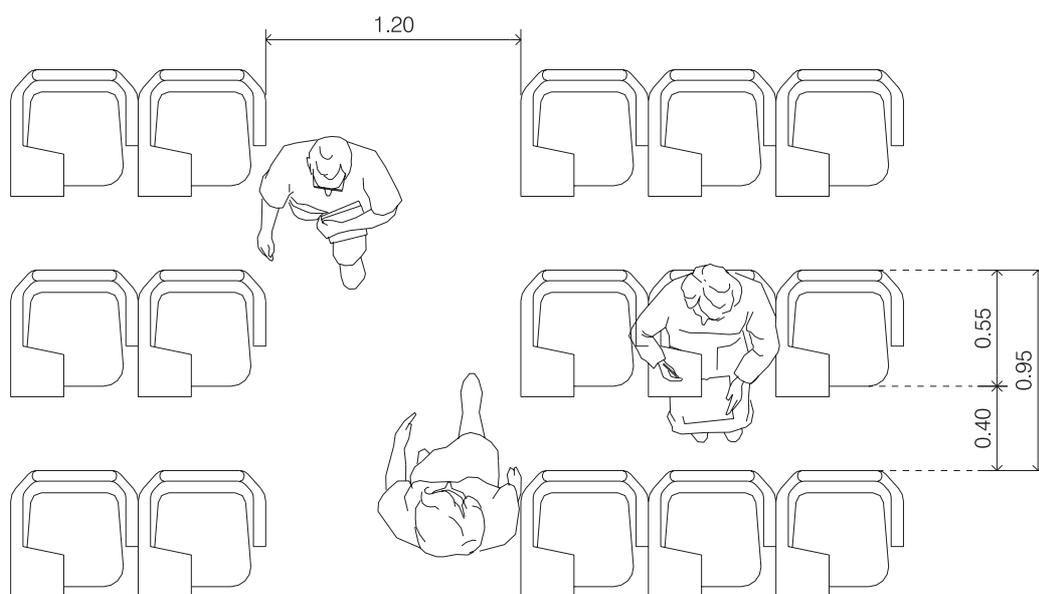
13.16c  
Easy chairs.



**13.17a**  
Conference room.

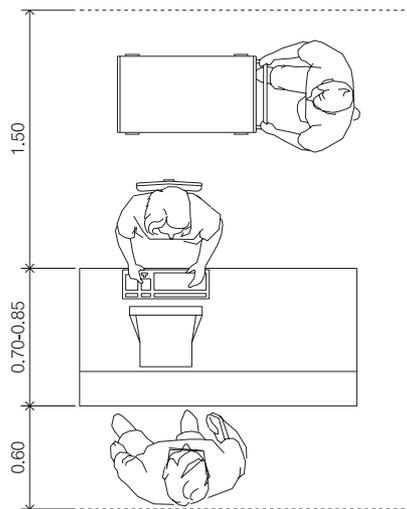
**Accessories**

- Children's area accessories (public libraries):
  - Cushions.
  - Game modules.
  - Theme rugs.
  - Elements for atmosphere.
  - Little reader tables, stools and chairs.
- Display:
  - Panels.
  - Glass cases.
  - Stands and other free-standing supports .
  - Mobile display cases.
- Office furniture:
  - Office desks.
  - Lateral add-on components.
  - Drawer modules.
- Accessories for audiovisual and computer equipment:
  - Magnetic archway.
  - Self-check out equipment.
  - Demagnetizing equipment.
  - Elements needed for the installation of the listening posts .
  - Trolleys on castors for TV and other audiovisual equipment
  - Brackets for computer equipment.
- Urban furniture:
  - Bicycle parking.
  - Outdoor benches.
  - Waste bins.
  - Ashtrays.



**13.17b**  
Conference room.

**13.18**  
Customer service  
counter.



- Outdoor lamps etc.
- Other accessory elements:
  - Signage.
  - Book drop.
  - Photocopiers.
  - Waste paper baskets.
  - Umbrella stands.
  - Coat racks.
  - Clocks.
  - Floor lamps.
  - Spotlights for the exhibition rooms.
  - Moveable elements for distribution of spaces.
  - Crates/baskets for users.
  - Ladders.
  - Book carts on castors.
  - Office material.
  - Accessories for the staff relaxation room:
    - ▶ White goods (cooker, microwave oven, etc.).
    - ▶ Cupboard for kitchen equipment.
    - ▶ Wardrobe.

#### Unforeseen costs

Total for unforeseen costs: from 2 to 3%

#### **Most common construction materials**

##### Wood

Most furniture comes in this finish, generally combined with metallic shelves and other elements.

Most common types of wood:

- Solid:
  - Mainly used for support structures for some tables.

- Plywood:
  - This is available in a wide range of formats and finishes, since the surface layer can be made from different woods.
- Particle board:
  - Comes in different types of texture depending on the size of the components.
  - Provides smooth surfaces and a more homogenous mass.
- Particle board covered with natural wood or plastic laminate:
  - Because this is two materials joined together, its resistance to knocks depends on the process used to glue them together and the thickness of the coverings.
  - Both sides of the panels should be covered to avoid any differential deformations.

#### Positive aspects:

(not including plywood with plastic laminate).

- Comfortable, welcoming appearance.
- Not noisy, warm to the touch.
- Low electrical/heat conductivity.
- Relative permeability reduces condensation produced by atmospheric damp.

#### Negative aspects:

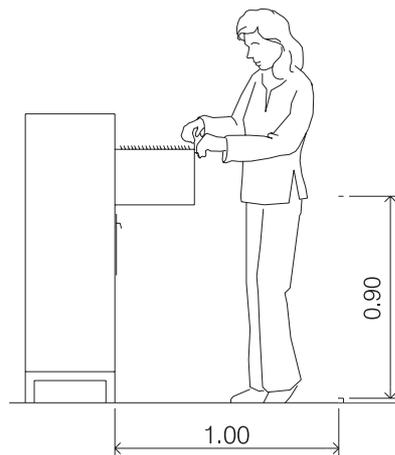
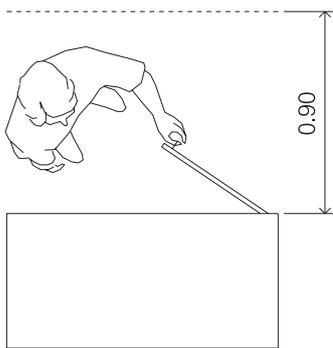
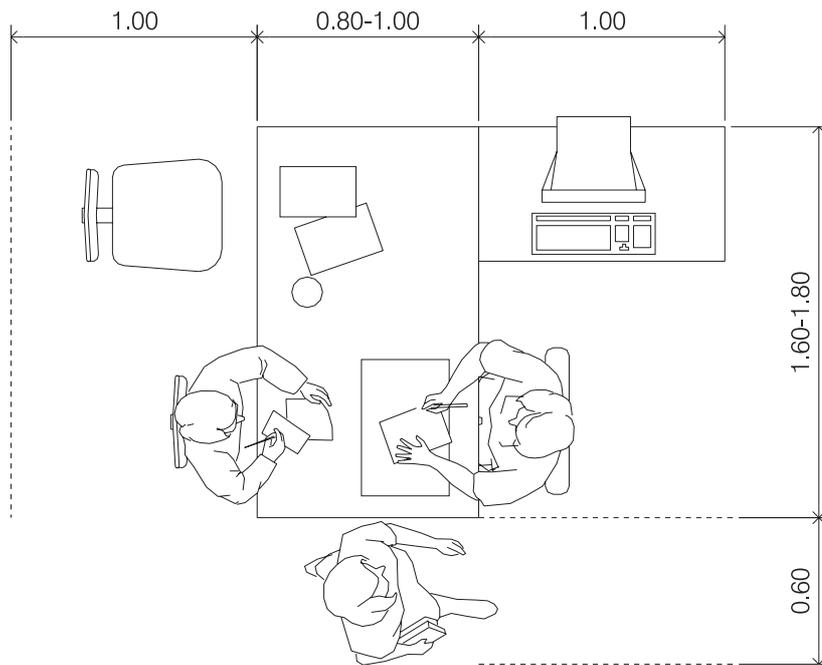
(not including plywood with plastic laminate).

- No resistant to knocks.
- Deformability through heat and damp.
- Inflammable material (can be given fire retardant treatment).
- Direct sunlight can affect the colour when it is not sufficiently protected.
- Needs to be protected against insects and fungus.
- Higher price.

Surfaces covered with plastic laminate have the good and bad points of the laminates listed in the following section.

The following thicknesses are recommended:

- Vertical panels: from 20 to 30 mm
- Horizontal panels (tables, counters, etc.): 30 mm
- Shelves:
  - Variable depending on weight.
  - Deflection must be less than 1/300 of the width.
  - Most common thickness: 22 mm



**13.19**  
*Internal work.*

- Plywood coverings:
  - Wood veneer: 0.8 mm
  - Wooden moulding: from 3 to 4 mm
  - Plastic laminate veneer: 1 mm

#### Laminates

- Laminated panels:  
Formed by uniting two layers bonded by pressure.
- Stratified panels:  
The same basic idea, but they are a high-tech product, made for more aggressive use.

Both are made up of a transparent surface layer which is highly resistant to use and ultra violet rays bonded to decorative paper, a sheet of wood or a thin decorative element. All this is then bonded to a plank of high density wood

fibre with a final stabilizing layer to absorb surface irregularities.

#### Positive aspects:

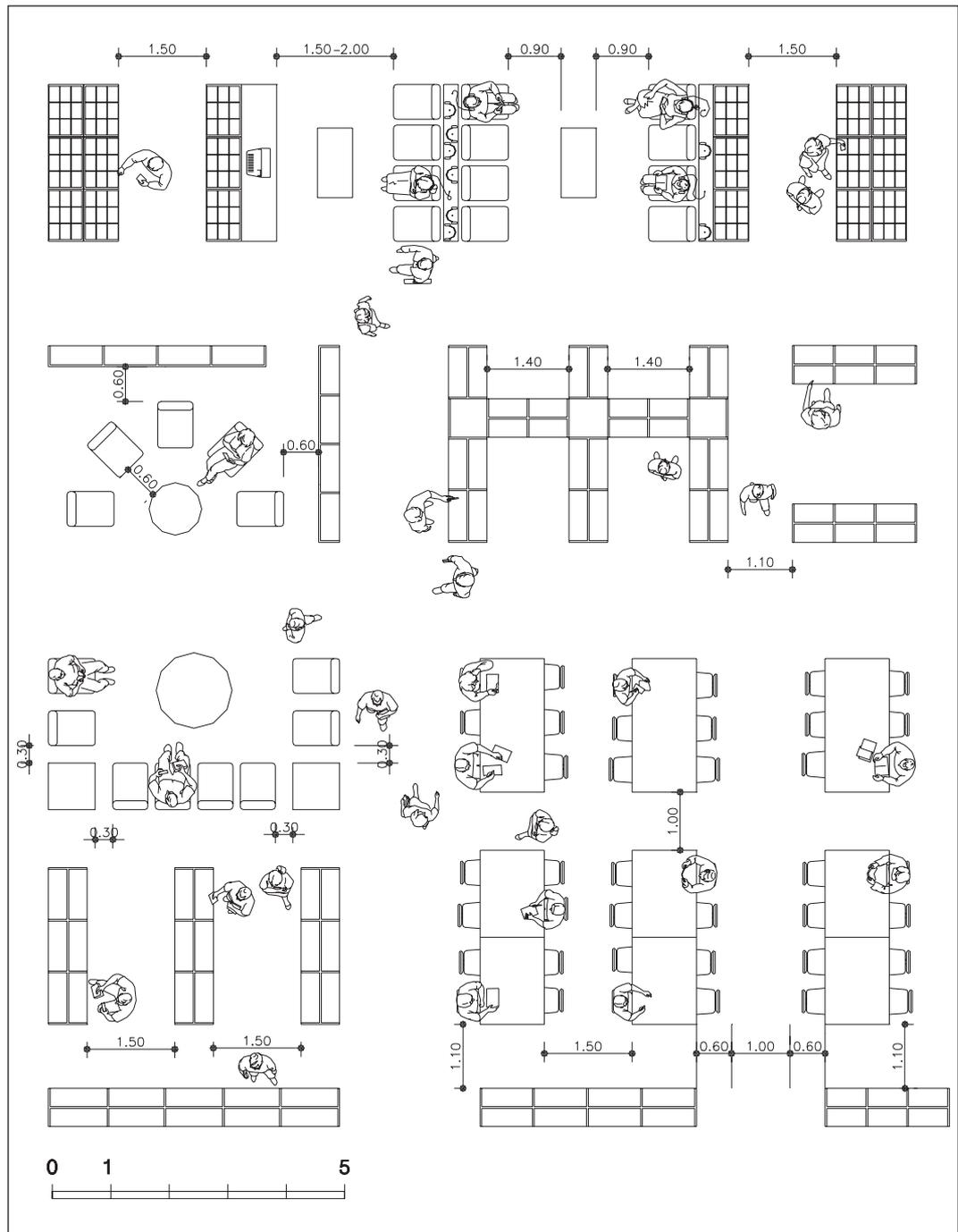
- Resistance to knocks, cuts, stains and graffiti.
- Wide range of looks depending on the decorative laminate.

#### Steel

Traditionally used for stockroom shelving, this has become a common material for a wide range of library furniture.

Comes in sections for the upright supports, and folded plates for the shelves.

Positive aspects:



13.20

- High resistance with little thickness.
- Ease of plate folding.  
This characteristic allows for:
  - Manufacture of different shelf formats.
  - Adaptation of the plate-folding to any requirements: increased rigidity, avoiding angles and sharp edges, etc.
- It is fire- insect- and fungus-proof.
- Needs no maintenance.

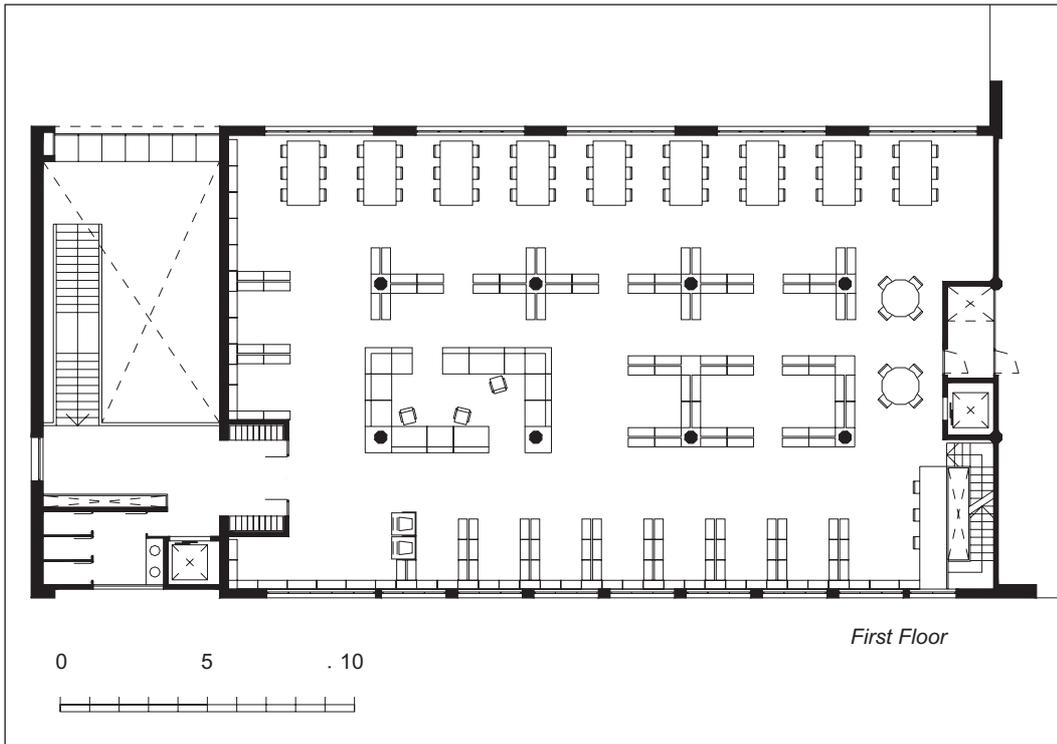
Negative aspects:

- Possibility of rust if the enamelling is uneven.

- It does not absorb the humidity in the air. With shelves, the resultant surface damp could damage books.
- The material is cold and noisy.
- Conducts electricity and heat.

Technical recommendations:

- Steel:
  - Cold rolled steel sheet, degreasing, phosphatation and drying at 140 °C.
  - Steel upright and foot sections:
    - ▶ Thickness: over 1.5 mm
    - ▶ Section: 30 × 60 mm
  - Shelving laminates:



**13.21**  
*Sant Adrià Public Library (Sant Adrià de Besós, Barcelona).*  
*Architect: Germà Vidal.*

*Furniture distribution is based on the following criteria:*

- *Central nucleus with customer service counter and low shelving so as not to interrupt visual unity.*
- *Work tables beside well-oriented façade windows.*
- *High shelving on the opposite wall.*

- ▶ Thickness: over 1 mm
- ▶ Made of single piece folded along the width.
- Surface treatment:
  - Uniform, smooth and unalterable by sunlight.
  - Resistant to knocks and scratches.
  - Polymerized epoxy polyester coating, not less than 60 micra nor more than 100 micra, thick, air-oven baked at a temperature of 200 °C.

- Number of documents for each designated activity area.
- Storage and display systems for the printed and audiovisual formats, both in the designated areas and the storage areas.

### Types of shelving

Depending on location:

- Open access.

### Furniture elements

Below, some main elements of furniture will be analysed. In each case the parameters which must be included in the specifications for the facility's supplies will be set out.

### SHELVING

Shelves are obviously the most common furniture element in libraries, and their measurements are often used as the basis for the interior dimensions of the space and the structural layout. To determine the quantity of shelving in the furniture project, the following information is required:



**13.22**  
*Sant Adrià Public Library (Sant Adrià de Besós, Barcelona).*  
*Architect: Germà Vidal.*

*The height difference means that the shelving group can be correctly placed at window height. This in turn creates surfaces for the user during quick reference.*

- Deposits.
- Depending on structural system:
- Case style system.
  - Cantilever / Bracket system.  
This is the most common.
  - Compact systems.  
Mainly used for deposits without much floor space.

### Basic requirements

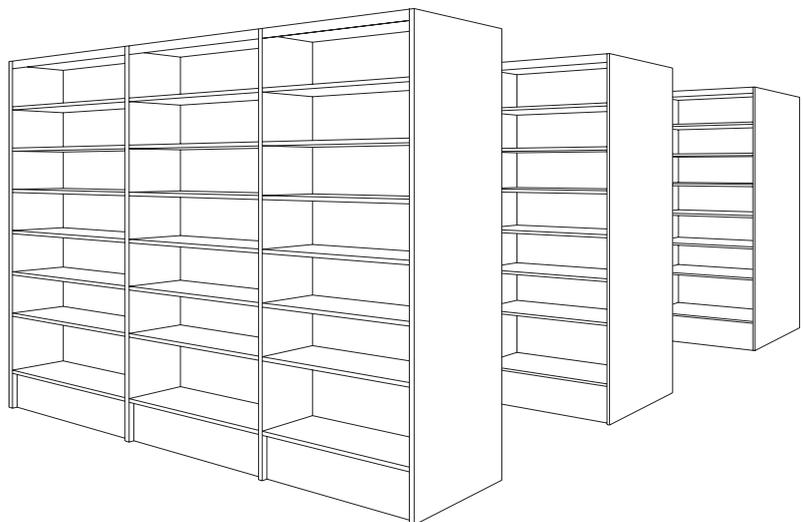
- Ease of storage and document reference.
- Free-standing structure for possible changes of location.
- Stability. This is particularly difficult with single-sided shelving.
- Adjustable feet to ensure horizontality on uneven floor surfaces.
- System to allow for adjustment of shelf height. Increments of 20 to 30 mm are recommended.
- Lateral connecting systems which

allow for the alignment of differing shelving modules.

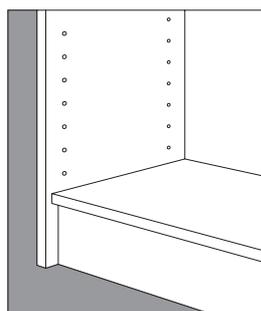
- Ease of assembly, disassembly and storage.
- Shelves:
  - Withstand the weight of the books.
  - Mobility. It must be possible to put them up, take them down and change their position independently of the rest of the shelving.
  - Wide range of types facilitating the storage of many different formats.
  - Design which stops the documents getting displaced or falling off the other side.
  - Possibility of adding shelf signage and moveable book supports .

### Principal elements

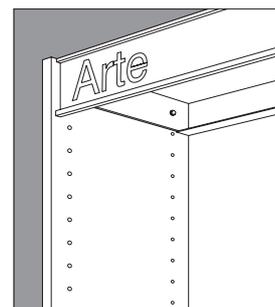
- CASE-STYLE system:
  - 3 vertical panels (2 end panels



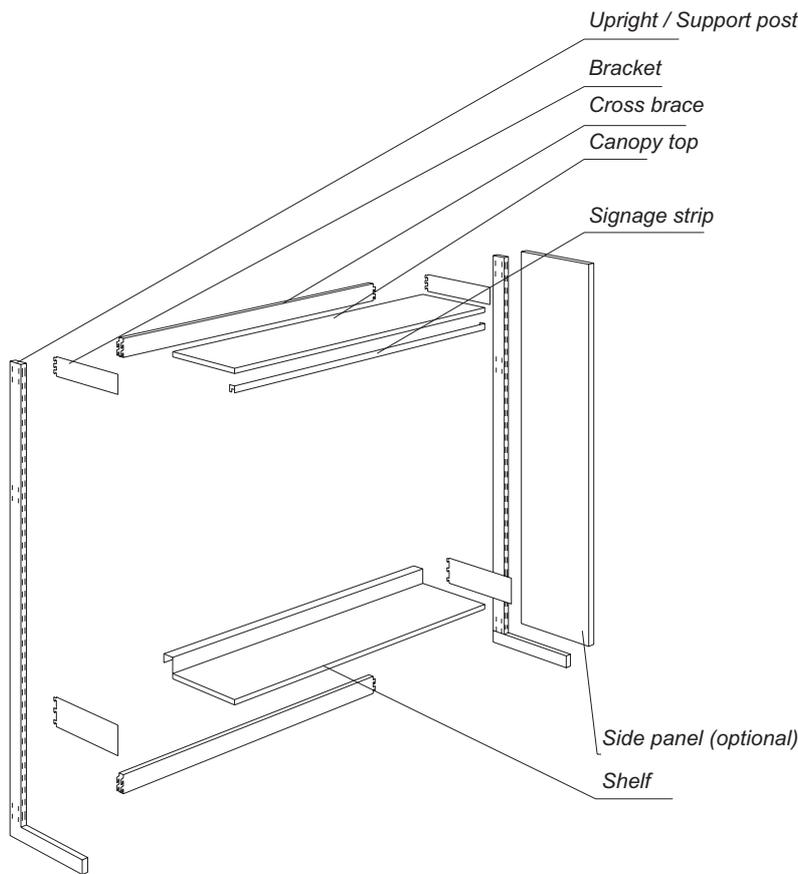
**13.23**  
Case-style system.



**13.24**  
Bottom shelf with base panel and top shelf with sign holders.



- and one transversal) and 2 horizontals (top and bottom).
  - The shelves are on brackets or uprights fixed to the end panels.
  - In modular systems the shelves can be fixed to both sides of the same central panel.
  - Limited air circulation could result in fungus. (Fig. 13.23 and 13.24).
- CANTILEVER system:
    - Single or double upright support posts for single sided or double sided shelving.
    - The uprights can be free standing or wall-fixed.
    - The shelves are connected to the uprights by means of brackets.
    - The ends of 2 shelves can be affixed to each upright, so only one upright is necessary for central sections.
    - The upright columns' feet are of the same depth as the shelves so as not to obstruct the aisle.
    - The support posts are held by cross-braces and need no further element to strengthen the unit.

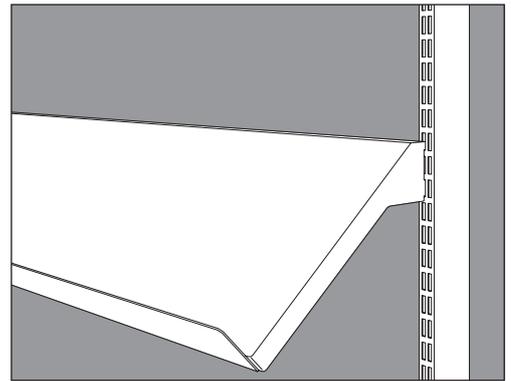


**13.25**  
Support system.



**13.26**  
Support system with wooden end panels.

**13.28**  
Sloped shelving

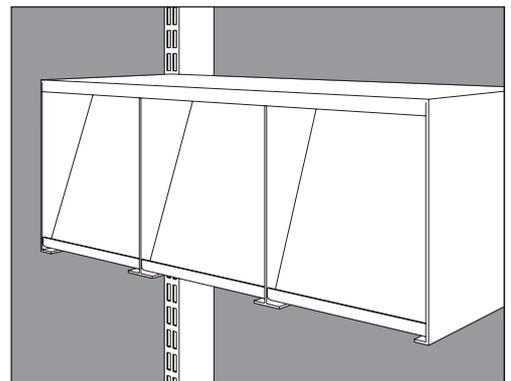


13.28

**13.27**

**13.29a and 13.29b**  
Display shelving with  
built-in storage  
system.

- A canopy top is recommended to keep the top shelf dust-free, and it can also be used for shelf signage and gives a unity of finish to the shelving system.
- The open ends of the shelves create a problem of support for the books, but end panels of various materials (wood, metal, laminates, glass, etc.) can be added. (Fig. 13.25 and 13.26).



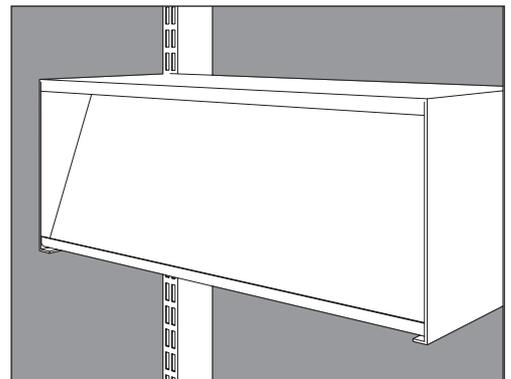
13.29a

- Compact shelving:  
(described in the following section).

### Accessories

Specialist manufacturers have the following elements to add to the shelves:

- Different format shelves:
  - Sloped for book, magazine and newspaper display. (Fig. 13.27 and 13.28).



13.29b

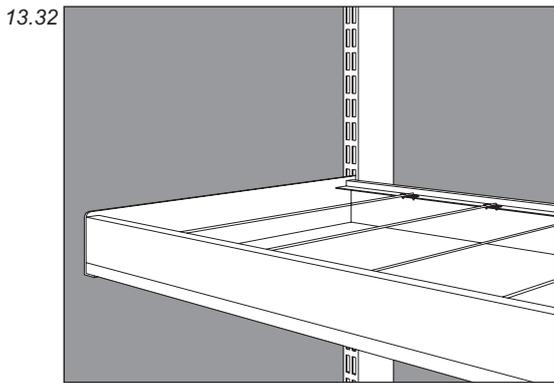
**13.30**  
Display shelving with  
built-in storage  
system.



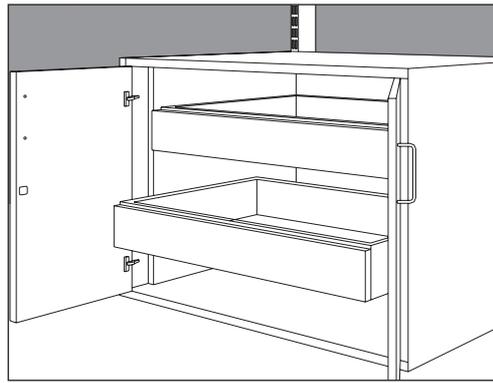
13.30

**13.31**  
Display shelving with  
built-in storage  
system.

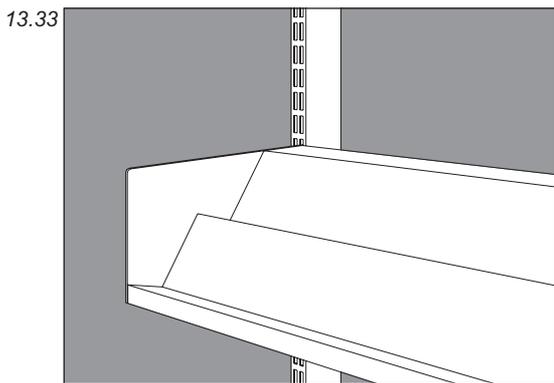




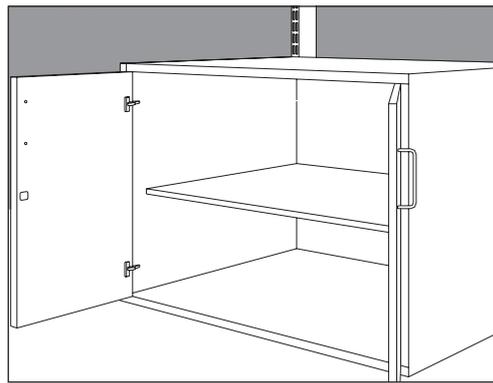
**13.32**  
*Shelving for audiovisual equipment.*



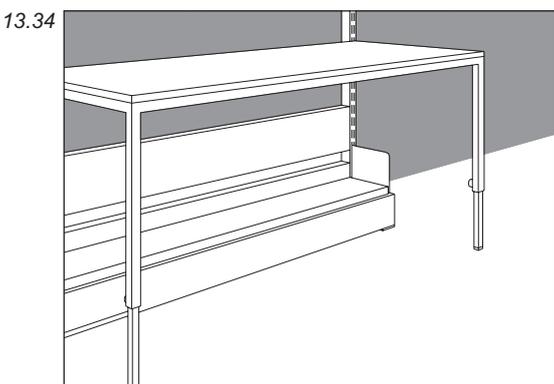
**13.35**  
*Filing cabinet.*



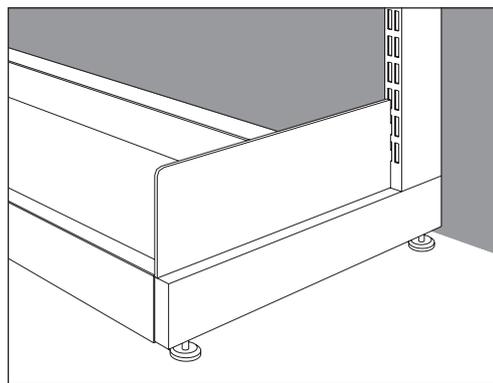
**13.33**  
*Shelving for audiovisual equipment.*



**13.36**  
*Filing cabinet.*



**13.34**  
*Height-adjustable reading table.*



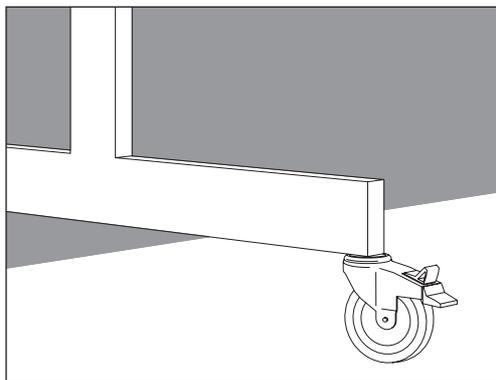
**13.37**  
*Height-adjustable feet*

- Display shelves with built-in storage. Magazines can be displayed on hinged shelves, with previous issues kept below them, accessible to the public. (Fig. 13.29, 13.30 and 13.31).
- Purpose-built audiovisual material shelves (records, audio cassettes, videos, CDs, transparencies, etc.). (Fig. 13.32 and 13.33).
- Retractable shelving.
- Adjustable height reading tables. (Fig. 13.34).
- Audiovisual material modules.
- Filing cabinets with different opening systems. (Fig. 13.35 and 13.36).
- Display cabinets with interior shelves

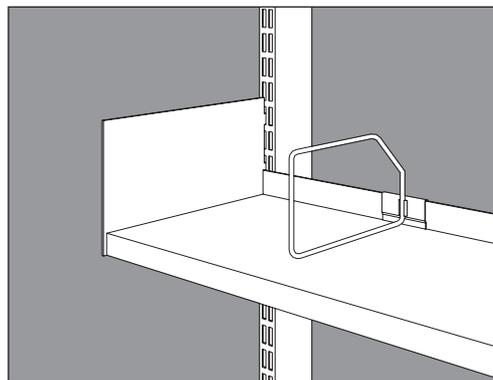
and lockable glass doors for displayed material which needs protection.

- Adjustable feet. (Fig. 13.37).
- Castors with brakes. (Fig. 13.38).
- Movable book supports. There are three types:
  - Separate from the shelves. If metal, they must be magnetized to avoid sliding off.
  - Attached to the underside of the shelves. There may be problems with these as supports for the documents on the shelf below when documents of different sizes are kept together, or if the shelf above has no

**13.38**  
Castors with brakes.

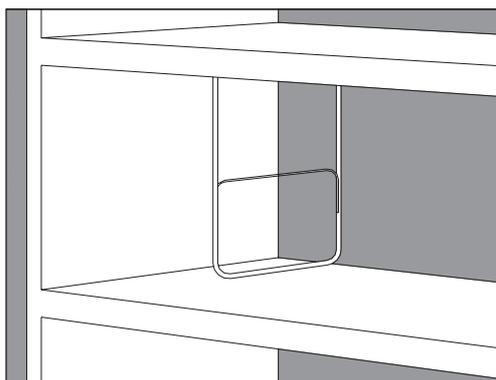


**13.40**  
Movable support attached to back of shelves.

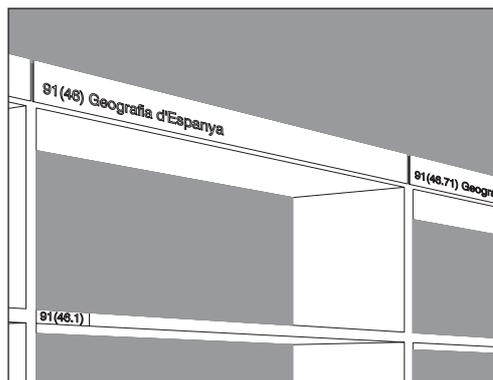


13.40

**13.39**  
Movable support attached to underside of shelves.



**13.41**  
Signage strips affixed top shelf-edges.



13.41

channel to attach the support to. (Fig. 13.39).

- Clipped on to the back edge of the shelf.  
The best material for the clip is plastic, since it moves more smoothly and does not damage the paintwork of the back edge of the shelf. (Fig. 13.40).
- Systems for shelf signage. There are several kinds:
  - Sections attached along the edges of the shelves for subject label holding. (Fig. 13.41).
  - Pennants of different sizes attached to the end panels or the canopy of the shelving system.
  - Dividers of different types placed between the documents.
- Panels of different materials and finishes which can be placed in the cantilever-construction shelving systems. (Fig. 13.42).
- End panels with guide tracks or supports for accessories (display racks, signage, etc.). (Fig. 13.43 and 13.45).
- Display racks for end panels.
- Shelf lighting. (Fig. 13.44).

## Dimensions

### Width

- The most common is 90 cm, which is the usual maximum field of vision.
- Manufacturers produce models from 70 to 100 cm, which means the shelving unit can be adjusted to the dimensions of the spaces.
- With widths of more than this, the structure needs reinforcing and the shelves need to be thicker.

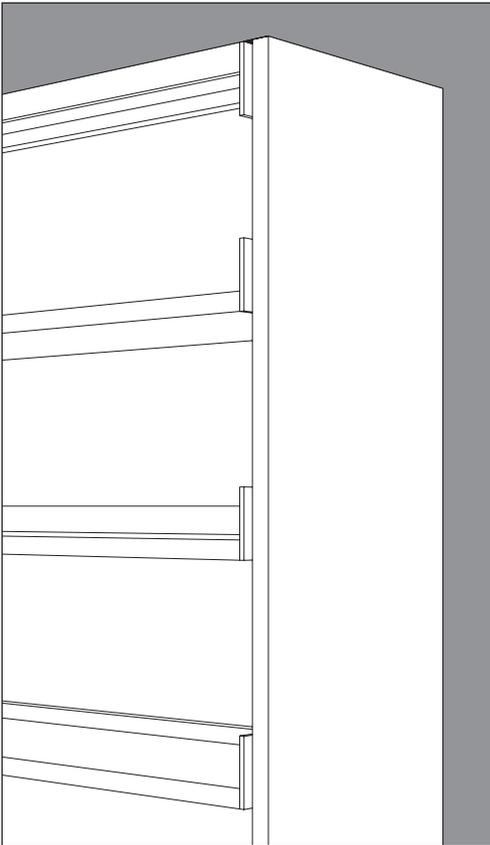
### Depth

- Between 20 and 40 cm depending on format.
- For newspapers, 50 cm is needed.
- The most common depth is 30 cm.
- Display shelves with built-in storage are 40 cm.
- In cantilever/bracket shelving, the total depth is the sum of the depth of the shelves plus the upright (normally 6 cm). (Fig. 13.46a and 13.46b).

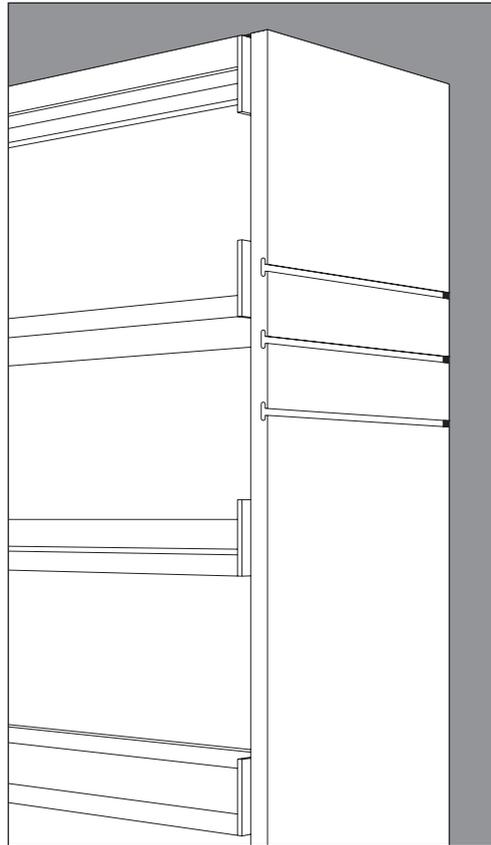
### Height

- Covering the range from 90 and 240 cm, in increments of 30 cm.
- The bottom shelf should be no lower than 25 cm so that the books can be reached. This shelf can slope 10 or 15°

13.42



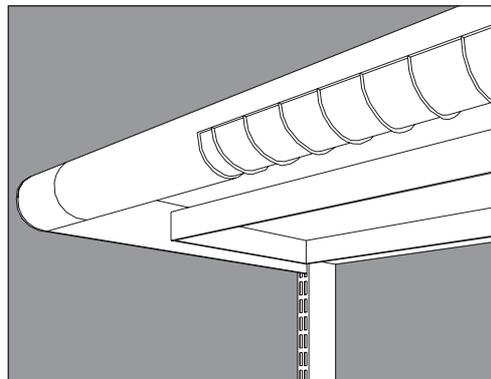
**13.42**  
End panel.



**13.43**  
End panel with guide tracks for accessories.

to facilitate sight and lighting of its documents.

- Most common number of shelves for each height:
  - 90 cm: 2 shelves.
  - 120 cm: 3 shelves.
  - 150 cm: from 3 to 4 shelves.
  - 180 cm: from 4 to 5 shelves (maximum recommended height for children's area).
  - 210 cm: from 5 to 6 shelves (maximum recommended height for open access shelving).
  - 240 cm: from 6 to 7 shelves.



**13.44**  
Built-in lighting.

**Materials**

- Most commonly used materials:
  - Metal sections for uprights.
  - Wood or rolled steel sheet for the shelves.
- Mixed shelves are a good combination of technical and aesthetic aspects:
  - Support structure: steel.
  - Shelves: wood or steel.
  - Vertical panels: wood, steel and other materials (glass, etc.).
  - Accessories (displays, dividers, etc.): metal, plastic, etc.



**13.45**  
End panel with guide tracks for accessories.

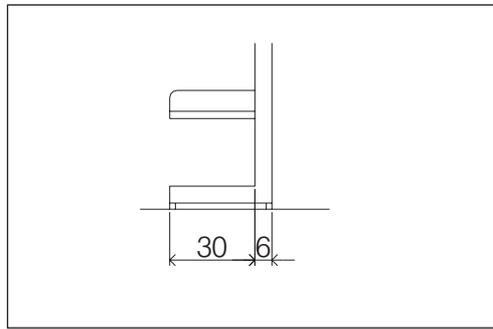
## Aspects of furniture distribution

- The library technician and architect have to be involved in the shelving distribution. The former will report on the system chosen to display the collection. The architect will translate these ideas into an organized layout.
- The architect must also know, for each area of the library, what relationship is desired between the shelving and the work stations.

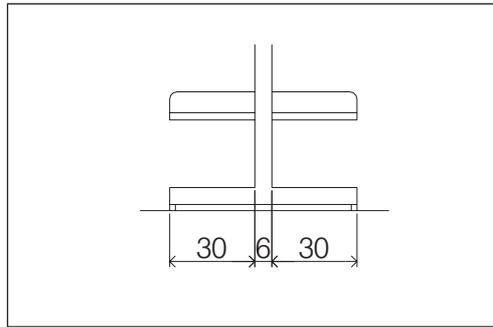
Typical options:

- Alternating functions:  
Placement of work stations in small groups surrounded by shelves, or a regular layout of shelving group followed by work station group, etc.
- Concentric layout:  
Sequential distribution which begins at the counter, then follow

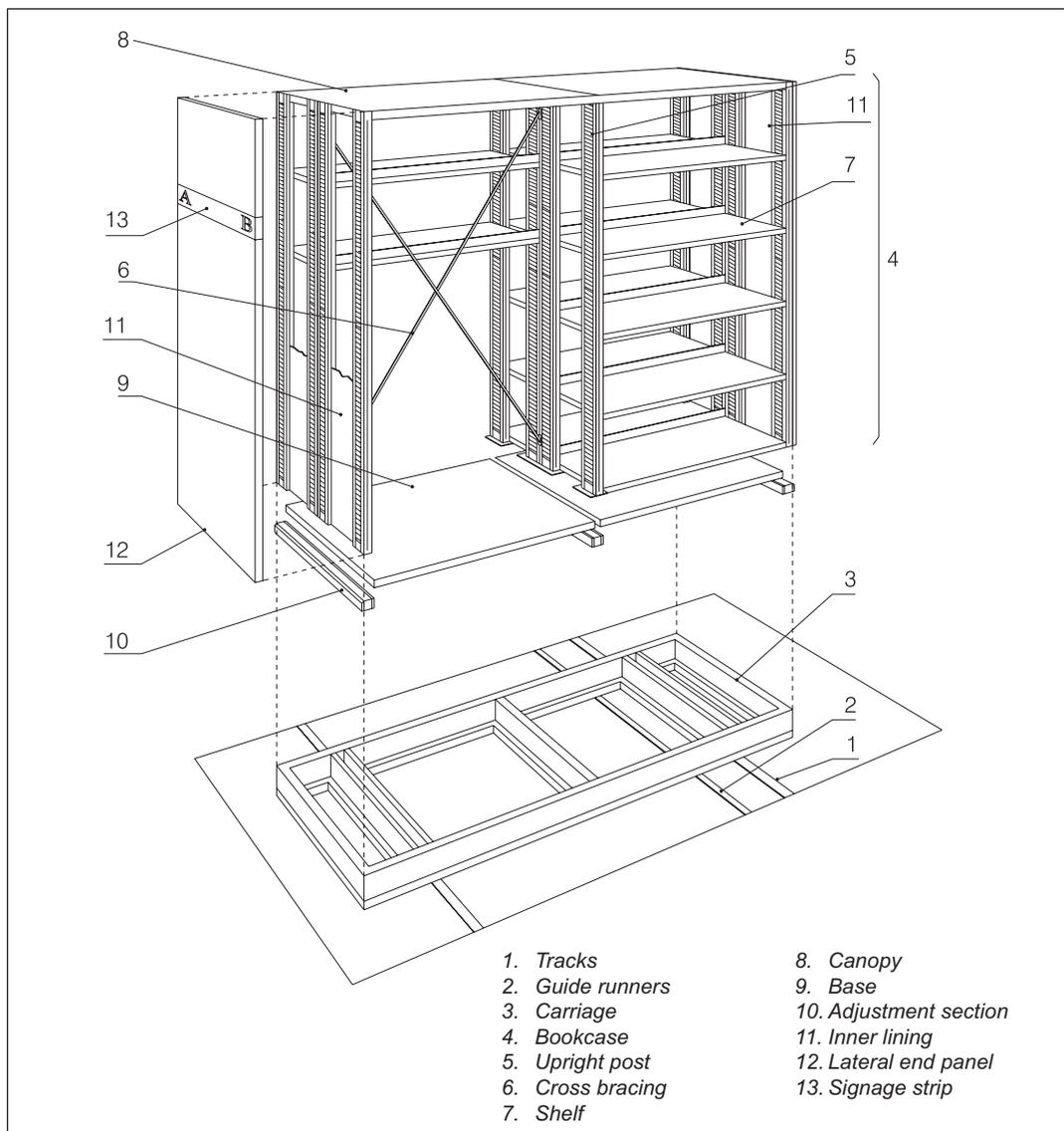
**13.46a**  
Single-sided shelving.

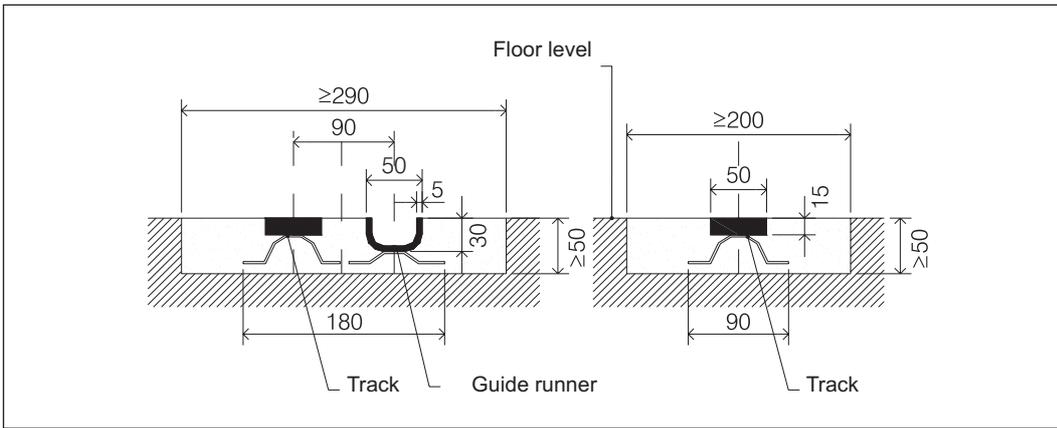


**13.46b**  
Double-sided shelving.



**13.47**  
Shelving – compact systems.





**13.48**  
Tracks and guides set into the floor.

the shelves, then lastly the work stations around the edge.

- Differentiated layout:  
Areas with work stations away from the open access shelving.

Other considerations:

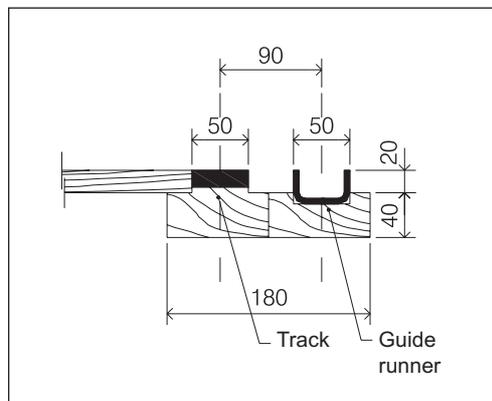
- Shelves placed perpendicular to windows receive a more homogenous natural light than those placed parallel to exterior walls.
  - Distributions which fan out from a centre make it more easy to monitor all the aisles.
  - Shelves over 5 metres long are not recommended.
  - Distribution by subject is easier and more understandable when there are other elements every so often, such as quick reference points, display racks with recent additions, notice boards and so on.
- Short shelving systems are also not recommended: limited capacity makes sequential organization difficult and disorients the reader trying to find documents.

## SHELVING – COMPACT SYSTEMS

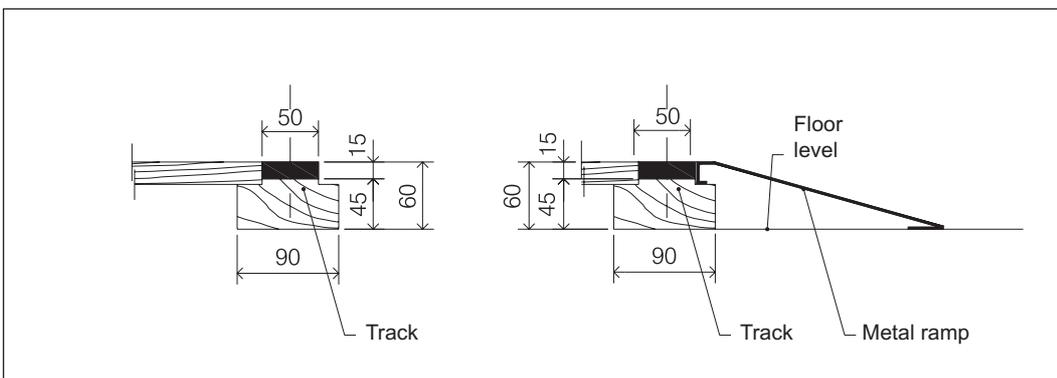
These are metal shelving stacks mounted on movable carriage system which can be set in the concrete or on a wooden platform.

### Main elements

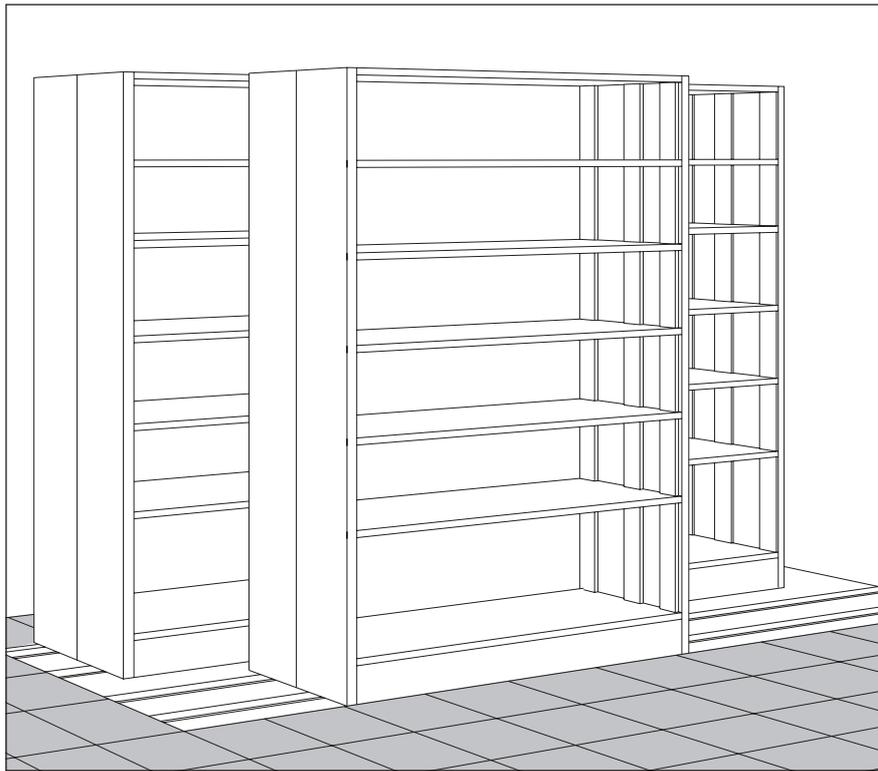
- Carriage system:
  - Tracks.
  - Guide tracks.
- Stacks:
  - Carriages.
  - Shelves. (Fig. 13.47).



**13.49a**  
Tracks and guides set into a wooden platform.

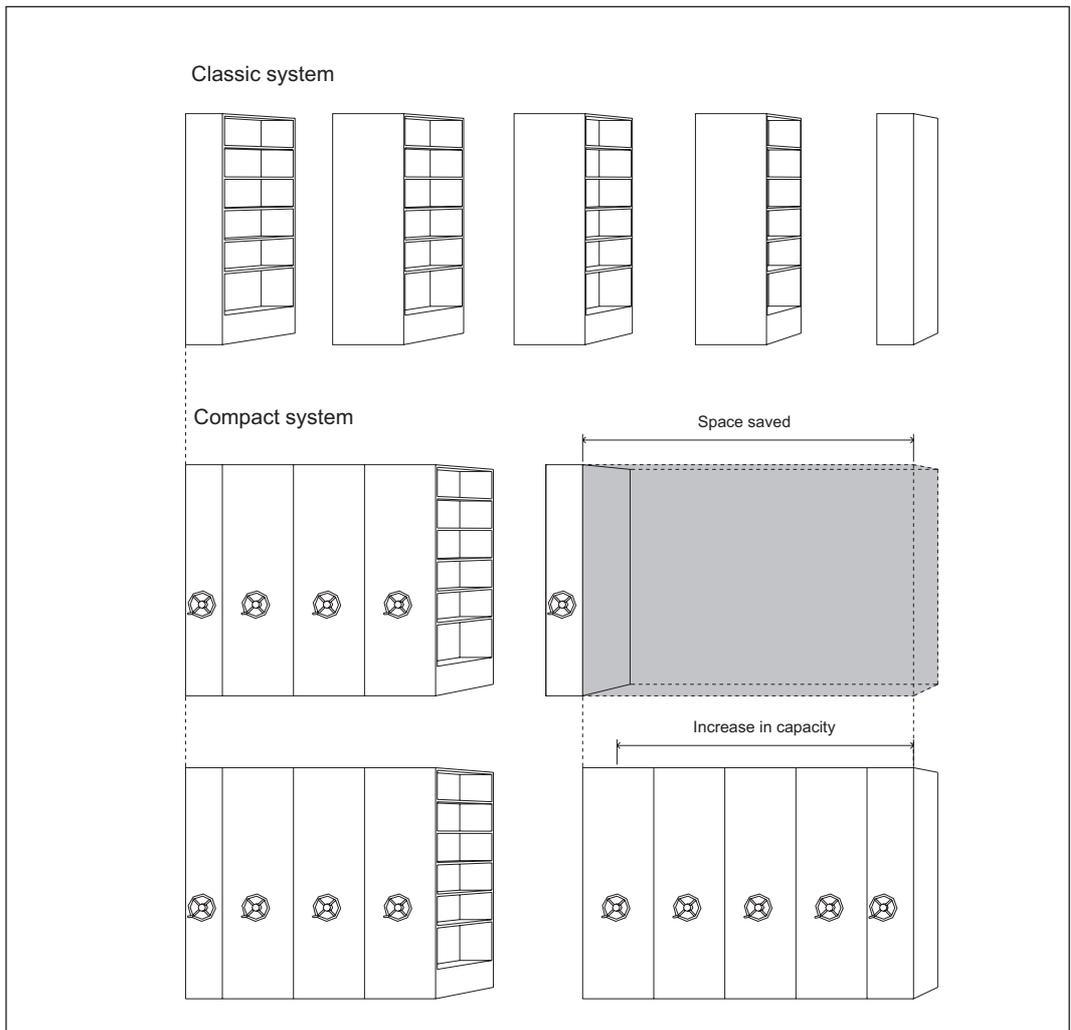


**13.49b**  
Tracks and guides set into a wooden platform.



**13.50**  
*Mobile shelving with movement parallel to the row itself.*

**13.51**  
*Mobile shelving with perpendicular movement.*



### Carriage system

- Tracks:  
These must allow for uniform load transmission from the wheels to the floor, as well as being strong enough to withstand slight variations in the surface.
- Guide runners:  
Separate from the tracks, the idea being to be able to decide where the best place for the running of each stack is.

### Types of installation:

- Tracks and guides set into the floor:  
The installation will be at the same level as the other spaces. There are two situations:
  - New flooring:  
This is the ideal solution because the system and the levelling will be completed before the flooring is laid.
  - Floating floor:  
Grooves of no deeper than 5 cm are made where the tracks will be laid, the level of which will be based on the existent floor to avoid unevenness in three tracks as far as possible. (Fig. 13.48).
- Tracks and guide runners built into a wooden platform:  
This system means compact shelving can be installed with a floating floor where grooves cannot be cut. The most obvious disadvantage is the resulting difference in level, which will be over 5 cm, for two reasons:
  - Installing the interior reinforcements so that the linear load of the carriages is distributed evenly, and occasional loads on the existing flooring are avoided.
  - The possibility of creating an even level independent of the existent level. (Fig. 13.49a and 13.49b).

### Stacks

- Carriages:  
These are the parts between the stacks and the running mechanism, which transmit all force on to the wheels, being the elements which join the tracks.
- Shelves:
  - These are made up of steel sections forming a braced structure, which can be finished in a number of ways.

- They are set out in parallel rows, with rolling devices which are parallel (lateral track) or perpendicular to the row itself.
- The most common is perpendicular motion. Space is saved through being able to move each stack so that the number of aisles is reduced to just one. The width of the working aisle can be no less than 90 cm to allow the carts to pass through. (Fig. 13.50 and 13.51).
- Because the structure of the stacks is based on the installation of shelving systems on carriages, the possibilities for storage will, depend on the type of shelving chosen.  
In the case of libraries, the most common choice is cantilever shelves as described in the preceding section. This has the advantage of a wide range of shelves and accessories.
- The system means that panels can be added to completely enclose the stack, or some parts can be left partially open in order to allow for natural ventilation inside.  
The first option provides security against robbery, and keeps both sunlight and dust away, but might lead to problems of damp. When the weather cannot be guaranteed, a bored finish is recommended to improve air circulation.
- The floor structure needs to be able to withstand a load of between 1,000 kg/m<sup>2</sup> (150 cm in height) and 1,500 kg/m<sup>2</sup> (225 cm in height).
- The complexity of the installation and the quality needed to ensure that the shelves move properly make the compact shelving system very expensive.

### **Accessories**

- Shelves and dividers in different formats.
- Rubber edging:  
Attached all around the edges of the shelving, they act as an elastic joint which stops light and dust getting in.

- Built in signage.
- General mechanical locking system for the whole unit, providing security and control.
- Finishing panels.

### Operating systems

The most appropriate operating system will depend on how often it is going to be used, the number of stacks and the load it has to withstand:

- Manual:
  - This is based on the physical effort of the user, who moves the wheels over the rails by simple traction.
  - Each stack has two handles on the front end.
  - This is recommended for installation of no more than 4 stacks, each one with a load of less than 1,000 kg and a maximum of 2 modulus deep.
- Mechanically assisted:
  - This can have a crank or a wheel on the front end of the stacks at user height.
  - The crank system is recommended for medium loads and less frequent use.
  - The wheel system is recommended for larger loads and more frequent use.
  - The upper limit for use would be moving 7 stacks loaded up to 4,000 kg each
- Electrical:
  - This system requires no effort on the part of the user.

- It is ideal for any load and size of stack and can withstand constant use.
- For each stack there is a motor unit consisting of gear motors which, transmit the power via chains and cogs to the wheels.
- These have safety to avoid accidents when the staff are inside the aisle.

### Technical recommendations

- Cold laminated steel.
- Running system:
  - Elastic steel tracks of 50 × 14 mm on foot mountings.
  - Foot mountings of 2,5 mm thick section, attached every 50 cm and grouted with quick-drying cement.
  - Stack guide runners made from a metal “U” channel of 40 × 50 × 40 mm and 5 mm thick.
  - Optical levelling of running systems by specialized personnel.
- Stacks:
  - Connecting carriages made with cold laminated “U” channels measuring 40 × 110 × 40 mm and 2,5 mm thick. These sections form a welded rectangle with reinforcing sections of 2,5 mm thickness. Cast iron convex surface wheels, of 120 mm diameter. Two high resistance ball-bearing assemblies.
  - Shelving with cold laminated structural bars with section of 75 × 30 mm and at least 1 mm

13.52



thickness, with 12 × 4 mm teeth forming zip-like structures all the way along to strengthen and straighten the shelves.

## COUNTERS

Architecturally these are a very important element of the interior image of the library, yet they are also elements of furniture which need to fulfil certain essential functions. That is why particular attention must be paid to the relationship between design and functionality. (Fig. 13.52).

Functional characteristics:

- These are work stations which have to be able to fit in with changing needs.
- They set limits on two areas: the public area and the staff work area.
- They define the relationship that exists between the users and the library staff.

Aesthetic characteristics:

- The counter can be a compact element designed for specific functions, or a group of modules that can be combined in various ways.
- In most cases, the option taken is for counters combining modular elements with special shapes or sizes. To make the manufacture easier, the elements which need to be made to measure should follow the basic criteria of the modular elements.
- As for the finishing materials, they can be made to match the interior architecture of the building, or the rest of the furniture in the library.

### Aspects to be determined in each case

Library technicians need to carry out a detailed analysis of the aims of each counter:

- Number of staff who will be working.
- Functions:
  - Although they may all be carried out at the same counter, three types can be identified:
    - Welcome:
      - Monitoring, registration, information on the working of the library and its activities, etc.



13.53

They must be located where the users will pass when they enter or leave the library.

- Lending process:
  - Documents coming back and going out, storage of returned material and so on. A space must be included for shelves and carts, both for returned documents which must be returned to the shelves and those which have another destination (reserved books, repairs, etc.).
- Information:
  - Consultation concerning the various needs of the users. The users must have somewhere to sit down, and in some cases, the counter should be organized to create some sense of privacy. There must be shelves to store



13.54

encyclopaedias and other reference books.

The work surface must allow for this type of consultation and for the installation of reference computers both for staff and users. (Fig. 13.53 and 13.54).

- Numbers and kinds of equipment:
  - Computer terminals, telephones, demagnetizing apparatus, audiovisual equipment and so on.
  - Placement and system of installation of the equipment (built into the work surface, mounted on structures, attached to moveable units, etc.).

### Basic requirements

Functional requirements:

- Focus on the physical and psychological comfort of the staff working at the counter.
  - Ergonomic design of the counter to lessen effort on the part of personnel (dimensions, proportions and distribution of the various elements).
  - Easy to add elements (shelves, drawers, etc.).
  - Best location for the equipment needed for the functions:
    - ▶ Computer screens:
      - ▷ Monitors on the counter surface take up a lot of space.
      - ▷ Monitors built into the desk top free up space, but make it difficult to work sitting down as they reduce the space under the desk.
      - ▷ Semi-sunk monitors in line with the back of the desk mean the staff can work sitting down. Studies put the ideal angle at 15° from horizontal.
      - ▷ Flat screens solve all these problems.
      - ▷ The contestant appearance of ergonomic studies about working in front of a computer screen suggests that the dimensions of the counter should be adapted to each specific situation.
    - ▶ Bins for the return of loaned items:
      - ▷ One solution is to have a hole in the work surface with carts on castors below, for returned items.
- Facilitating communication.
  - For lending and immediate information, users are standing up. The counter must be made top allow for note taking, putting bags or other personal items down, etc.
  - Personalized attention has other needs. Users are seated and they need to be able to get close to the staff.
  - There is also the question of adaptation to people's different characteristics. Both children and the disabled must have a counter suited to their situation.
- Ease of work, storage and circulation behind the counter (privacy and comfort at workstations, space to move and to get carts in and out, etc.).

Construction requirements:

- Adjustable feet or mountings for levelling.
- Incorporation of ductwork for installations which require cables, with solutions which conceal the cables coming up from the floor.
- Horizontal surfaces:
  - Resistant edges (no less than 30 mm thick if wood) which must be rounded so as not to cause injury.
  - Surface finishes must be easy to clean and resistant to scratches, knocks and chemical/organic products.
- Vertical transverse panels:
  - Intermediary panels cut away to allow for the movement of the librarian's legs when she moves from one place to another on a chair on castors.
- Vertical front panels:
  - There should be elements which block the inside of the counter area from public view.
  - In the personal attention areas, users must be able to sit facing the staff
  - Lower part must be finished in knock and scuff resistant materials.
- Space to attend to users in wheelchairs. In this case the lateral/front panels must go inwards, or incorporate elements which allow

face to face dealings with the library staff.

### Main elements

- “Work surface”.
- “Public support counter” consulted standing up. This is at a higher level and keeps the staff work surface free.
- “Service counter” at a lower level for the users to put their personal effects down.

### Complementary elements

- Storage furniture: These can be installed as independent elements or can form part of the counter.
  - Filing cabinets with drawers or doors (files, audiovisual material, etc.).
  - Cupboard space with moveable/removable shelves for the audiovisual equipment.
- Various format modules on castors.
- Shelves and display cases built into the counter.
- Swinging doors.
- Accessible exposed ducts.
- Elements of various formats for placement of computer and audiovisual equipment (CPU and keyboard tray, etc.).
- Built-in lighting.

### Dimensions

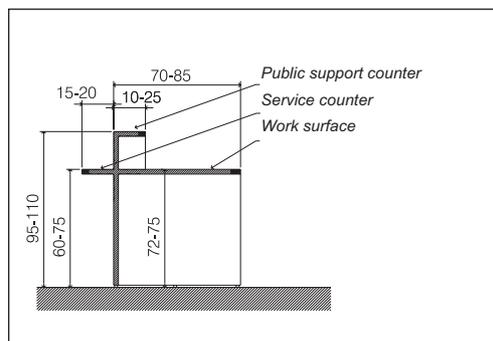
#### Height

The proportions set out refer to counters where there is no difference between the inside and the outside floor levels. If this is not the case, the staff access regulations must be observed.

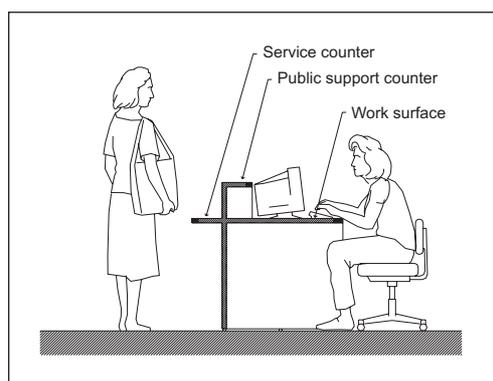
- “Work surface” seated: from 72 to 75 cm
  - Minimum free space below desk: 65 cm
  - Heights above this needing uncomfortable seats or stools for the staff are not advised.
- “Public support counter”: from 95 to 110 cm
  - This dimension has caused some difference of opinion. For the standing user, this is a comfortable

height for leaning, taking notes and picking up or leaving loaned documents. The staff, on the other hand, is more restricted:

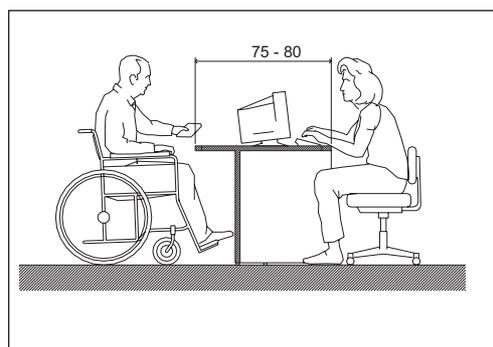
- ▶ The height of 95 cm seems insufficient to conserve the staff’s interior working space, but the movement they have to make to hand documents to or take documents from the user is not so tiring. Also, when staff members are seated, talking to users, their position is closer and less forced from the ergonomic point of view. For this reason it is the most recommendable.
- ▶ As the height increases, the advantages become disadvantages and vice versa.
- In the children’s area, this surface is not recommended as it makes



13.55



13.56



13.57

13.58



13.59



13.59

interaction with the children more difficult.

- “Service counter” for personal effects: from 60 to 75 cm

Depth

- “Work surface” seated: from 70 to 85 cm
  - This measurement is defined by the type of computer terminal in use (flat screen, built-in screens, etc.) and by the useable depth.
  - A depth of 85 cm functions best because you can put the keyboard in front of an ordinary monitor, but the distance between the staff and the users is too far.
- “Support counter” for the public: from 10 to 25 cm
  - This measurement supposes the existence of a surface for personal effects.
  - It must also be connected to the height, as the part which hangs over the inside of the working surface can limit its usable depth.

- With heights of 95 cm and a working surface of 70 cm deep, there is a problem. If the work surface is invaded, there will be problems finding space for the keyboard in front of a conventional monitor. Otherwise, the total depth of the counter increases the distance between the staff and the user.

- “Service counter”: from 15 to 25 cm
  - Most attention should be paid to this element’s resistance. Apart from personal effects, some users tend to lean on it. (Fig. 13.55, 13.56 and 13.57).

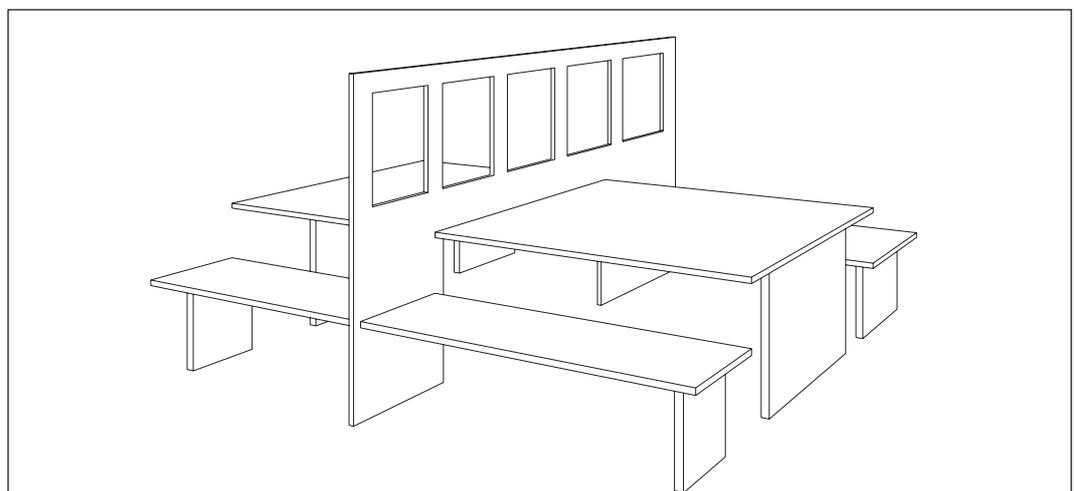
**Materials**

The most commonly used are:

- Supporting structure: wood and steel.
- Vertical panels: wood.
- Horizontal surfaces:
  - Work surface: Laminated wood

13.60

Children’s table.



- (with natural wood or plastic laminate finish).
- Other surfaces: wood and steel.
- Accessories:
  - Filing cabinets, modules, etc.: wood and steel.
  - Shelves and display cases: steel, wood, plastic, etc.
  - Exposed cable ductwork: steel and plastic.

## TABLES AND BOOTHS

### Types of tables and booths

Depending on the ages of the users, which will determine the dimensions:

- Adults.
- Children from 4 to 8 years old.
- Little readers of under 4 years old.

Depending on use and type:

#### Study tables

- Users around a table.
  - No privacy, except when dividers are used.
  - They can be organized in any number of ways and create combinations to suit any need.
  - They must be of suitable measurements for individual work.
  - Main characteristics for each shape:
    - ▶ Rectangular:
      - ▷ Can be adapted to work/study activity because they mark out the individual working space.
      - ▷ Individual tables, despite being popular because of the privacy they provide,



13.61

take up more space and are often moved by the users themselves, which means rearranging them at the end of the day.

- ▷ The usual size is to seat 4 or 6. Four-seaters are more versatile.
- ▷ Tables which seat more than 6 are not recommended because they encourage noise. (Fig. 13.58, 13.59 and 13.60).
- ▶ Circular:
  - ▷ Provide a 'group' feeling.
  - ▷ Chairs can be put together, and they can seat odd numbers.
  - ▷ Difficult to mark out an individual workspace.
  - ▷ Suitable for group work or quick reference. (Fig. 13.61).
- ▶ Trapezoid:
  - ▷ Used individually and in a line they increase the space per person.



13.63



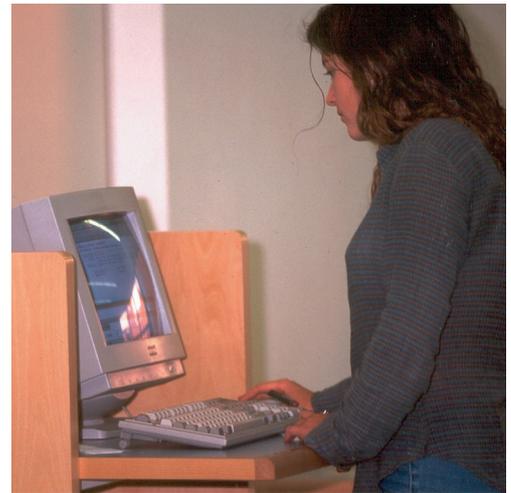
13.62

13.63

**13.64**  
Occasional  
reference table.



**13.66**  
Audiovisual  
reference table.



13.66

- Long work surfaces for individual work stations.
  - Provide working privacy.
  - Moveable dividers can be attached.
  - When they are against a wall, the finish of the vertical panelling below must be done so as to minimize the effects of scuffing/knocking etc..
  - When a long work surface provides a railing for a mezzanine, the vertical panelling must ensure that objects cannot fall off, nor can the users' legs be seen from the floor below. (Fig. 13.62 and 13.63).

Occasional reference tables

- Placed between the shelving units, the idea is to help users to consult books standing up or sitting on stools.
- The use of these tables means that the design and dimensions can be independent of the rest of the furniture. (Fig. 13.64).

Individual study booth

- Provide privacy.
- The height of the desk dividers will depend on the level of visual/audio isolation needed.
- They should be designed by modular criteria: dimensions and a construction system which allows the organization of both independent work stations and groups of booths connected to each other for two or more people to work together. (Fig. 13.65).

Audiovisual booths

Types of booths:

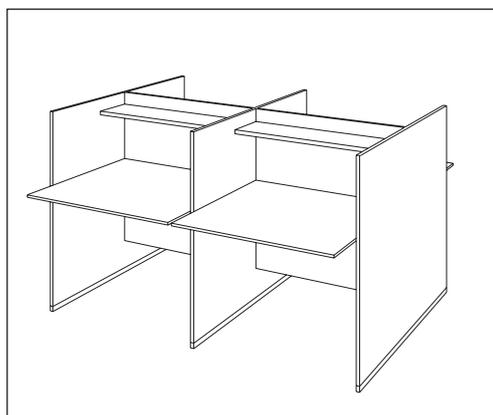
- Standing catalogue reference.
- Standing audiovisual self-service reference.
- Seated audiovisual collection reference. (Fig. 13.66).

Office desks

Lower side tables

- In the informal areas, relaxation zones.
- Like the occasional reference tables, the design and measurements of

**13.65**  
Individual study  
booth.



**13.67**  
Lower auxiliary  
table.



13.67

these can be completely independent. (Fig. 13.67).

- Shelving.
- Built in lighting.
- Footrests.

Outside tables

**Basic requirements**

- Supporting structure:
  - Height adjustable to adapt to any irregularities in the ground.
  - Should not interfere in the movements of seated users (crossing legs, pulling in chairs with armrests, etc.).
  - The legs should not get in the way of a user who comes in to work. Designs which do not take this possibility into account are reducing useable workspace.
  - Stability and strength. They must be able to take the weight of users who lean on the edges without moving or tipping.
- Work surface:
  - Easy to clean.
  - Resistant to cuts and knocks, and to organic/chemical products.
  - No sharp corners or edges as safety against bumps and knocks.
  - Avoid shiny, reflective or highly coloured surfaces (white reflects light, and both bright or dark colours produce eye fatigue because of the high contrast with the working documents).

Natural wood finishes are not recommended for study tables, since they tempt many users to write on them. The problem also occurs in tables with other finishes, but with wood edging.
- Wiring:
 

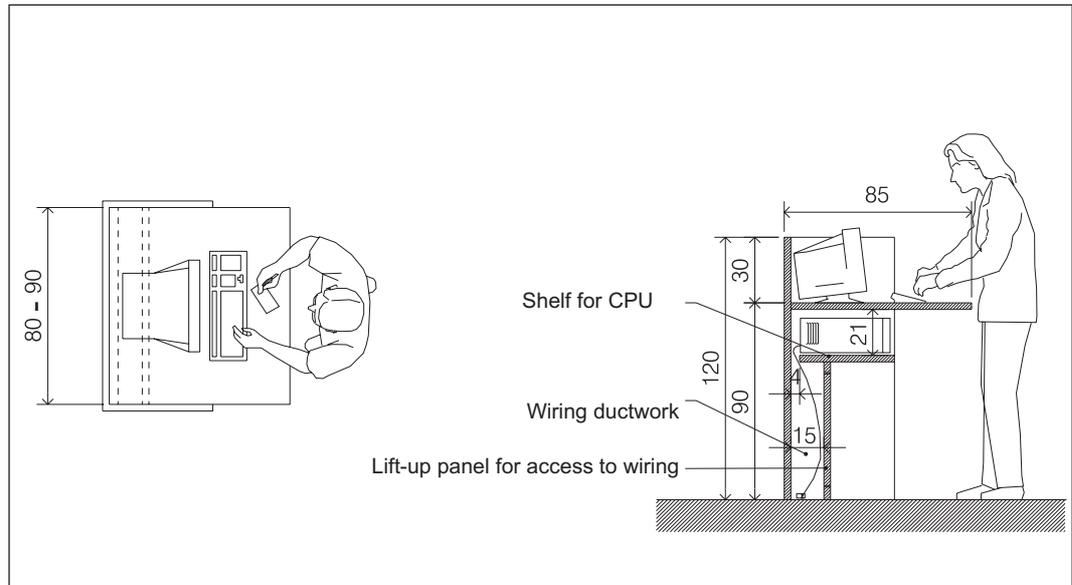
Wiring should be built into tables or booths for working with equipment which needs wiring, using solutions which can conceal the cables coming up from the ground. (Fig. 13.68 and 13.69).

**Accessories**

- Dividers (moveable or fixed).
- Accessible exposed ducts.
- Elements of various formats for placement of computer and audiovisual equipment (CPU and keyboard tray, etc.).

**Dimensions (see tables)**

<b>Work surface</b>
<b><i>Recommended space per user</i></b>
Work/study: Width . . . . . From 80 to 90 cm. Depth . . . . . From 60 to 70 cm. These dimensions are insufficient for large format document reference (atlases, maps, etc.).
Work/Study with computer: Width . . . . . From 100 to 110 cm. Depth . . . . . From 80 to 90 cm.
Standing computer reference: Width . . . . . From 80 to 90 cm. Depth . . . . . From 80 to 90 cm. This measurement includes the space needed for the user to take notes.
Standing occasional reference: Width . . . . . From 50 to 70 cm. Depth . . . . . From 40 to 50 cm.
<b><i>Recommended dimensions for tables</i></b>
Rectangular:  Dimensions dependent on work/study activity.  –6 people: Width . . . . . From 220 to 240 cm Depth . . . . . From 110 to 120 cm  –4 people: Width: . . . . . From 160 to 180 cm Depth . . . . . From 110 to 120 cm  –2 people Dimensions . . . . . 100 × 100 cm  –Office table: Width . . . . . From 160 to 180 cm Depth . . . . . From 80 to 100 cm  –Side wing: Width . . . . . From 100 to 130 cm Depth . . . . . From 60 to 70 cm
Circular:  Only suitable for quick reference and group work.  Dimensions indicated are insufficient for newspaper reading spaces, where the format of the document determines the capacity of each table.  –From 5 to 6 people . . . Diameter: 150 cm –From 4 people . . . . . Diameter: 130 cm
Long work surfaces:  Depth . . . . . From 70 to 90 cm Width per user . . . . From 85 to 100 cm



**13.68**  
Standing computer  
reference booth.

**Materials**

The most commonly used are a combination of metallic structure with wooden surfaces with various finishes.

- Support structures:
  - Solid wood.
  - Wooden panels (mainly the vertical elements of the booths, long work surfaces and office tables).
  - Steel.
- Work surfaces:
  - Plywood.
  - Particle board covered with natural wood or plastic laminate.
  - Semi-solid planks made form a structure of strips covered by two veneer sheets.

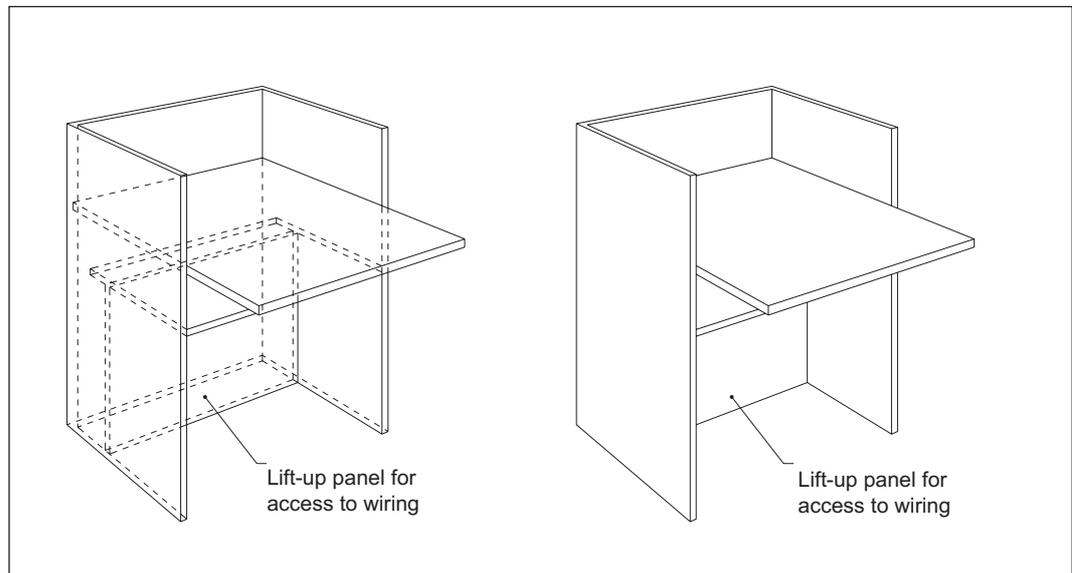
Natural varnished wood coverings look good and are warmer, but are not always totally smooth and can be difficult to maintain.

Plastic laminates are more resistant and easier to clean, but are colder to the touch.

Plastic laminate finishes with built on wooden edging make a good combination of durability and warmth.

- Lower side tables and occasional reference tables:
  - Wood, metal, glass, etc. (depending on decor).
- Outside tables:
  - Aluminium, plastic, treated wood and other weather-resistant tables.
- Accessories (dividers, ductwork, etc.):
  - Glass, steel, plastic, etc.

**13.69**  
Standing computer  
reference booth.



Work surface	
Height	
Seated work:	
– Adults:	
Height . . . . .	From 70 to 75 cm (72 cm recommended)
Minimum height of free space beneath table . . . . .	65 cm
– Children:	
Height . . . . .	From 65 to 70 cm (68 cm recommended)
Minimum height of free space beneath table . . . . .	60 cm
– Little readers:	
Height . . . . .	From 42 to 48 cm (46 cm recommended)
Minimum height of free space beneath table . . . . .	40 cm
Standing computer reference:	
The dimensions indicated refer to monitors paced on the work surface.	
– Adults . . . . .	90 cm
– Children . . . . .	70 cm
Standing occasional reference:	
– Adults . . . . .	From 90 to 110 cm
– Children . . . . .	From 70 to 90 cm
Lower side tables . . . . .	From 35 to 45 cm



13.70

- They must be bought from specialist manufacturers. This is one of the main reasons why the contract should be awarded by item. When all the furniture is left to a single manufacturer, it is usually a company which specializes in libraries. This company needs to buy the chairs from an outside manufacturer, which means an increase in costs because of the intermediary role the contracted company is taking.
- The range of types and the high number of units mean that the chairs become one of the defining elements of the style of the library. For unity of image, models should be chosen which can incorporate a wide range of accessories which adapt to different needs. Subtlety in the design makes the whole group more pleasing to the eye.
- Choosing the models cannot be done through a catalogue. Specialists have

## CHAIRS/EASY CHAIRS

The chair is one of the most complex objects from the design point of view, and has a very particular characteristic: it has to be comfortable for people of different sizes and proportions to make it possible for them to do other activities carried out at other pieces of furniture (table, counter etc.) whose dimensions are invariable.

The wide range of chairs which furnish a library (depending on the designated activity or zone they are intended for, like the variety of prices, designs, proportions, dimensions and materials suggested by the manufacturers, make it very difficult to choose models which fulfil all requirements.

### Aspects to consider

- From a financial point of view, they are one of the most important parts of library furnishing.



13.71



13.72

to be brought in who can agree on a suitable choice for each need, for users who differ physically, and which strike a balance between aesthetic, ergonomic and financial questions.

- Of all the requirements listed below, hard wearing structure is of particular importance.

Experience shows that chairs are the items of furniture which take most punishment and are the first to break. Added to this is the difficulty in finding financial resources to cover the replacements when the library is relatively new.

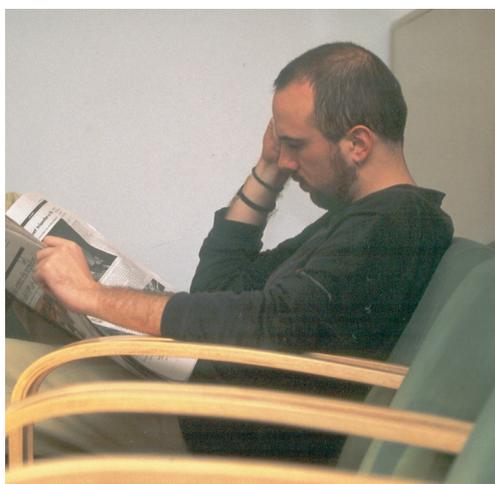
### Types of chairs / easy chairs

The age of the users determines the size:

- Adults.
- Children from 4 to 8 years old.
- Little readers of under 4 years old.

By user and type:

13.73



### Study/reading chairs

This is the most numerous range in the library.

The shape and proportions must guarantee comfort during prolonged use. (Fig. 13.70).

### Chairs for multi-purpose spaces and meeting rooms

The constant changes of use in these spaces means that models which are easily moved and stored away should be used. They should also be easy to add accessories to (tablet arms, connecting pieces, etc.).

### Office chairs

For library staff, at the counters and internal work areas, the requirements are similar to office chairs.

For a wide range of activities, they must guarantee comfort during static work and mobility for specific tasks (lending process, work at the monitor or with the printer, speaking on the telephone, etc.).

### Easy chairs

Mainly in the welcome and meeting areas, the newspaper/magazine section and informal reading areas. (Fig. 13.71).

For the children's area, the specialist market has scaled-down models which can help create little informal corner areas.

### Stools

There are three types:

- Informal reference areas. (Fig. 13.72).
- Children's area, around a table.
- Storerooms and workshops for treatment of books.

These stools must fulfil certain ergonomic requirements depending on the tasks being carried out.

### Outside chairs and benches

### Basic requirements

#### Chairs

- Comfort and ergonomics:
  - They must allow the user to change position (crossing legs, putting legs under chair, body movements, etc.).
  - The chair back must support the lumber region when the user is

- sitting up, and the upper back when relaxed.
- The seat must have a rounded or curved front edge so as not to hurt the legs.
  - When the front legs have a crossbar, it must not get in the way of putting ones legs under the seat.
  - The advisability of having armrests on the reading and study chairs must be assessed, given that they can often get in the way of movement of the body and arms.
  - Particular attention should be paid to the staff seating and the audiovisual seating: adjustable height, moveable backrests, swivel seats, and the possibility of adding armrests and castors with brakes. These requirements mean that office furniture models which are far more expensive than ordinary work and study chairs must be chosen. The high cost means that less ergonomic models are often used at the audiovisual reference points. Given that ease of movement is important, they at least need to have swivel seats and castors so that the eyes can be moved closer and further from the screen, documents can be consulted and the printer can be reached.
  - The specialist ergonomic furniture market offers models whose design is very different from that of a conventional chair, but which are the best option ergonomically speaking. In this case, excessive specialization means they are not advisable for a space meant for public use.
  - Resistance and durability:
    - Structure, joints, moving parts, add-ons and all other elements which make up a chair must withstand intensive use and misuse.
    - They must withstand static and dynamic loads, stress produced by users' incorrect seating positions (balancing on two legs, excessive stress on the back, etc.), being dragged, knocks and actions resulting from addition of parts (castors, armrests, writing tablet, etc.).
  - Special attention must be paid to the construction solution for the joints and connecting parts. The chair is made up of the frame, the seat and the backrest, and it is the joints which are the critical part of the whole.
  - Stability:
    - Three-legged chairs have maximum floor-contact, but are not advisable due to their instability if rocked. Within this group the safest are those which have two back legs and one central front leg.
    - Four-legged chairs must be adapted to uneven floors, as it is difficult to find models with adjustable feet.
  - Mobility:
    - Light. Easy to pick up and move with one hand.
    - Structure which does not produce noise (special anti-vibration structure, addition of pads, etc.).
    - Easy to move for changes of space distribution.
    - Staff and audiovisual reference chairs must also be easy to move.
    - Easy to store, above all for multi-purpose spaces, meeting rooms and the children and little readers' spaces. Folding chairs are less hard wearing. Stackable models are recommended which include trolleys for the movement of groups of chairs.
    - Easy to clean the floor. Some models have arms which fix to the work surface and do not touch the floor.
  - Easy to clean:
    - For study chairs material upholstery is not recommended.
    - This requirement is particularly important for children's chairs.
  - Possibility of adding accessories: Although it is difficult to find chairs which fulfil so many requirements, it is worth evaluating the advantages of models which can vary their function:
    - In multi-purpose rooms, it should be possible to have writing tablets, armrests, ganging brackets to link chairs into rows and racks beneath for personal effects.
    - Seats for meetings and personal

- assistance from librarians should have armrests for relaxed posture.
  - Audiovisual reference chairs must be able to add on castors.
- So a single model which would allow all these elements to be included would mean a major saving, and would add to the unity of image.

### Easy chairs

The above requirements for chairs cannot be fulfilled when it comes to easy chairs. The comfort and image they have to give, and the lower number of units needed means that certain aspects can be overlooked. However, the recommendations below should not be ignored:

- Comfort:
  - Proportioned so as to make it easy to sit down and get up.  
This is especially important for older people who cannot use many of the designs on the market because the seat is too low and/or too deep.
  - Medium-soft seat.
  - When they have arms, they must increase the comfort of the reader (whether of newspapers or books) and facilitate the act of getting up.
- Welcoming image. (Fig. 13.73).
- Privacy:
 

Users prefer individual easy chairs to multi-seater sofas, particularly in the reading area.

The type of activities of the meeting area means that other types can be used, but using the same models would make it easier to change the furniture around.
- Mobility:
 

Both the magazine/newspaper section and the informal areas have characteristics which make redistribution a possibility (creating a corner for relaxation, moving an easy chair to enjoy a view, etc.).

These characteristics mean that a light, easy to move model should be chosen and also highlights the advantages of individual chairs.
- Easy to clean:
  - The above requirements make it difficult to go without textile upholstery, but models must be chosen which solve other problem areas:
    - ▶ Armrests, which wear out

quickest, must have a hardwearing finish.

- ▶ The model chosen cannot have any corners which the vacuum cleaner cannot get to.
- Easy chairs with removable covers which can be removed and cleaned guarantee a level of maintenance. The system must ensure that the material does not ruck and cause creases through user movement.
- Ease of cleaning is a high priority requirement in the children's area.

### **Accessories**

- Trolleys to transport chairs.
  - Most are made for a specific line of chairs, and can carry between 10 and 15 units.
  - The number of trolleys will depend on the frequency with which the function of the area changes and the closeness of the storage areas.
- Armrests.
- Writing tablet.
  - Fold-down tablets on a vertical sidebar are recommended.
  - A certain percentage of left-handed users should be anticipated.
- Racks beneath for personal effects.
- Ganging brackets.
  - Chairs can be linked to make rows to make emergency evacuation quicker.
- Castors which can have brakes added.
- Pads.
  - These stop slips, scraping noises and scratches on the floor.
  - They may be rubber, felt, plastic and stainless steel (recommended for carpeted floors).

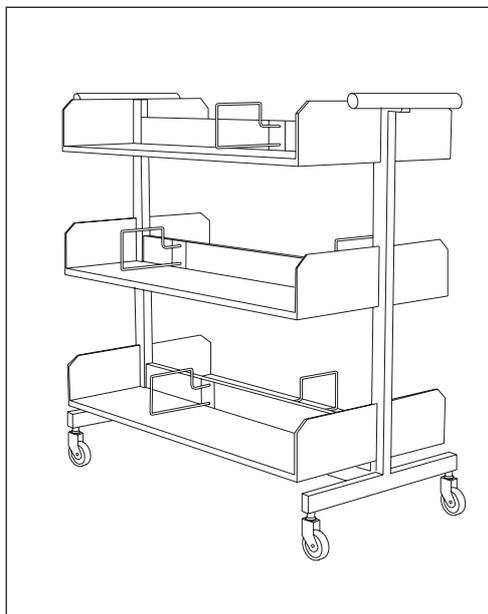
### **Dimensions**

The following tables list the typical values, but it should be pointed out that the positive aspects of the chairs and easy chairs are to be found in a proportionate combination of these basic dimensions.

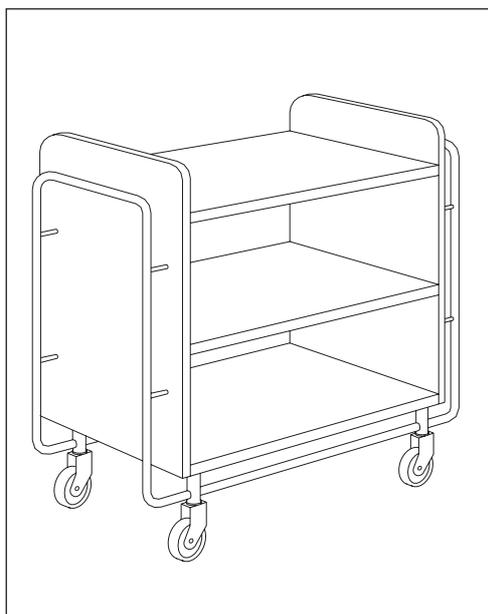
<b>READING AND STUDY CHAIRS</b> <i>Dimensions</i>	
<b>Adults:</b>	
– Seat height . . . . .	From 42 to 45 cm (44 cm recommended)
– Seat width . . . . .	From 40 to 50 cm
– Seat depth . . . . .	From 40 to 50 cm
– Total height . . . . .	From 70 to 85 cm
<b>– Back rest:</b>	
– Lumbar area . . . . .	From 15 to 25 cm of the seat
– Dorsal area . . . . .	From 25 to 40 cm of the seat
– Angle of incline from horizontal:	
– Erect posture . . . . .	100°
– Relaxed posture . . . . .	120°
<b>– Writing tablet:</b>	
– No smaller than A-4	
– Height . . . . .	From 65 to 70 cm
<b>Children:</b>	
– Seat height . . . . .	From 38 to 42 cm (41 cm recommended)
– Seat width . . . . .	From 30 to 40 cm
<b>Little readers:</b>	
– Seat height . . . . .	From 25 to 35 cm (28 cm recommended)
<b>Informal high reading stools</b>	
– Seat height . . . . .	From 65 to 85 cm
<b>Easy chairs</b>	
– Seat height . . . . .	No lower than 38 cm
Children's easy chairs have different proportions, which make them completely unseable for adults.	



13.74



13.75



13.76

## Materials

### Chairs and stools

- **Frame:**
  - Metal (chrome finish, painted or plastic covered).
  - Wood.
- **Seat and back:**
  - Plywood.
  - Particle board or other light supports covered in material leather, linoleum or synthetic materials.
  - Stiff synthetic materials.

The problems with material as a cover are the cleaning, maintenance and wear.

Synthetic materials produce static electric charges, are non-porous and are cold at first touch.

### Easy chairs

- **Seat and back:**
  - Material:

- ▶ Materials chosen should be hard-wearing but soft to the touch.
- ▶ The colours must be neither too light nor too uniform so that stains and dirt do not show up too much.
- Leather:
  - ▶ This is not recommended as it is delicate, expensive and does not breathe in the case of prolonged use.
- Synthetic materials:
  - ▶ Certain synthetic coverings can be recommended, only for the children's section where the priorities are that the furniture be fireproof, waterproof, pleasant to touch, hardwearing and easy to clean.
- Armrests:
  - The component which takes the most punishment. One good solution is wood, as it is warm, hardwearing and easy to clean.

#### Outside chairs and benches

Aluminium, plastic, treated wood and other weather resistant materials.

## **CARTS**

---

Elements used by staff for the movement of books within the library, both for collecting and putting them back on the shelves and for taking them to storage.

Places for carts:

- Book return counters
- Designated activity areas:
 

Some libraries advise users to leave the books they have consulted on the tables. Others prefer that they leave them in carts to make it easier to collect them up. In this case, there must be enough carts visible at different points.
- Storage.
- Internal work and book organization areas .

It is important to have a fairly accurate idea of the number of carts needed for each space. This information affects not so much the cost as the question of how much space there is to put them.

## **Types of cart**

- Single-sided - vertical:
  - Generally tall and narrow, With a slightly angled frame.
  - Moveable shelves inserted into upright posts, or a box which is open at the upper front.
  - Handles: one crossbar-type or two individual handles at the back.
  - Similarity to the actual shelving of the library will make it easier to place the books. (Fig. 13.74).
- Double-sided - horizontal:
  - Generally, these take up more floor space, and are lower, which makes them more stable.
  - Fixed or moveable shelves accessible from both sides, with the possibility of putting in dividers so that each side is independent.
  - It is more versatile than the single-sided model. When the lower shelf is fixed, and the other shelves are removed, it can be used to move audiovisual equipment and other larger materials.
  - Handles on both of the narrower sides. (Fig. 13.75 and 13.76).

## **Basic requirements**

- Resistance:
  - Shelves, frames and castors made to withstand intensive use and the weight of the books.
  - A loaded cart can weigh between 250 and 300 kg.
- Stability:
  - Carts must remain stable when moved suddenly, and when the load is not evenly distributed.
- Mobility:
  - Capacity for movement and manoeuvre.
  - Dimensions and design which allow them to be transported fully loaded by anybody.
  - Special attention must be paid to the quality of the wheels and the size and location of the handle.
  - Most recommended are carts which can turn 180° on the spot.

## **Main elements**

- Frame:

- Generally metal framework.
- They must be edged with rubber against bumps and knocks.
- A low crossbar means that the foot can be used in certain moving manoeuvres (turning to get through doorways, small ridges to get over going into the lift etc.).
- Handle:
  - Fixed to the vertical frame.
  - Covered in rubber or other material which is not cold to the touch.
  - Manoeuvrability is improved if the person pushing it can have their hands apart.
  - It can be a single bar handle as wide as the cart, or two individual handles fixed to the upright supports.
  - They must not stick out from the cart in order to avoid knocks and bumps.
- Castors:
  - They must be fixed to the supporting structure.
  - They must run silently and not mark the flooring. They should be rubber covered.
  - Built-in brake.
  - Number of castors:
    - ▶ 3 castors:
      - Unusual system, as it is not very stable.
      - It is used on some single-sided vertical models, with one back wheel.
    - ▶ 4 castors:
      - This is the most common solution.
      - Two fixed castors (near the handle) and two swivel castors.
      - When there is a handle on each side of the cart, all four castors are swivel, so there is a loss of stability.
    - ▶ 6 castors:
      - Present some difficulties in sideways movement.
- Shelves:
  - Horizontal, slanted and other formats.
  - These can be removable fixed to the frame.
  - Modular systems mean that the accessories described in the shelf section can be added (display sections, dividers, etc.).

## Dimensions and capacity

These must respect provisions of use and location (width of entrance doors, distance between shelves, access to the lift, under-counter storability, etc.). The size allotted must also be connected to the fully loaded weight, so that anybody can move them around easily.

<b>CARTS</b> <i>Dimensions of the most common models</i>	
Single sided - vertical:	
– Width .....	From 45 to 60 cm
– Depth .....	From 60 to 65 cm
– Height .....	From 100 to 115 cm
Cart of 50 × 60 × 100 cm	
Capacity .....	80 volumes
Double-sided - horizontal:	
– Width .....	From 75 to 100 cm 10 or 15 cm must be added for each handle
– Depth .....	From 45 to 55 cm
– Height .....	From 65 to 110 cm
Cart of 75 × 50 × 65 cm	
– Capacity .....	180 volumes
Cart of 75 × 50 × 110 cm	
– Capacity .....	240 volumes
Handle:	
– At a height between 90 and 100 cm	
– Minimum width when there is only one .....	45 cm
Castors:	
– Diameter: .....	From 10 to 20 cm

## Materials

- To fulfil all the requirements mentioned, it is a good idea to use the same type of construction and materials as the open-access shelves, with steel frame and shelves.
- Some carts have a steel frame, wooden sides and bottom shelf, and the remaining shelves of wood or steel. The models using wood are heavier, but they look warmer when they are standing in public areas.

## DISPLAY FURNITURE

In the “Shelving” section, a series of complementary shelves was described

13.77



which, once on the support structure, enable different formats of documents to be displayed (magazines, newspapers, CDs, videos, slides, records, audio cassettes, etc.). These can also be displayed on purpose built furniture. These are some of the most common:

- Audiovisual material browsers.
- Storybook and comic browsers.
- Newspaper display modules.

### AUDIOVISUAL MATERIAL BROWSERS

- This is a frame with a horizontal upper tray with compartments at different levels and movable divisions.
- The same piece of furniture can be used to display videos, CDs and audio cassettes. It is a matter of simply changing the size of the compartments.

13.78



The more versatile models have a basic frame with a support system which any type of compartment can be fitted into.

- Rubber anti-slip matting.
- Height adjustable feet for uneven flooring.
- The material is placed into each compartment vertically in groups. The front piece must be at a height which allows the covers to be seen but stops the discs from falling out. The compartments must not be completely filled to allow for movement of the documents when the user is browsing. (Fig. 13.77).
- Gradient distribution helps the user to see material further away. When the gradient is very steep, the highest and lowest levels are inconvenient for the user. (Fig. 13.81). Shallower gradient makes all the documents more accessible and create a lower module.
- Shallow gradient models can have a drawer below, with rubber matting and movable separators, which means the capacity of the display can be doubled if space is limited or if an increase in the collection is expected.

The user must fully open the drawer, which results in an increase of occupied browsing space.

The structure of the furniture must be such that opening the drawer will not tip it over.

The drawers must have telescopic runners for smooth opening and must take the weight of the material (a full CD drawer is approximately 30 kg).

The front should be see-through so the user sees the material as open-access. (Fig. 13.78, 13.79 and 13.80).

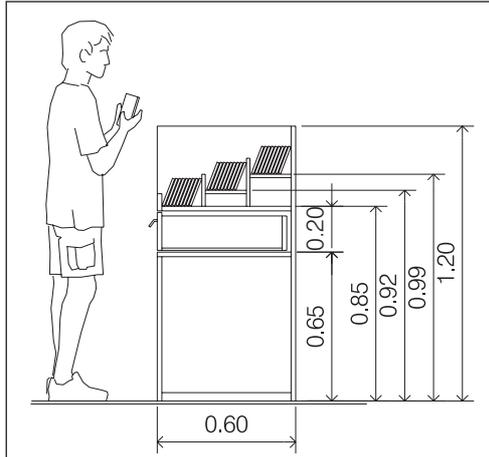
- A signage by subject system must be worked out.
- Some models have panels at the back where new arrivals or information about the material on show can be placed.

Materials:

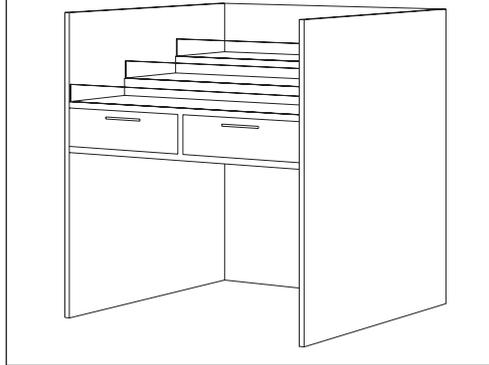
- Metal, wood or a combination of the two.



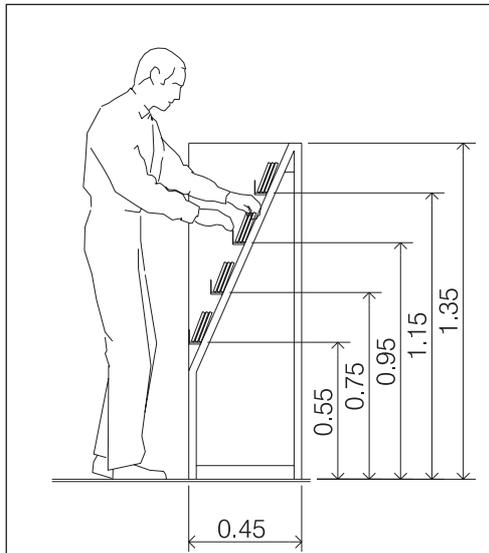
13.79



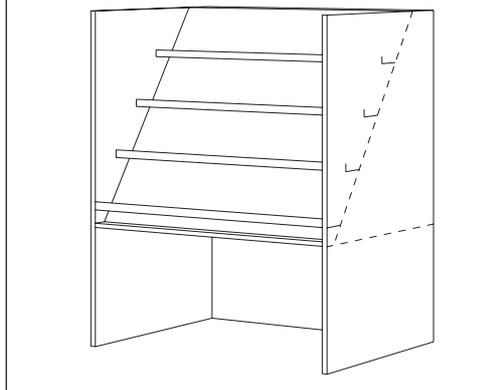
13.79



13.80  
Audiovisual module.

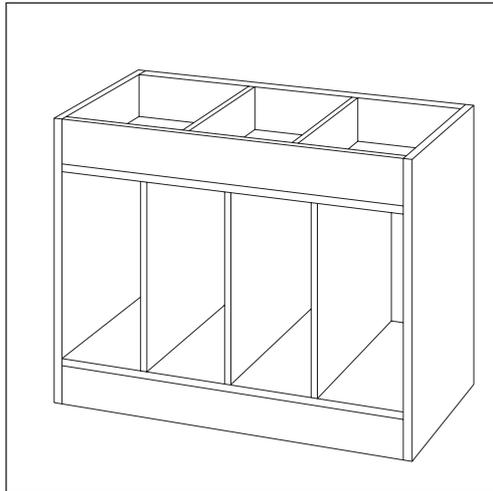


13.81  
Audiovisual module.



<b>AUDIOVISUAL MATERIAL BROWSERS</b> <i>Dimensions and capacity</i>	
<b>Shallow gradient model:</b>	
- Width	90 cm
- Depth (3 racks high)	60 cm
- Height	120 cm
- Bottom level	85 cm
- Middle level	92 cm
- Top level	99 cm
Lower drawer (drawer height 20 cm)	65 cm (the heights of the children's area models are 20 cm lower at each level)
<b>Steep gradient model:</b>	
- Width	90 cm
- Depth (up to 4 rack high)	45 cm
- Height	135 cm
- Bottom level	55 cm
- Middle levels	75-95 cm
- Top level	115 cm (this model cannot have a lower drawer)
<b>Maximum recommended CD capacity:</b>	
<b>Shallow gradient model:</b>	
- 3 racks high	180 CD
- Lower drawer	170 CD
<b>Steep gradient model:</b>	
- 3 racks high	210 CD
- 4 racks high	280 CD
<b>Maximum recommended video capacity:</b>	
<b>Shallow gradient model:</b>	
- 3 racks high	90 videos
- Lower drawer	64 videos
<b>Steep gradient model:</b>	
- 3 racks high	60 videos
- 4 racks high	80 videos

13.82



13.83



13.83

### STORYBOOK AND COMIC BROWSERS

- These are made up of a frame supporting a horizontal tray or drawer at the top with movable dividers to form the compartments. Stories and comics are put in groups vertically. The front piece must be at a height which allows the covers to be seen but stops the books from falling out. The compartments must not be completely filled to allow for movement of the documents when the user is browsing. Rubber anti-slip matting. (Fig. 13.83 and 13.84).
- The module could have compartments below where the documents can be placed with their spines facing out, or slanted display shelves. (Fig. 13.82).
- Height adjustable feet for uneven flooring.

- Castors can be added for increased mobility.
- A signage by subject system must be worked out.
- Some models have panels sticking out of the back. These can be shaped and painted to appeal to children or made to hold recent additions. (Fig. 13.85).

Materials:

- Metal, wood or a combination of the two.

Dimensions and capacity:  
(see tables)

### NEWSPAPER DISPLAY MODULES

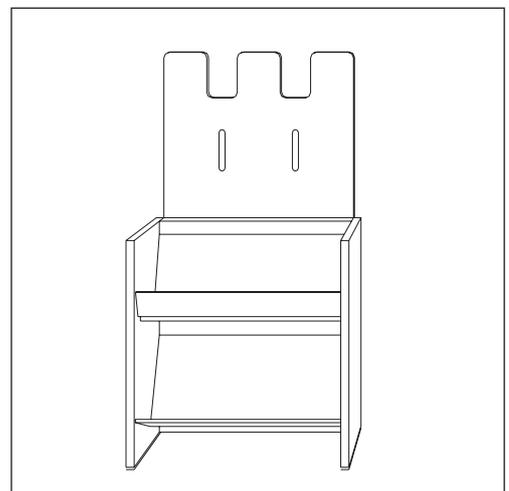
#### Characteristics of newspapers

The characteristics of newspapers make it difficult to display, store and conserve them:

13.84



13.85



13.85

<b>STORYBOOK AND COMIC BROWSERS</b>	
<i>Dimensions</i>	
- Width .....	90 cm
- Depth .....	40 cm
- Height .....	70 cm (children's area) 90 cm (adult area)
Maximum recommended capacity:	
- Upper drawer .....	40 documents
- Vertical compartments below .....	60 documents

- It is a very large yet very fine document which comes in a variety of formats.
- Intensive use coupled with the type of paper used make newspapers the documents most prone to getting torn, creased or losing pages.

**Display requirements**

- As open access periodicals, newspapers must be very visible, and have at least the name showing at the top.
- The frequency of these documents demands a mixed system which has the latest edition on show but which also stores previous editions, available to the public.
- Newspapers have so little rigidity that they need some display method which stops them sliding or falling off, and which will not crush them.

**Display methods**

- 1- On slanted racks.
- 2- Fixed to newspaper rods.
- 3- Displayed vertically.

1 - On slanted racks

These are generally shelf racks joined on to the shelving structures. There are two types:

- Racks with a system of built-in storage of lift-up shelves.
  - The latest edition lies on the lift-up shelf, and previous editions are kept protected inside the storage space.
  - Too much slant on the shelves can mean the newspapers slide off, so



**13.86**  
*Shelving with built-in storage system.*

a system, is needed to keep them in place .

- This is most recommended for magazines, given their smaller format.
- Lift-up shelves can be as wide as the shelving, or be organized into individual cubicles (three or four units making up a shelving module). This division is unsuitable if the dimensions are less than those of the document being displayed. (Fig. 13.86).
- Independent slatted shelf with horizontal shelf beneath for previous editions.
  - This is a more flexible solution because it means that the angle of the top shelf can be adjusted according to its height (when it is lower, the document can be seen better with less slant) and the depth of the shelving (the shelves can be joined on to any shelving in the library without affecting the line).

<b>NEWSPAPER DISPLAY MODULES</b>	
<i>Dimensions and capacity</i>	
- Shelf depth .....	50 cm
- If the newspaper is displayed folded in half: .....	30 cm
Approximate capacity:	
	3 newspapers /linear m
	4 magazines / linear m

2 - Fixed to newspaper rods

Three possibilities:

- Resting on specially designed modules.
- Resting on wall-mounted racks.

- At an angle like flagpoles in wall mounts.

The rods can be wooden or metal.

Positive aspects:

- A trustworthy solution from the point of view of support: The bars keep the newspaper straight, avoid creasing and stop the pages falling out.

Negative aspects:

- Looking at them is less comfortable, especially seated in an easy chair.
- Metal rods make a noise and can scratch table surfaces and chairs.
- Wooden rods bend and break easily.
- Library staff have to take off and put on every newspaper, every day.

## NEWSPAPER DISPLAY RACK

- Made up of a series of descending notches on the sides of the upper part, where newspapers can be hung on rods horizontally at different levels. (Fig. 13.87).
- A bottom shelf can be added for previous editions.
- The newspapers do not show the whole front page, just a side-view. The side-view means the name cannot be read. There needs to be a signage system for the user on the bars or on the module itself.
- Adjustable height feet for uneven flooring.

13.87



- Some models have panels at the back for new arrivals or information about the material on display.

Materials:

- Metal, wood or a combination of the two.

<b>NEWSPAPER DISPLAY RACK</b> <i>Dimensions and capacity</i>	
– Width .....	60 cm
– Depth .....	40 cm
– Height .....	60-120 cm
– Capacity .....	8 documents

### 3 - Display vertically

The newspapers are placed in narrow compartments and held in place by transparent sheets or bars. There are various types:

- Specially made modules of cascading tiers.
- Free-standing mobile displays, or ones with connecting devices to join them to other elements of furniture (shelving, end panels, etc.).

Positive aspects:

- The versatility of the second type means they can be placed anywhere in the library.

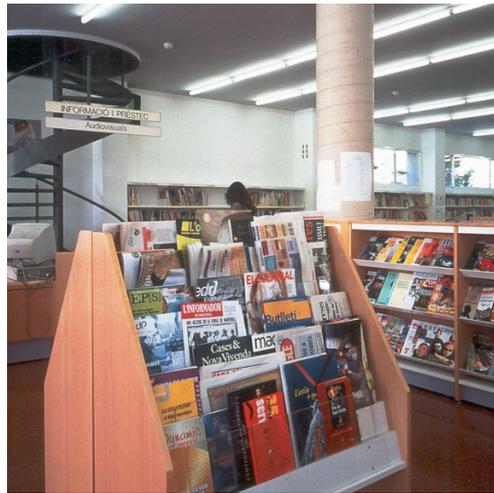
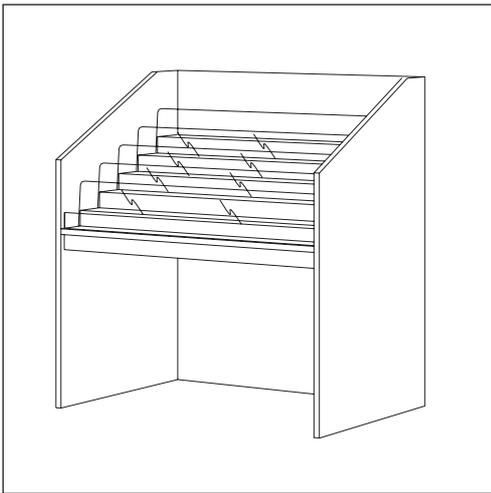
Negative aspects:

- Documents get creased and out of place easily. They are often folded in half in order to make them stiffer.
- Intensive use, and the display system itself means that the users tear the documents while taking them or putting them back, which creates an untidy image.
- The material is often left in such a way that the name cannot be read.

## COMPARTMENTALIZED NEWSPAPER DISPLAY MODULES

- These are usually made from a frame supporting an upper horizontal tray, and compartments in cascading tiers.
- The front of each compartment has wire bars or see-through sheets holding the newspapers practically upright.
- The height should ensure that the

13.89



13.88

13.89

newspaper does not get creased. Otherwise it should be folded in half. (Fig. 13.88 and 13.89).

- The size of the tiers must allow the names of all the documents to be seen.
- A lower horizontal shelf for past editions can be included.
- A signage by subject system must be worked out.
- Some models have panels at the back where new arrivals or information about the material displayed can be placed.

Materials:

- Metal, wood or a combination of the two.
- Racks to hold papers: glass, Perspex, metal or wire bars.  
Perspex is not very hardwearing (scratches, etc.).

COMPARTMENTALIZED NEWSPAPER DISPLAY MODULES <i>Dimensions and capacity</i>	
– Width . . . . .	From 90 to 100 cm
– Depth . . . . .	40 cm (6 tiers)
– Height . . . . .	From 90 to 120 cm
– Lower level . . .	65 cm
– Upper level . . .	95 cm
Capacity . . . . .	18 newspapers

## STORAGE FURNITURE

In any library there is a lot of material which, because of its format, use, value

or location cannot be stored in the furniture described so far.

When we talk about storage furniture, we mean that group of furniture of various kinds which are made to take these kinds of materials.

Below are the usual aspects and characteristics of the most typical storage furniture.

### Most common storage materials

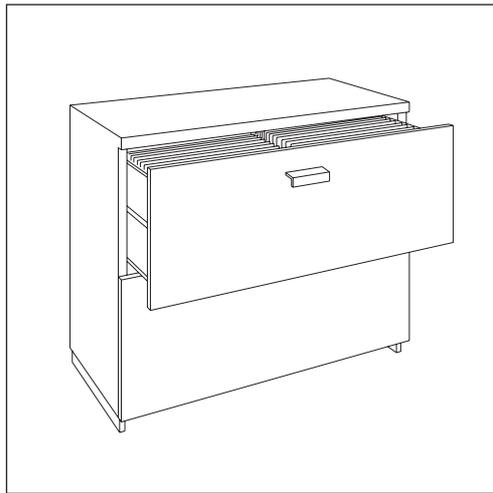
- Hanging files.
- Office supplies.
- Special format graphic documents (maps, atlases, etc.).
- Audiovisual documents (CDs, DVDs, videos, audio cassettes, etc.).
- Audiovisual equipment (TV, video, CD and DVD players, music systems, etc.).

### Construction materials

- Metal, wood or a combination of the two.
- Glass in the doors and for some shelves of the display cabinets.

### Basic types

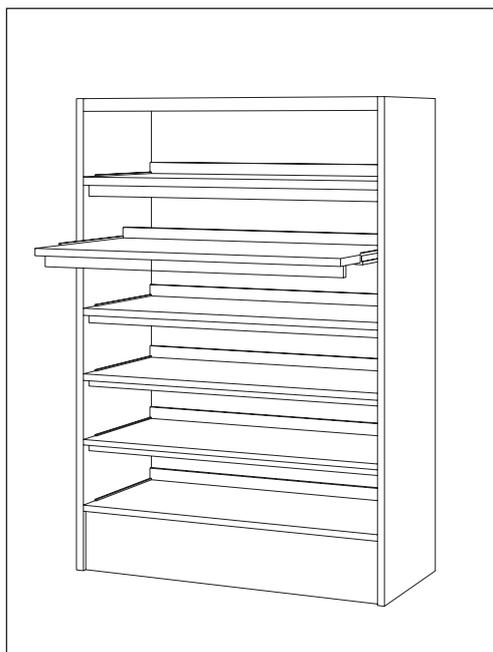
- Drawers:
  - Hard wearing telescopic runners to withstand constant use and the weight of the material.
- Shelves:
  - In most cases these should be height adjustable.
  - If they are telescopic, they should



**13.90**  
Hanging files storage.



**13.91**  
Audiovisual document storage container.



**13.92**  
Audiovisual equipment cabinet.

have the same system as the drawers.

- The doors of the cabinets may be in the same material as the rest of the furniture, or they may be glass if the contents needs to be seen.
- Doors may be hinged, sliding or roller shutters. (Fig. 13.90, 13.91 and 13.92).

### Construction systems

- Fixed:
  - Height adjustable feet to ensure they are level and to compensate for uneven flooring.
- Movable:
  - Castors made to take the weight of the furniture fully loaded and withstand frequent moving.
  - Built-in brakes.
- The furniture must be free-standing, and designed to ensure they will not topple over when fully loaded. This requirement is difficult to fulfil in certain types and certain conditions of use. One of the most complex pieces of furniture is the container with drawers for audiovisual equipment. The construction must ensure that it will not fall forward when all drawers are open, or there must be a system in place which makes it impossible to open more than one drawer at a time. (Fig. 13.93). The first option is practically impossible without attaching it to the wall. The risk of accidents suggests the second option is best.
- Built in subject signage.
- Locks, if the type of material and conditions of use demand them.

### SPECIAL FORMAT DOCUMENT STORAGE

- These are usually stored flat, separately or in groups depending on the type of document (atlas, map, poster, etc.).
- There must be a flat or slightly slanted surface for quick reference standing up.

<b>SPECIAL FORMAT DOCUMENT STORAGE</b> <i>Dimensions and capacities</i>	
Reference surface height . . . . .	From 90 to 110 cm
Atlas containers (grouped horizontally)	
– Width . . . . .	From 70 to 80 cm
– Depth . . . . .	From 65 to 70 cm
– Compartment height . . . . .	From 35 to 40 cm
– Capacity of each compartment . . . . .	5 or 6 volumes
Map and poster containers	
The variety of format will determine the size of the containers. They can be stored flat (flat case), hanging vertically or rolled up.	
Flat case storage for documents:	
A-0 Size:	
– Width . . . . .	140 cm
– Depth . . . . .	From 95 to 100 cm
A-1 Size:	
– Width . . . . .	115 cm
– Depth . . . . .	75 to 85 cm
– Compartment height . . . . .	From 5 to 10 cm
Vertical storage containers:	
Easier to handle the document, but it requires a special structure to hang rods on.	
– Width (A-0) . . . . .	From 100 to 110 cm
– Width (A-1) . . . . .	85 cm
– Depth . . . . .	55 cm
– Height . . . . .	From 125 to 150 cm



13.93

<b>AUDIOVISUAL EQUIPMENT STORAGE</b> <b>Approximate size</b>	
– Width . . . . .	From 80 to 100 cm
– Depth . . . . .	From 60 to 65 cm
– Container height . . . . .	From 90 to 140 cm
– Total height . . . . .	From 150 to 190 cm

**AUDIOVISUAL EQUIPMENT STORAGE**

- These are to keep sound and vision equipment needed for collective multi-media presentations (TV, video, CD and DVD players, music systems, etc.).
- Main characteristics:
  - Lockable roller shutters or hinged doors.  
If they are hinged, they must open as wide as possible to allow maximum view.
  - Castors with brakes.
  - Ventilation grilles.
  - Electrification (plugs, TV-FM aerial and telephone points, etc.).
  - Fixed shelves (normal and reinforced for the TV).
  - Slide-out trays of different sizes (computer keyboard, audiovisual documents, etc.). (Fig. 13.94).

**MADE TO MEASURE FURNITURE**

This refers to non-standard furniture, whether because of its type or its location.

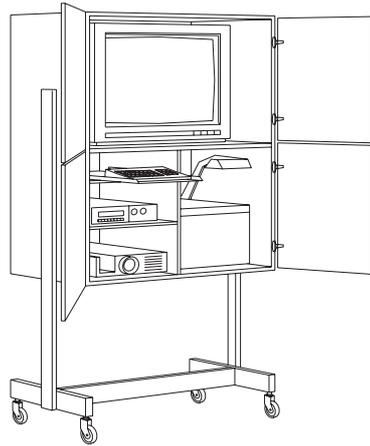
As explained in the “Basic Furniture Requirements“ section, this section should have as few elements as possible, since made-to-measure furniture is more expensive and less adaptable to any changes.

Main elements of made-to-measure furniture:

- Long work surface tables (described in the “Tables and Booths” section).
- Lockers for users’ personal effects.
- Platforms.

**PERSONAL EFFECTS LOCKERS**

- For users’ personal effects (helmet, wallet, raincoat, etc.), in order to:
  - Avoid theft.
  - Avoid untidiness resulting from effects being left on library tables and chairs.
  - Increase freedom of movement.
- They have direct public access and are located in the foyer/entrance



13.94

lobby, or can be distributed at various points near designated activity areas.

- The most efficient system is coin operated locking.
- Lockers of many different sizes and materials are on the market, but the physical presence of the whole unit makes it advisable include them in the space as an architectural element.
- Suggested number of lockers: 30% of the library's work stations. (Fig. 13.95).

<b>PERSONAL EFFECTS LOCKERS</b> Dimensions	
In most cases, a certain number of modules for helmets are installed (depending on the characteristics of where the library is located), and the rest are smaller, for keeping files.	
– Width (for helmets) . . . . .	40 cm
– Width (for files) . . . . .	20 cm
– Height . . . . .	40 cm
– Depth . . . . .	50 cm

13.95



13.96

## PLATFORMS

- Set directly on the floor of the library, these can take any shape connected with the design of the space.
- They can be fixed or collapsible, depending on their size and the anticipated need for versatility.
- The regulations about removal of physical barriers mean there must be a ramp, which can be separate, or joined to the unit.

### Materials:

- Generally they are made of particle board covered in a flooring surface.
- The edge finish must guarantee the immovability of the flooring surface, and the safety of the users.
- Types of floorings:
  - Wood.
  - Lightweight floorings (linoleum, rubber, PVC, etc.).
  - Carpeting:
    - This provides good insulation, but it gathers dust and can cause allergy problems.

### Children's area platforms

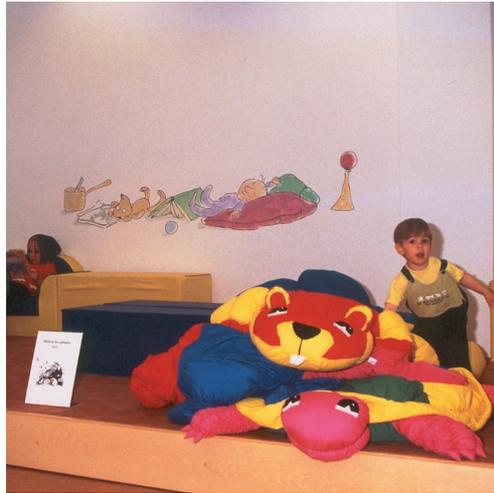
- In the fiction section and the Little Readers Section, they allow users to carry out activities sitting or lying on the floor (special module sets or themed rugs, story-reading, etc.).
- Height adjustable, combinations of varying heights can be made, and benches can be included to sit on, as can other elements to give an image appropriate for the readers' age. (Fig. 13.96).



13.96

## Platforms in multi-use rooms

- In spaces for conferences, projections, presentations and other areas requiring a raised space.
- Variable height depending on the anticipated use and the measurements of the room.
- Access requirements are mandatory in this kind of platform.
- The construction must include inspection covers or other access to wired installations.
- The furnishing project must indicate where the covers should be (stage lighting installation, conference table, multimedia presentation equipment, etc.).



13.97

- Other accessorial elements.

## ACCESSORIES

These are included in the general furnishings of the library, answer needs of the programme and form a fundamental part of the functioning of the service areas.

This item is variable, depending on the following aspects:

- Type and size of library.
- The aim of including all the necessary elements needed to complete the furniture and fittings in the furnishings budget, so there are no unforeseen costs.

Below are the most typical:

- Children's section accessories.
- Display furniture.
- Computer and audiovisual equipment accessories.

## CHILDREN'S SECTION ACCESSORIES

Basic requirements:

- Rounded edges and corners to avoid accidents.
- Must be mobile and lightweight.
- Right high-contrast colours.
- Cushions and other material-covered accessories must be pleasant to touch, fireproof, safe, hard-wearing, waterproof and easy to clean.

## CUSHIONS

- Cubes, hexagons, various geometrical shapes and other elements to create informal reading areas.
- Smaller cushions.



13.98



13.98

13.99

- These are usually circular and are kept in a stack in a tube shaped cart on castors. (Fig. 13.97, 13.98 and 13.99).

### ELEMENTS FOR AMBIENCE

Papier mâché figures, mobiles, wooden panels, etc. (Fig. 13.100).

### LITTLE READER TABLES, STOOLS AND CHAIRS

13.100

Different sizes and shapes top help create a variety of environments. (Fig. 13.101 and 13.102).

<b>LITTLE READER TABLES, STOOLS AND CHAIRS</b>	
Dimensions:	
– Table height . . . . .	From 42 to 48 cm
– Stool height . . . . .	From 25 to 35 cm

### DISPLAY FURNITURE

Indispensable in libraries because it can display – temporarily or permanently – a huge range of information. There are various types and sizes, depending on the anticipated use.

Type of material to be displayed:

- Documents from the library collection which the library, for a variety of reasons (they are new or of special



interest etc.), wants to draw attention to temporarily.

- Various information:
  - Booklets, pamphlets and other publicity material available to the users.
  - Occasional information (programmes of activities, current news, etc.).
  - Permanent information (rules of behaviour, etc.).
- Exhibition objects (paintings, ceramics, etc.).

Types of displays:

- Free standing.
- Attached to other furniture elements.

Requirements:

- Easy to put on and take away exhibited material.
- Warp resistant.
- Strong enough to withstand the weight of the exhibited material.

13.101



13.102



13.102

- Mobile.
- Weather resistant when they need to be placed outside.

## PANELS

### Types:

- Mural panels mounted on walls or leant against free standing structures.
- Panels mounted on mobile structures.

### Requirements:

- The surface finish should be soft to facilitate the insertion of drawing pins
- Some manufacturers offer optional finishes for the structures (surfaces for writing on, for magnets, with grooves for slotting in notices, etc.).
- Incorporation of accessories to increase flexibility (picture rails, lateral guides so they can be attached directly to the upright posts of the shelving system, holes where other display elements can be hung, etc.).
- Ease of change, setting up, transport and storage.
- Support structure must be able to take castors with brakes.
- With mural panels it is important that the anchoring system can withstand frequent changes of location. (Fig. 13.103).



13.103



13.104

## GLASS CABINETS

- For temporary display of valuable objects which need security systems to avoid dust, misuse and theft.
- These can be free-standing with a certain number of glass sides, or glass fronted cabinets integrated into the shelving systems. (Fig. 13.104).

## STANDS AND OTHER INDEPENDENT SUPPORTS

There are many different types and materials, already on the market or specially made, in this wide range which includes all small format display furniture which can be hung or stood on flat surfaces, with the versatility of use and location which that brings.



13.105

Most typical characteristics:

- Stands to display books open.
- Compartments to display audiovisual material and pamphlets.
- Elements made to hold information sheets and posters.

SELF-SERVICE LOAN EQUIPMENT Dimensions and weight	
– Width	70 cm
– Depth	65 cm
– Height	From 30 to 60 cm
– Weight	25 kg

### MOVABLE DISPLAY FURNITURE

- Cylindrical or hexagonal spinners, displaying books or other documents around the exterior.
- These usually have various revolving levels which are height adjustable to hold documents. (Fig. 13.105).

### COMPUTER AND AUDIOVISUAL EQUIPMENT ACCESSORIES

#### SELF-SERVICE LOAN EQUIPMENT

- This enables the user to do the loaned book demagnetization process, which saves library staff time.
- These are normally mounted on special platforms or in a booth like those described in the “Tables and Booths” section.
- The support structure must be able to take the weight of the equipment and be at a height where the process can be carried out standing up. (Fig. 13.106).

### ELEMENTS NEEDED FOR INSTALLATION OF LISTENING POSTS

If there is no wireless system, listening to audiovisual formats can be done in individual booths or in an armchair.

The listening posts for use in easy chairs can be installed in one of two ways:

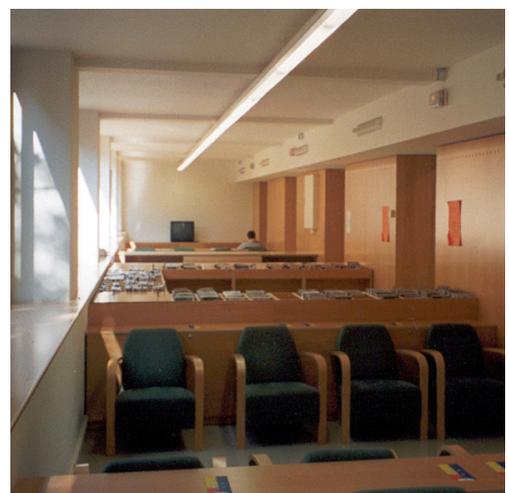
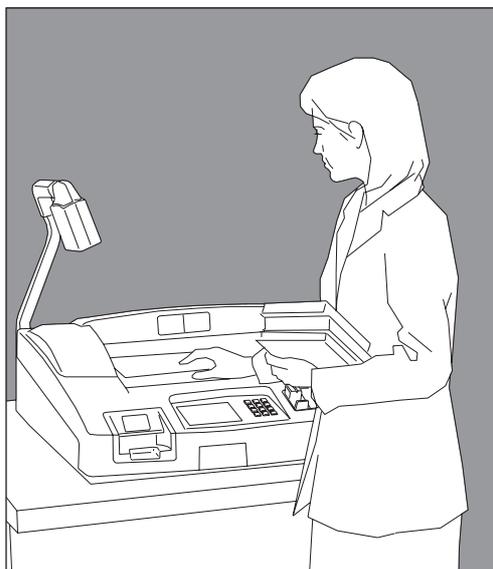
- Wooden platforms with built-in connections with covers to allow access to the electrics  
In this case the platforms should be added to the items in “Made to measure furniture”. (Fig. 13.107).

Wooden platforms with built-in connections Dimensions	
Width depends on the width of the seat.	
– Approximate height	70 cm
– Depth	40 cm

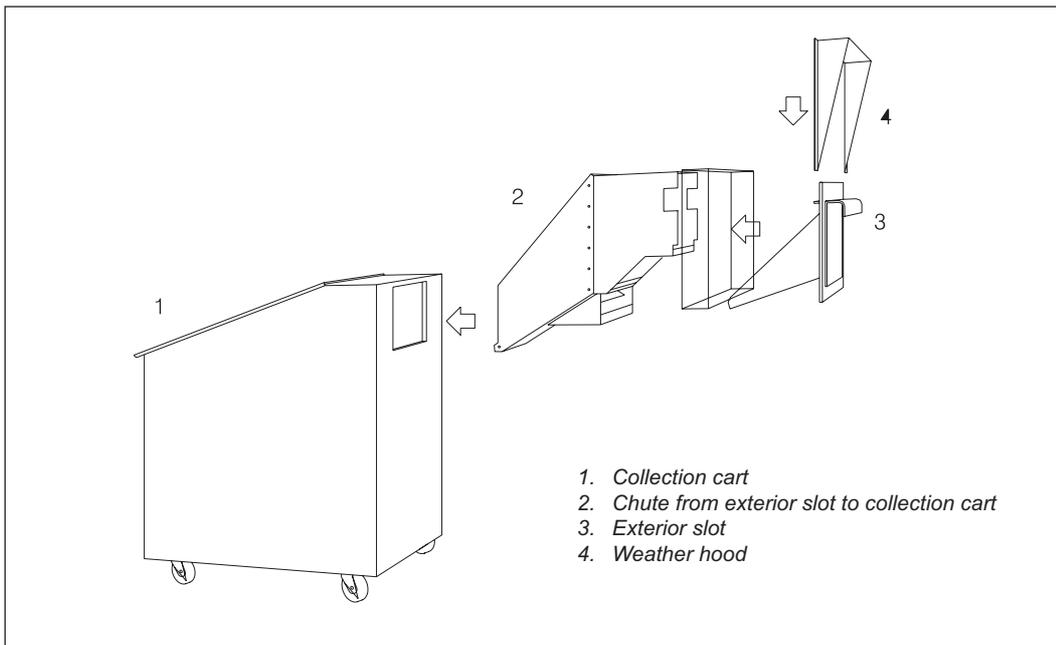
- Metal feet built into the floor, large enough to allow the inclusion of the necessary connections, and designed so that there is access to same.

13.106  
Self-service loan  
equipment.

13.107



13.107



13.108

**COMPUTER EQUIPMENT SUPPORTS**

The most common are:

- CPU stands:
  - These can be mobile or equipped with a system of attachment to other furniture elements.
- Monitor supports:
  - The most common are made to protect the connections in the back of the monitors on counters.
  - They usually consist of one supporting surface with holes for cables, and one vertical protection surface.
  - They can be swivel mounted or have height adjustable feet.
  - Rubber pads should be used underneath them to avoid

damaging the work surface. (Fig. 13.109).

- Keyboard trays.

**OTHER ACCESSORIAL ELEMENTS**

**OUTSIDE BOOK DROP**

The installation of an outside book drop has two aims:

- The return of lent documents when the library is closed.
  - Receipt of the daily newspapers and periodicals subscribed to.
- The book drop means that the library staff does not have to go to the post office or other places away from the library to get them.

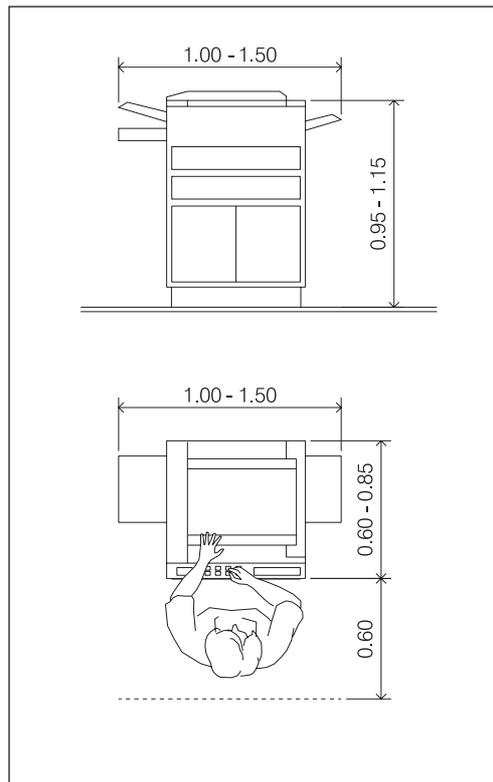


13.109



13.109

**13.110**  
 Book drop and newspaper / periodical delivery point.



13.111

There are three installation systems:

- A book drop built in during the construction of the building, with two openings in the façade and a container inside which is accessible for the library staff. (Fig. 13.110).
- A book drop which is separate from the actual building.  
In this case the construction must be able to withstand both the weather and vandalism.
- Using existent openings in the façade for a standard model book drop container, using structural elements to adapt it to the slot.  
There are models available with castors, which makes it easier to move returned documents to the storage area, and also creates the possibility of taking the container away when the library is open in order to free up space. (Fig. 13.108).

Basic requirements:

- There should be two clearly marked independent slots: one for the return of books, and the other for periodicals subscribed to.
- Built-in elements to prevent the entry of rainwater.
- The opening and interior chute should

be designed to avoid the spread of fire caused by vandalism.

- The inside flooring should be soft so documents do not get bent or damaged when they fall.
- The size of slot and interior container adapted to the format of the documents received.

## PHOTOCOPIERS

- For public access machines, a coin or token operated system is recommended.
- A work surface must be included for ordering and binding papers, plus shelves or a cupboard to keep office material (paper, card, ink, etc.). (Fig. 13.111).

### Most common sizes of photocopier

- Total width (including trays) . . . . From 100 to 150 cm
- Depth . . . . . From 60 to 85 cm
- Height . . . . . From 95 to 115 cm

## STEPS

There are two kinds:

- Public area steps:
  - Not for public use: to be used when library staff needs to place a large number of documents on high shelves.
  - They do not need to be very high, as the maximum height for open access shelves is 210 cm.
  - They must be light for easy movement.
  - The most common models look like tiered stools with castors which brake automatically under vertical pressure.
- Storeroom steps:
  - Height, strength, type and mobility in relation to the dimensions of the shelves and the type of material stored on them.

## DRAWER UNITS

- Installed under the counters and in the internal work areas, these are for each worker's office supplies.

- These usually have three drawers with a pen tray in the top drawer, and castors.
- The materials and finishes should be in line with the rest of the library's furniture.

<b>DRAWER UNITS</b> <b>Approximate dimensions</b>	
- Width .....	40 cm
- Depth .....	60 cm
- Height .....	From 50 to 60 cm



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# Library Architecture Appendices



# APPENDIX 1: GUIDELINES

*IFLA Guidelines (1973/1977)*  
*Public Library Standards for Catalonia*  
*(January 2008)*  
*Autonomous Government of*  
*Catalonia and Provincial Council of*  
*Barcelona*

## IFLA GUIDELINES (1973/1977)

### Documentary Collection

Collection	2 vols. / capita
Children's Collection	1/3 of stock
Reference Books	10%
Acquisition Rate	Minimum 250 vols. / 1,000 population
Loan Collection	Minimum 1 vol. / capita
Periodicals	Minimum 10 vols. / 1,000 population
Audiovisual Material	Minimum 200 vols. / 20,000 population
Ethnic Minorities	1 vol/ 5 population

### Staff

Workers	Minimum 1 / 2,000 population
Librarians	40% of staff
Children's Library Specialists	1/3 of the librarians

### Building Features

Location	Ground floor if possible	
Entrance access	Easy, direct and independent	
Areas:		
Reading Room for Adults	1 user space/100 population	Area: 2.5 m <sup>2</sup> / space
Reading Room for Children	1.5 user spaces/100 children	Area: 3 m <sup>2</sup> / space
Magazines Reading Room	1 chair / 2,000 to 3,000 population	Area: 3 m <sup>2</sup> / space
Lending Room	1 chair / 100 adult population	Area: 15 m <sup>2</sup> / 1,000 vols.
Staff Office	20 m <sup>2</sup> / 10,000 population	Area: 10 to 12 m <sup>2</sup> / worker
Circulation Area	10% - 20% of Total Surface Area	

**PUBLIC LIBRARY STANDARDS FOR CATALONIA – (January 2008)**  
**(Autonomous Government of Catalonia and Provincial Council of Barcelona)**

<b>Municipalities with one library</b>				
<b>Local libraries</b>				
	municipalities 3,000 inhab.	municipalities 5,000 inhab.	municipalities 10,000 inhab.	municipalities 20,000 inhab.
<b>Docs./inhab. (municipal ratio)*</b>	<b>3</b>	<b>2.5</b>	<b>2.5</b>	<b>2</b>
* Open access documents.				
<b>Open access document collection</b>				
<b>Total General Collection</b>	<b>6,750</b>	<b>9,750</b>	<b>19,500</b>	<b>32,000</b>
Non-Fiction	3,350	5,350	10,700	17,600
Fiction	1,700	2,450	4,900	8,000
Music and Image	1,700	1,950	3,900	6,400
<b>Total Children's Collection</b>	<b>2,250</b>	<b>2,750</b>	<b>5,500</b>	<b>8,000</b>
Non-Fiction	800	950	1,900	2,800
Fiction	1,000	1,300	2,600	4,000
Music and Image	450	500	1,000	1,200
<b>Total Collection</b>	<b>9,000</b>	<b>12,500</b>	<b>25,000</b>	<b>40,000</b>
<b>Newspapers and Magazines</b>	<b>75</b>	<b>90</b>	<b>120</b>	<b>180</b>
<b>Building</b>				
<b>Reception/Promotion Area</b>	<b>120</b>	<b>225</b>	<b>250</b>	<b>310</b>
Entrance Area	60	100	115	145
Multipurpose Space	50	60	70	90
Multipurpose Space Storage	10	10	10	10
Support Space	—	20	20	30
User Education Space	—	35	35	35
<b>General Area</b>	<b>200</b>	<b>335</b>	<b>560</b>	<b>905</b>
Information and General Collection Area	140	245	430	700
Music and Image Area	20	25	45	75
Newspapers and Magazines Area	40	65	85	130
<b>Children's Area</b>	<b>70</b>	<b>100</b>	<b>175</b>	<b>250</b>
Information and Children's Collection Area	70	100	175	250
<b>Non Public Areas</b>	<b>60</b>	<b>90</b>	<b>115</b>	<b>135</b>
Management Offices	15	20	20	20
Internal Working Area				
Documentary Material Storage		50	65	85
Logistical Storage	45	10	15	15
Staff Rest Area		10	15	15
<b>Total Programme Floor Space</b>	<b>450</b>	<b>750</b>	<b>1,100</b>	<b>1,600</b>
<b>Total Built Surface Area (+30%)</b>	<b>585</b>	<b>975</b>	<b>1,430</b>	<b>2,080</b>
<b>Human Resources</b>				
<b>Total Staff</b>	<b>2-3</b>	<b>4-5</b>	<b>5-7</b>	<b>7-9</b>
Library Manager	—	1	1	1
Librarians	—	—	0-1	1
Support Staff Manager	1	—	—	—
Support Staff	1-2	3	4	4-6
Service Assistants	—	0-1	0-1	1
<b>Service Hours per Week</b>	<b>25</b>	<b>30</b>	<b>35</b>	<b>35</b>
<b>Equipment</b>				
<b>Public Computer Reference Points</b>	<b>6</b>	<b>8 +</b> (10 user education)	<b>13 +</b> (10 user education)	<b>23 +</b> (10 user education)
<b>Reading Stations</b>	<b>40</b>	<b>75</b>	<b>110</b>	<b>140</b>

## Municipalities with city library networks Central libraries

	municipalities 30,000 inhab.	municipalities 50,000 inhab.	municipalities 100,000 inhab.	municipalities 200,000 inhab.
<b>Docs./inhab. (municipal ratio)*</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1.5</b>

\* Open access documents.

### Open access document collection

<b>Total General Collection</b>	<b>36,000</b>	<b>49,200</b>	<b>84,000</b>	<b>100,800</b>
Non-Fiction	19,800	27,050	48,750	58,500
Fiction	9,000	12,300	20,150	24,200
Music and Image	7,200	9,850	15,100	18,100
<b>Total Childrens Collection</b>	<b>9,000</b>	<b>10,800</b>	<b>16,000</b>	<b>19,200</b>
Non-Fiction	3,250	4,100	6,400	7,900
Fiction	4,500	5,400	8,000	9,600
Music and Image	1,250	1,300	1,600	1,700
<b>Total Collection</b>	<b>45,000</b>	<b>60,000</b>	<b>100,000</b>	<b>120,000</b>
<b>Newspapers and Magazines</b>	<b>180</b>	<b>200</b>	<b>240</b>	<b>260</b>

### Building

<b>Reception/Promotion Area</b>	<b>410</b>	<b>480</b>	<b>645</b>	<b>765</b>
Entrance Area	170	200	270	330
Multipurpose Space	110	150	200	230
Multipurpose Space Storage	20	20	25	25
Support Spaces	60	60	90	120
User Education Spaces	50	50	60	60
<b>General Area</b>	<b>1,000</b>	<b>1,365</b>	<b>2,230</b>	<b>2,510</b>
Information and General Collection Area	790	1,085	1,835	2,060
Music and Image Area	80	115	175	210
Newspapers and Magazines Area	130	165	220	240
<b>Children's Area</b>	<b>365</b>	<b>445</b>	<b>640</b>	<b>710</b>
Information and Children's Collection Area	275	340	500	550
Support Area	30	30	50	60
Activities Area	60	75	90	100
<b>Non Public Areas</b>	<b>195</b>	<b>260</b>	<b>385</b>	<b>515</b>
Management Offices	20	20	20	20
Meeting Room	—	25	25	30
Internal Working Area	80	90	140	180
Documentary Material Storage	50	75	150	230
Logistical Storage	25	25	25	25
Staff Rest Area	20	25	25	30
<b>Total Programme Floor Space</b>	<b>1,970</b>	<b>2,550</b>	<b>3,900</b>	<b>4,500</b>
<b>Total Built Surface Area (+30%)</b>	<b>2,560</b>	<b>3,315</b>	<b>5,070</b>	<b>5,850</b>

## Municipalities with city library networks Central libraries

	municipalities 30,000 inhab.	municipalities 50,000 inhab.	municipalities 100,000 inhab.	municipalities 200,000 inhab.
<b>Docs./inhab. (municipal ratio)*</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1.5</b>

\* Open access documents.

### Human Resources

<b>Total Staff</b>	<b>10-12</b>	<b>13-16</b>	<b>17-20</b>	<b>21-25</b>
Library Manager	1	1	1	1
Deputy Manager	0-1*	0-1*	1	1
Librarians	2	2-3	3-4	5-6
Support Staff	6-8	8-9	9-11	11-13
Administrative Support Staff	—	0-1	1	1
Service Support Staff	1	2	2	2-3

\* A deputy manager is needed in those central city libraries the management of which also exercises functions as area or regional centre, or in the central libraries of city networks with three or more separate facilities.

<b>Network Staff</b>	<b>0-1</b>	<b>1-2</b>	<b>2-4</b>	<b>4-6</b>
Roving Library Staff	—	—	—	0-1
Roving Support Staff	—	0-1	1	1-2
IT Support Staff	0-1	1	1-2	2
Social Activities Staff	—	—	0-1	1
<b>Service Hours per Week</b>	<b>40</b>	<b>45</b>	<b>55</b>	<b>60</b>

### Equipment

<b>Public Computer Reference Points</b>	<b>23 +</b> (15 user education)	<b>26 +</b> (15 user education)	<b>31 +</b> (20 user education)	<b>42 +</b> (20 user education)
<b>Reading Stations</b>	<b>140</b>	<b>210</b>	<b>270</b>	<b>300</b>

**Municipalities with city library networks  
District libraries**

	area covered 10,000 inhab.	area covered 20,000 inhab.	area covered 40,000 inhab.
<b>Open Access Document Collection</b>	<b>15,000</b>	<b>25,000</b>	<b>40,000</b>
<b>Building (Total Programme Floor Space)</b>	<b>750</b>	<b>1,100</b>	<b>1,600</b>
<b>Total Staff</b>	<b>4-5</b>	<b>5-7</b>	<b>7-9</b>
Library Manager	1	1	1
Librarians	—	0-1	1
Support Staff	3	4	4-6
Service Support Staff	0-1	0-1	1
<b>Service Hours per Week</b>	<b>35</b>	<b>35</b>	<b>40</b>



## APPENDIX 2: NUMERICAL DATA

### CHAPTER 06

#### RATIOS IN A PUBLIC LIBRARY

##### The public

<i>Number of users</i>	
▶ Municipalities of over 10,000 inhabitants	25% users
▶ Municipalities of up to 10,000 inhabitants	20% users
▶ Population of children (up to 14)	From 25 to 30% inhabitants

##### Study stations

<i>Number of reading stations</i>	
▶ Periodicals zone	0.5 to 2 stations / 1,000 inhabitants
▶ Adult zone	1.5 to 5 stations / 1,000 inhabitants
▶ Children's zone	0.5 to 2.5 stations / 1,000 inhabitants

<i>Average floor space</i>
3 m <sup>2</sup> / study station Referring to the "implementation ratio"

##### The collections

- Measuring the collections

<i>Number of items</i>	
From 0.75 to 2.5 items / inhabitant (0.75 items for larger populations) (the percentage increases the smaller the population)	
▶ Periodicals	From 3 to 20 titles / 1,000 inhabitants
▶ Collections for loan	From 50 to 70% of stock
▶ Reference works	From 5 to 10% of stock
▶ Children's collection	From 20 to 30% of stock
▶ Annual growth	From 15 to 25% of stock
▶ Items removed	10% of stock

- Floor space occupied by collection

<b>Estimate of floor space occupied by collection</b>	
<i>Environment</i>	<i>Floor space occupied by the collection (referring to the "implementation ratio")</i>
Public spaces with open-access collection	From 50 to 70 items / m <sup>2</sup> usable
Periodicals zones	From 1 to 2 titles / m <sup>2</sup> usable
Storage with conventional shelving	From 175 to 200 items / m <sup>2</sup> usable
Storage with compact shelving	From 250 to 450 items / m <sup>2</sup> usable

<b>Basic data used in calculations</b>	
Shelving dimensions	<ul style="list-style-type: none"> <li>• Maximum shelf height: 2 m</li> </ul>
	<ul style="list-style-type: none"> <li>• Maximum vertical number of shelves: 5</li> </ul>
	<ul style="list-style-type: none"> <li>• Space for passage between shelves: From 1.5 to 2 m</li> </ul>
	<ul style="list-style-type: none"> <li>• Depth of shelves: 30 cm</li> </ul>
	<ul style="list-style-type: none"> <li>• Height of shelves: 30 cm</li> </ul>

Density of Paper	From 600 to 1,000 kg / m <sup>3</sup>
------------------	---------------------------------------

<i>Item exhibited in open-access</i>	<i>Dimensions of item</i>	<i>Capacity / linear metre of shelving</i>	<i>Weight / linear metre of shelving</i>
Book	Height: 24 cm Width: from 20 to 30 cm Thickness: 1.8 cm	Bibliography: from 30 to 35 volumes / lm Reference books: 20 books / lm Dictionaries: 12 works / lm	From 25 to 45 kg / lm
Periodical	—	From 3 to 4 titles / lm	—
VHS Video	Height: 20.5 cm Width: 12.5 cm Thickness: 3 cm	25 VHS videos / lm	15 kg / lm
CD	Height: 12.5 cm Width: 14 cm Thickness: 11 cm	90 CD / lm	13 kg / lm
Cassette	Height: 11 cm Width: 7 cm Thickness: 1.7 cm	55 cassettes / lm	4 kg / lm

---

## Staff

Full time staff	1 person / 2,000 to 4,000 inhabitants
Workplace	10 m <sup>2</sup> usable / employee
Staff rest room	2.5 m <sup>2</sup> usable / employee

## Other ratios of floor space area

---

▶ Loan desk	20 m <sup>2</sup> usable – Includes circulation and document storage areas
▶ Information desk	15 m <sup>2</sup> usable – Includes circulation space
▶ Presentation room	Meeting room Multi-purpose room 1.5 m <sup>2</sup> usable / chair – Includes circulation and platform or stage
▶ Group study rooms	2 m <sup>2</sup> usable / chair – Includes circulation
▶ "Story time" space	40 m <sup>2</sup> usable / module – Module with capacity for 30 children – Includes platform or stage
▶ Photocopying space	7 m <sup>2</sup> usable / photocopier
▶ Toilets	3 m <sup>2</sup> usable / toilet

---

## RATIOS FOR UNIVERSITY LIBRARY

### Workstations

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▶ Number of workstations	1 station / 5 university students
▶ Average floor space area	From 2.5 to 4.5 m <sup>2</sup> / workstation (referring to "implementation ratio")

---

### Collections

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▶ Items	130 items / student
▶ Periodicals	1 title / 100 students
▶ Annual growth	0.5 items / student

---

### Staff

---

▶ Assistant librarians	1 / 500 students
▶ Staff librarians	1 / 3 assistants
▶ Administrative assistant	1 / 2 assistants
▶ Auxiliary	1 / 1 assistant
▶ IT assistant	2 for each university

---

### Other ratios of floor space area

---

▶ Library floor space	From 1 to 1.5 m <sup>2</sup> / student
▶ Minimal floor space	1,000 m <sup>2</sup>
▶ Independent study rooms	15% of the total floor space area

---

**Lifespan of buildings**

Time period of useful life that can be expected of a building:

<i>Element</i>	<i>Useful life</i>
Useful life of the body of the building	at least 100 years
Supporting structure	should last as long as the building
Basic elements of the façade	should last as long as the building
Weakest elements of the façade (cladding, shutters, etc.)	from 25 to 50 years
Installations	from 10 to 25 years
Waterproof roofing material	from 10 to 15 years
Painting and varnishing	from 5 to 10 years

The causes of deterioration can be found in different phases of the construction process. The following is a list of the percentages:

- Project..... 40%
- Production of the materials ..... 15%
- Onsite installation ..... 35%
- Maintenance ..... 10%

**Parking**

- Vehicle dimensions
  - Small vehicle:
    - Length.....3.5 m
    - Width ..... 1.5 m
  - Van:
    - Length.....6 m
    - Width ..... 1.6 m
  - Mobile Library Bus:
    - Length.....from 7. 5 to 11 m
    - Width .....2.5 m
    - Height .....3.5 m

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## CHAPTER 11

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### STRUCTURES AND DIVIDING FLOORS

#### Use load

##### New construction

- Use-load: 500 kg/m<sup>2</sup>.
- Reinforced compression layer in the floor: 5 cm.

##### Renovation

- Uniform load of all elements across the whole structure: 300 kg/m<sup>2</sup>.
- Added load of each linear element in the unidirectional girders: 500 kg / linear m.
- Reinforced compression layer in the floor: 5 cm.

##### Areas with compact shelving

- Compact shelving of 150 cm high: 1,000 kg/m<sup>2</sup>.
- Compact shelving of 225 cm high: 1,500 kg/m<sup>2</sup>.

##### Parking the mobile library bus

- Approximate load: 1,000 kg/m<sup>2</sup>.
- Reinforced compression layer in the floor structure: 8 cm.

### OPENINGS

MAIN TYPES OF GLASS SURFACES AND THEIR HEAT TRANSMISSION COEFFICIENTS			
TYPE OF SURFACE	THICKNESS OF AIR CHAMBER	TYPE OF CARPENTRY	HEAT TRANSMISSION COEFFICIENT K (W/m <sup>2</sup> °C)
<i>Single</i>	-----	<i>Wood, PVC Metal</i>	5 5.8
<i>Double</i>	<i>6 mm</i>	<i>Wood, PVC Metal</i>	3.3 4
<i>Double</i>	<i>12 mm</i>	<i>Wood, PVC Metal</i>	2.9 3.7
<i>Double window</i>	<i>Over 30 mm</i>	<i>Wood, PVC Metal</i>	2.6 3

## CHAPTER 12

### AIR TREATMENT – AIR CONDITIONING

#### Recommended comfort levels

<i>Recommended comfort levels:</i>			
PLACE	AMBIENT TEMPERATURE (°C)	RELATIVE HUMIDITY (%)	AIR RENEWAL (m <sup>3</sup> /h/pers.)
Book deposits	From 15 to 18 (±1)	From 45 to 65 (±5)	Minimum (0,5 volume of the space per hour)
Spaces for public use	From 19 to 21 Summer: from 23 to 25 Winter: from 19 to 21	From 45 to 65	32
<i>Environmental conditions for various formats:</i>			
FORMAT	AMBIENT TEMPERATURE (°C)	RELATIVE HUMIDITY (%)	
<i>Paper</i>	<i>From 15 to 18</i>	<i>From 45 to 65</i>	
<i>Vinyl</i>	<i>From 20 to 22</i>	<i>From 65 to 70</i>	
<i>Photographic</i>	<i>From 10 to 20</i>	<i>From 30 to 40</i>	
<i>Magnetic</i>	<i>From 14 to 18</i>	<i>From 40 to 50</i>	
<i>"Microforms"</i>	<i>From 18 to 20</i>	<i>From 30 to 40</i>	

## LIGHTING

### Illuminance

Levels of illuminance produced by natural light:

– Exterior space on a clear day	From 100,000 to 500,000 lx
– Exterior space on an overcast day	5,000 lx
– Exterior space, at night with a clear moon	0.7 lx
– Interior space, without direct sunlight, near a window	2,000 lx

### Recommended illuminance:

ACTIVITY	ILLUMINANCE (lx)
Precision work activities	From 600 to 2,000
Drawing	From 500 to 800
Exhibition spaces	From 500 to 700
Reading - counter - offices	From 500 to 600
Open access shelving area	From 400 to 600
General lighting (foyer etc.)	From 250 to 400
Bibliographic deposits	From 200 to 300
Activities which require no special attention to sight	From 200 to 300
Working with a computer	From 150 to 300
Circulation areas	From 150 to 300
Conference room	From 100 to 300
Toilets	From 100 to 200
Incunabulum deposits and unprotected graphic formats	50

## Reflection coefficient

Reflection coefficient of some colours:

White	0.8
Very light colours (cream and off-white)	From 0.5 to 0.7
Light colours (pastels)	From 0.3 to 0.5
Medium colours (bright light colours)	From 0.1 to 0.3
Dark colours (browns, bright dark colours)	From 0.1 to 0.3
Very dark colours (black and dark brown)	Less than 0.1

Reflection factors recommended:

Ceiling	Over 70%
Walls	From 30 to 70%
Floor	From 20 to 40%
Furniture	From 30 to 40%

## ARTIFICIAL LIGHT

Relation between the colour of the light and colour temperature:

COLOUR OF LIGHT	COLOUR TEMPERATURE (degrees Kelvin)
Natural white	6,000 °K
Neutral white	4,000 °K
Warm white	3,000 °K

Types of lighting for interior spaces:

Direct	From 90 to 100%
Semi-direct	From 60 to 90%
Diffused	From 40 to 60%
Semi-indirect	From 10 to 40%
Indirect	From 0 to 10%

## ACOUSTIC CONDITIONS

### *Recommended levels of acoustic comfort*

LOCAL	SOUND LEVEL (dB A)	REVERBERATION TIME (s)	VIBRATION
Deposits	50	1.5	K = 5
Offices	40	1	K = 5
Reading areas	35-45	1	K = 1
Communal areas	50	1.5	K = 5
Multi-purpose room	40	1	K = 1
Technical areas	55	< 1.5	-

The conference room will be the subject of a specific independent acoustic study depending on the maximum volume needed for the programmed activity.

### *Acoustic insulation recommended for the dividing elements*

Walls: solid parts	45 dB A
Walls: façade unit	35 dB A
Roof	45 dB A
Isolation between floor structure beams	45 dB A
Zonal isolation between different reading areas	35 dB A
Interzonal isolation	30 dB A
Isolation of the communal spaces	45 dB A
Isolation of the installation rooms	55 dB A

**VOICE AND DATA**

Approximate cabling dimensions:

- For each terminal, two independent conduits must come from the distribution box:
  - Voice and data: 2 cables of 5 mm diameter each.
  - Stabilized current: 1 cable of 10 mm diameter.
 Therefore the ductwork coming out of the distribution box could take up a lot of space.
- Cables under 90 m long.

**AUDIOVISUAL**

**Audiovisual library collection reference**

- Centralized equipment:
  - Approximate size of the ductwork: 35 mm diameter wire channels for each group of 3 or 4 reference points.

**TV**

- Approximate size of the ductwork: 16 mm diameter wire channels from each of the television viewing points to each of the aerials.

**Public address**

- Approximate size of the ductwork: Conduits of 16 mm diameter from the equipment to each of the loudspeakers.

**SHELVING**

Number of shelves for each height:

- 90 cm: 2 shelves.
- 120 cm: 3 shelves.
- 150 cm: from 3 to 4 shelves.
- 180 cm: from 4 to 5 shelves (maximum recommended height for children's area).
- 210 cm: from 5 to 6 shelves (maximum recommended height for open access shelving).
- 240 cm: from 6 to 7 shelves.

**TABLES AND BOOTHS**

<b>Work surface</b>
<i>Recommended space per user</i>
Work/study: Width . . . . . From 80 to 90 cm. Depth . . . . . From 60 to 70 cm. These dimensions are insufficient for large format document reference (atlases, maps, etc.).
Work/Study with computer: Width . . . . . From 100 to 110 cm. Depth . . . . . From 80 to 90 cm.
Standing computer reference: Width . . . . . From 80 to 90 cm. Depth . . . . . From 80 to 90 cm. This measurement includes the space needed for the user to take notes.
Standing occasional reference: Width . . . . . From 50 to 70 cm. Depth . . . . . From 40 to 50 cm.

<b>Work surface</b>
<b><i>Recommended dimensions for tables</i></b>
<p>Rectangular:</p> <p>Dimensions dependent on work/study activity.</p> <p>– 6 people:  Width . . . . . From 220 to 240 cm  Depth . . . . . From 110 to 120 cm</p> <p>– 4 people:  Width: . . . . . From 160 to 180 cm  Depth . . . . . From 110 to 120 cm</p> <p>– 2 people  Dimensions . . . . . 100 × 100 cm</p> <p>– Office table:  Width . . . . . From 160 to 180 cm  Depth . . . . . From 80 to 100 cm</p> <p>– Side wing:  Width . . . . . From 100 to 130 cm  Depth . . . . . From 60 to 70 cm</p>
<p>Circular:</p> <p>Only suitable for quick reference and group work.</p> <p>Dimensions indicated are insufficient for newspaper reading spaces, where the format of the document determines the capacity of each table.</p> <p>– From 5 to 6 people . . . Diameter: 150 cm  – From 4 people . . . . . Diameter: 130 cm</p>
<p>Long work surfaces:</p> <p>Depth . . . . . From 70 to 90 cm  Width per user . . . . From 85 to 100 cm</p>

<b>Work surface</b>
<b><i>Height</i></b>
<p>Seated work:</p> <p>– Adults:  Height . . . . . From 70 to 75 cm  (72 cm recommended)</p> <p>Minimum height of free space beneath table . . . . 65 cm</p> <p>– Children:  Height . . . . . From 65 to 70 cm  (68 cm recommended)</p> <p>Minimum height of free space beneath table . . . . 60 cm</p> <p>– Little readers:  Height . . . . . From 42 to 48 cm  (46 cm recommended)</p> <p>Minimum height of free space beneath table . . . . 40 cm</p>
<p>Standing computer reference:</p> <p>The dimensions indicated refer to monitors paced on the work surface.</p> <p>– Adults . . . . . 90 cm  – Children . . . . . 70 cm</p>
<p>Standing occasional reference:</p> <p>– Adults . . . . . From 90 to 110 cm  – Children . . . . . From 70 to 90 cm</p>
<p>Lower side tables . . . . . From 35 to 45 cm</p>

## CHAIRS/EASY CHAIRS

<b>READING AND STUDY CHAIRS</b> <i>Dimensions</i>
<p>Adults:</p> <ul style="list-style-type: none"> <li>- Seat height ..... From 42 to 45 cm (44 cm recommended)</li> <li>- Seat width ..... From 40 to 50 cm</li> <li>- Seat depth ..... From 40 to 50 cm</li> <li>- Total height ..... From 70 to 85 cm</li> </ul>
<p>- Back rest:</p> <ul style="list-style-type: none"> <li>- Lumbar area ..... From 15 to 25 cm of the seat</li> <li>- Dorsal area ..... From 25 to 40 cm of the seat</li> <li>- Angle of incline from horizontal:               <ul style="list-style-type: none"> <li>- Erect posture .....100°</li> <li>- Relaxed posture ...120°</li> </ul> </li> </ul>
<p>- Writing tablet:</p> <ul style="list-style-type: none"> <li>- No smaller than A-4</li> <li>- Height ..... From 65 to 70 cm</li> </ul>
<p>Children:</p> <ul style="list-style-type: none"> <li>- Seat height ..... From 38 to 42 cm (41 cm recommended)</li> <li>- Seat width ..... From 30 to 40 cm</li> </ul>
<p>Little readers:</p> <ul style="list-style-type: none"> <li>- Seat height ..... From 25 to 35 cm (28 cm recommended)</li> </ul>
<p><b>Informal high reading stools</b></p> <ul style="list-style-type: none"> <li>- Seat height ..... From 65 to 85 cm</li> </ul>
<p><b>Easy chairs</b></p> <ul style="list-style-type: none"> <li>- Seat height ..... No lower than 38 cm</li> </ul> <p>Children's easy chairs have different proportions, which make them completely unseable for adults.</p>

## CARTS

<b>CARTS</b> <i>Dimensions of the most common models</i>
<p>Single sided - vertical:</p> <ul style="list-style-type: none"> <li>- Width ..... From 45 to 60 cm</li> <li>- Depth ..... From 60 to 65 cm</li> <li>- Height ..... From 100 to 115 cm</li> </ul> <p>Cart of 50 × 60 × 100 cm Capacity ..... 80 volumes</p>
<p>Double-sided - horizontal:</p> <ul style="list-style-type: none"> <li>- Width ..... From 75 to 100 cm 10 or 15 cm must be added for each handle</li> <li>- Depth ..... From 45 to 55 cm</li> <li>- Height ..... From 65 to 110 cm</li> </ul> <p>Cart of 75 × 50 × 65 cm - Capacity ..... 180 volumes</p> <p>Cart of 75 × 50 × 110 cm - Capacity ..... 240 volumes</p>
<p>Handle:</p> <ul style="list-style-type: none"> <li>- At a height between 90 and 100 cm</li> <li>- Minimum width when there is only one ..... 45 cm</li> </ul>
<p>Castors:</p> <ul style="list-style-type: none"> <li>- Diameter: ..... From 10 to 20 cm</li> </ul>

## DISPLAY FURNITURE

### AUDIOVISUAL MATERIAL BROWSERS *Dimensions and capacity*

- Shallow gradient model:
- Width ..... 90 cm
  - Depth (3 racks high) ..... 60 cm
  - Height ..... 120 cm
    - Bottom level ..... 85 cm
    - Middle level ..... 92 cm
    - Top level ..... 99 cm

Lower drawer (drawer height 20 cm) ..... 65 cm  
(the heights of the children's area models are 20 cm lower at each level)

- Steep gradient model:
- Width ..... 90 cm
  - Depth (up to 4 rack high) ..... 45 cm
  - Height ..... 135 cm
    - Bottom level ..... 55 cm
    - Middle levels ..... 75-95 cm
    - Top level ..... 115 cm  
(this model cannot have a lower drawer)

Maximum recommended CD capacity:

- Shallow gradient model:
- 3 racks high ..... 180 CD
  - Lower drawer ..... 170 CD

- Steep gradient model:
- 3 racks high ..... 210 CD
  - 4 racks high ..... 280 CD

Maximum recommended video capacity:

- Shallow gradient model:
- 3 racks high ..... 90 videos
  - Lower drawer ..... 64 videos

- Steep gradient model:
- 3 racks high ..... 60 videos
  - 4 racks high ..... 80 videos

### NEWSPAPER DISPLAY MODULES *Dimensions and capacity*

- Shelf depth ..... 50 cm
- If the newspaper is displayed folded in half: ..... 30 cm

Approximate capacity:  
3 newspapers /linear m  
4 magazines / linear m

### NEWSPAPER DISPLAY RACK *Dimensions and capacity*

- Width ..... 60 cm
- Depth ..... 40 cm
- Height ..... 60-120 cm

- Capacity ..... 8 documents

### COMPARTMENTALIZED NEWSPAPER DISPLAY MODULES *Dimensions and capacity*

- Width ..... From 90 to 100 cm
- Depth ..... 40 cm (6 tiers)
- Height ..... From 90 to 120 cm
  - Lower level ... 65 cm
  - Upper level ... 95 cm

Capacity ..... 18 newspapers

### STORYBOOK AND COMIC BROWSERS *Dimensions*

- Width ..... 90 cm
- Depth ..... 40 cm
- Height ..... 70 cm (children's area)  
90 cm (adult area)

Maximum recommended capacity:

- Upper drawer ..... 40 documents
- Vertical compartments below ..... 60 documents

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**STORAGE FURNITURE**

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**MADE TO MEASURE FURNITURE**

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**SPECIAL FORMAT DOCUMENT STORAGE**  
*Dimensions and capacities*

Reference surface height . . . . . From 90 to 110 cm

Atlas containers (grouped horizontally)

- Width . . . . . From 70 to 80 cm
- Depth . . . . . From 65 to 70 cm
- Compartment height . . . . . From 35 to 40 cm
- Capacity of each compartment . . . . . 5 or 6 volumes

Map and poster containers

The variety of format will determine the size of the containers.

They can be stored flat (flat case), hanging vertically or rolled up.

Flat case storage for documents:

A-0 Size:

- Width . . . . . 140 cm
- Depth . . . . . From 95 to 100 cm

A-1 Size:

- Width . . . . . 115 cm
- Depth . . . . . 75 to 85 cm
- Compartment height . . . . . From 5 to 10 cm

Vertical storage containers:

Easier to handle the document, but it requires a special structure to hang rods on.

- Width (A-0) . . . . . From 100 to 110 cm
- Width (A-1) . . . . . 85 cm
- Depth . . . . . 55 cm
- Height . . . . . From 125 to 150 cm

**PERSONAL EFFECTS LOCKERS**  
**Dimensions**

In most cases, a certain number of modules for helmets are installed (depending on the characteristics of where the library is located), and the rest are smaller, for keeping files.

- Width (for helmets) . . . . . 40 cm
- Width (for files) . . . . . 20 cm
- Height . . . . . 40 cm
- Depth . . . . . 50 cm

**AUDIOVISUAL EQUIPMENT STORAGE**  
**Approximate size**

- Width . . . . . From 80 to 100 cm
- Depth . . . . . From 60 to 65 cm
- Container height . . . . . From 90 to 140 cm
- Total height . . . . . From 150 to 190 cm

---

## ACCESSORIES

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<p><b>LITTLE READER TABLES, STOOLS AND CHAIRS</b> Dimensions:</p>
---

- |   |
|---|
| <ul style="list-style-type: none"><li>- Table height . . . . . From 42 to 48 cm</li><li>- Stool height . . . . . From 25 to 35 cm</li></ul> |
|---|

<p><b>SELF-SERVICE LOAN EQUIPMENT</b> Dimensions and weight</p>
---

- |   |
|---|
| <ul style="list-style-type: none"><li>- Width . . . . . 70 cm</li><li>- Depth . . . . . 65 cm</li><li>- Height . . . . . From 30 to 60 cm</li></ul> |
| <ul style="list-style-type: none"><li>- Weight . . . . . 25 kg</li></ul>  |

<p><b>Wooden platforms with built-in connections</b> Dimensions</p>
---

<p>Width depends on the width of the seat.</p>
--

- |  |
|--|
| <ul style="list-style-type: none"><li>- Approximate height . . . . . 70 cm</li><li>- Depth . . . . . 40 cm</li></ul> |
|--|

<p><b>Most common sizes of photocopier</b></p>
--

- |  |
|--|
| <ul style="list-style-type: none"><li>- Total width<br/>(including trays) . . . . From 100 to 150 cm</li><li>- Depth . . . . . From 60 to 85 cm</li><li>- Height . . . . . From 95 to 115 cm</li></ul> |
|--|

<p><b>DRAWER UNITS</b> Approximate dimensions</p>
---

- |   |
|---|
| <ul style="list-style-type: none"><li>- Width . . . . . 40 cm</li><li>- Depth . . . . . 60 cm</li><li>- Height . . . . . From 50 to 60 cm</li></ul> |
|---|



## APPENDIX 3: PROJECT COMPLETIONS

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### Introduction

The following projects form a complementary section showing the amazing complexity involved in the creation of a library.

The resultant buildings, with their high level of functional and architectural quality, are a good example of the range of solutions open to any programme of similar features.

This wealth of solutions shows how much all projects are influenced by aspects such as architectural language of the development team, the actual state of the land, the features of the environment, the duration of the building process and other factors more closely connected to political or financial decisions.

It is important here to give the same kind of information for all the projects. For this reason, the graphic method of the plans has been normalized, incorporating the actual distribution of the furniture, and a record of the figures relating to the building of the library has been produced. For the explanation of the solution adopted in each case, a project report and representative sketch – by the authors - is included for each project, in order to show what the most determining factors in the project realization were.

I would particularly like to thank the architectural projects team and other groups which have been involved in the compilation of information, which occasionally seemed to lie behind a kind of veil which was hard to see through.



# PUBLIC LIBRARIES

## Can Pedrals Library (Granollers, Barcelona)

### REGIONAL CENTRAL PUBLIC LIBRARY

#### Address:

ESPI i GRAU, 2  
08400 - GRANOLLERS

#### Developer:

GRANOLLERS COUNCIL

#### Architects:

**RIERA, GUTIERREZ i ASSOCIATS, S.A.**

#### Collaboration:

ALBERT ARTIGAS (architect)  
JOSEP SOTORRES ESCARTÍN (building surveyor)  
MILIAN i VENTURA ASSOCIATS (installations)

#### Construction Company:

GESTIÓN, INGENIERÍAS Y PROMOCIONES, S.A.

#### Furniture:

INDUSTRIAS GAMA, S.A.

#### Dates:

Project: 11-89  
Work begun: 5-90  
Work completed: 3-95  
Opening: 6-5-95

#### Useable Surface Area:

1,290 m<sup>2</sup>

#### Built Surface Area:

1,816 m<sup>2</sup>

#### Total Cost of Construction

(Execution by Contract Budget - ECB): 2,061,471.52 euros

#### Cost/m<sup>2</sup> built (ECB):

1,135.17 euros/m<sup>2</sup>

#### Cost of Furniture (ECB):

180,277.33 euros

#### Photography:

ALBERT DE LA PEÑA (2, 3, 4)  
LOURDES JANSANA (1, 5)

This project must be seen in the context of the difficulty of the location and the presence of historical heritage elements.

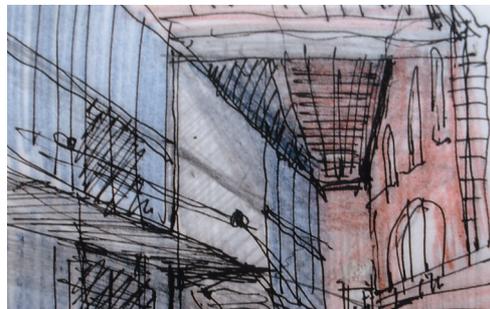
The site is dominated by a 17<sup>th</sup> Century country house called Can Pedrals. The house is three storeys high, with a gabled roof. Structurally, it is a rectangular floored parallelepiped. It is an important urban monument, particularly with regard to civic memory. Its interior, interestingly, is totally run down and structurally it is unsuitable for public use. It faces three public spaces: two streets and a square. Along one of the streets, the house wall uses part of the old town wall which ran round the historical centre of the city, and which must be preserved. The rear façade gives on to a patio which sometimes serves as a loading bay for another historical building, Can Pundes, by the architect Raspall.

Can Pundes had an extension added on to it where a music school was built.

All this means we are faced with a site full of historical heritage elements which put certain outside limitations on it. On the inside, on the other hand, nothing at all can be used - a whole new building must be constructed inside to house the new library.

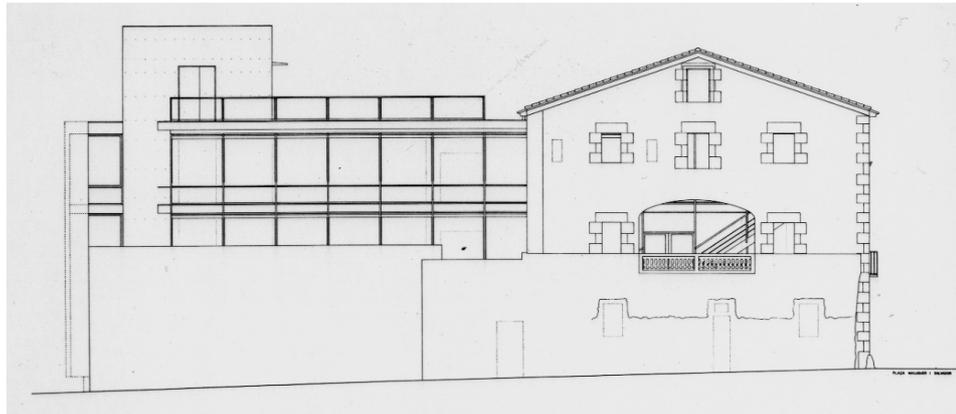
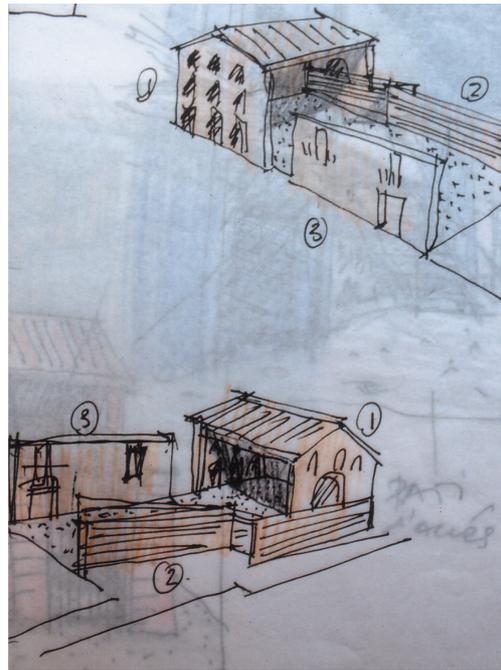
Given the limited space on the site floor, the buildable area must be exploited to the maximum on all levels: basement, first, second and third floors and the roof.

This is where the main strategy of the project comes from: defining a three-storey structure, like a huge set of shelves, with its own regular geometry, with as few supports as possible, to increase the unclutteredness of the floor, and with the core areas and the toilets all grouped together at one end. The rest is a problem of communication wiring networks and furniture. The meeting between this new shelving of floor-structures and historical elements creates the unusual details and spaces which characterize the general feeling of the whole.



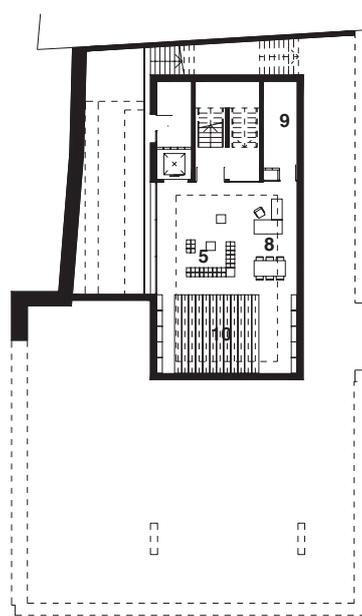
This is a permanent dialogue between the new and the old wherein, from time to time, you can overhear some interesting conversations.

Pere RIERA, architect  
Josep M. GUTIÉRREZ, architect

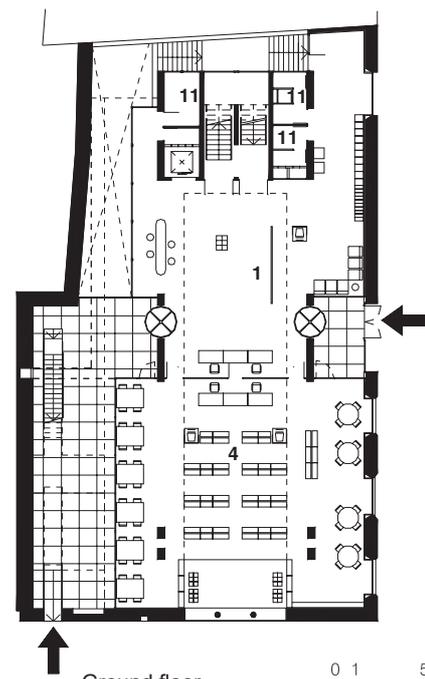


South elevation

- 1. Foyer
- 2. Periodicals and music
- 3. General area
- 4. Children's area
- 5. Little Readers Corner
- 6. Group work room
- 7. Office
- 8. Internal working area
- 9. Staff rest area
- 10. Storage
- 11. Toilets



Floor -1



Ground floor

0 1 5



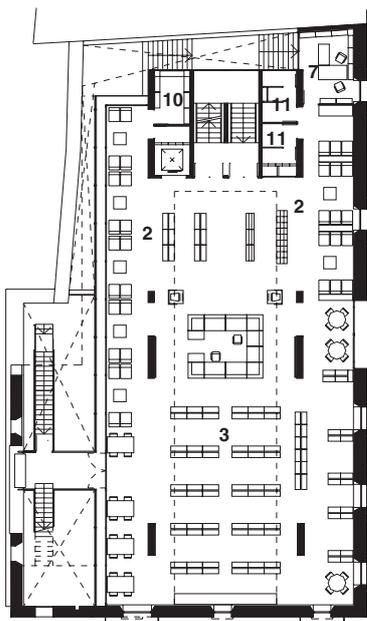
2



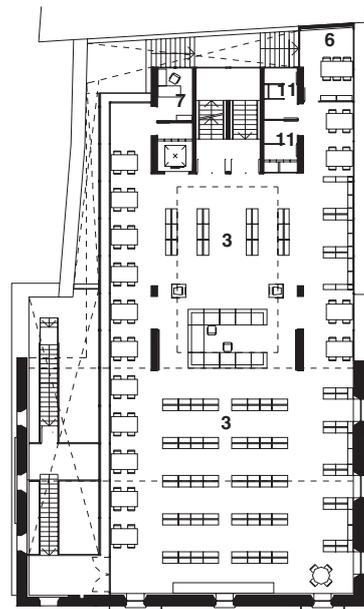
3



North elevation

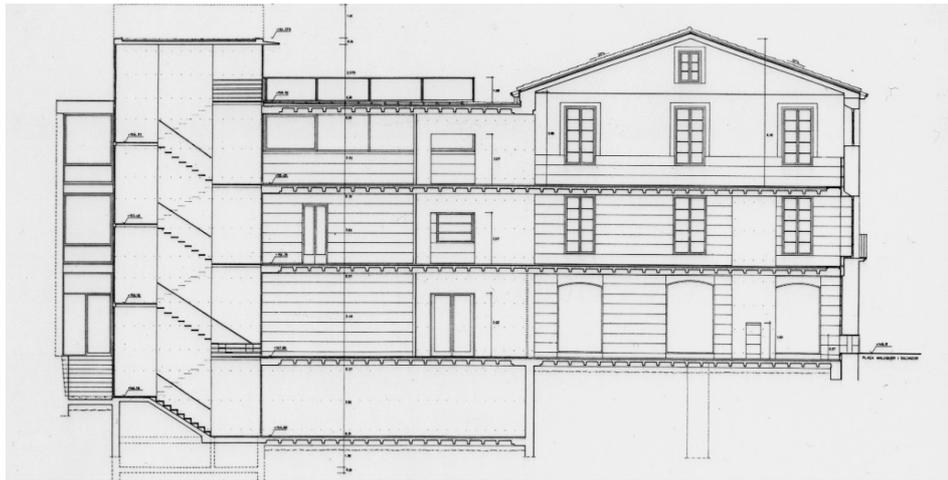


First floor

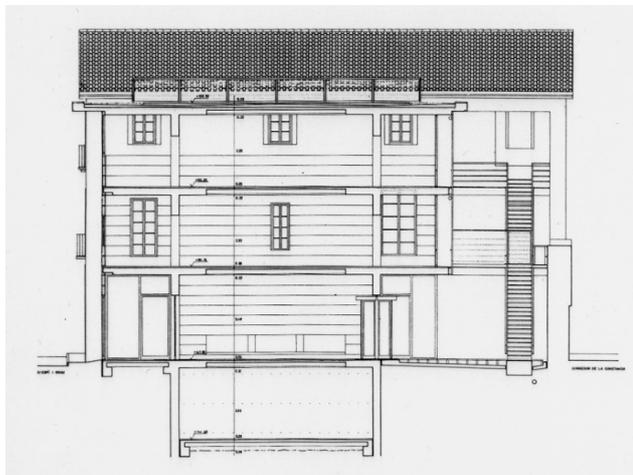


Second floor





Longitudinal section



Cross section

4



5



# Casino Library (Manresa, Barcelona)

REGIONAL CENTRAL PUBLIC LIBRARY

Address:  
PASSEIG DE PERE III, 27-29  
08240 - MANRESA

Developer:  
MANRESA COUNCIL

Architect:  
**JOSEP-EMILI HERNÁNDEZ CROS**

Collaboration:  
ANTÒNIA MAYOL SEGUÍ, JESÚS PÉREZ LLUCH,  
PILAR SALINAS SANDOVAL (architects)  
LLUÍS CAMÍ CASELLAS, JOSEP M<sup>a</sup> MORATÓ  
FARRERAS (building surveyors)  
CAST ENGINEERING/EUROCHALLENGE, S.A.  
(engineering)

Construction Company:  
CONSTRUCCIONS COTS I CLARET S.L.

Furniture:  
INDUSTRIAS GAMA, S.A.

Dates:  
Project: 1990-1994  
Work begun: 1991  
Work completed: 1998  
Opening: 8-5-99

Library's Useable Surface Area:	1,824.2 m <sup>2</sup>
Built Surface Area:	
Library:	2,129.5 m <sup>2</sup>
Total Building:	4,950.5 m <sup>2</sup>

Cost of Construction (total building consolidation and all library works together)  
(Execution by Contract Budget - ECB): 3,552,202.46 euros  
Cost/m<sup>2</sup> built (ECB): 1,668.09 euros/m<sup>2</sup>  
Cost of Furniture (ECB): 206,624.36 euros

Photography:  
ALBERT DE LA PEÑA

## History

In 1906, the Casino de Manresa Company commissioned the architect Ignasi Oms to design its headquarters on the Pere III road, which had recently been constructed during the city's expansion. Construction started immediately and 1910 saw the partial opening of the building, but financial and management problems meant that building work became intermittent, and then finally stopped altogether shortly after beginning.

This situation continued throughout the building's life, becoming particularly acute during the Civil War when it lost its main function for good, and a process of progressive deterioration began which led to the pitiable state in which it found itself over the last few decades. The attempt by the owners to demolish the building 1973 was halted thanks to a major civic mobilisation against the decision, claiming that it should be allowed to stand as a building of architectural importance for Manresa. The result of the citizens' demonstration was the official recognition of the building by *Bellas Artes* as a monument of historical and artistic importance.

However, although the building was saved, the movement did not prevent the process of obsolescence and deterioration which had engulfed the building. The process began to slow down in 1990, when the Manresa county council decided to acquire the building and restore it, with initial collaboration from the *Barcelona Diputació*.

## Project Chronology

### Phases I and II

Project of building restoration.

### Phase I

This was a question of emergency operations consisting of sealing all the architectural openings so as to avoid any further vandalism, and the reparation of the exterior



walls and suspended ceilings which were about to fall in. The most dangerous parts of the structure – some on the verge of collapse - were shored up and work then moved on to the dismantling of the decorative stained glass windows so that they could be restored and put back at a later date.

Phase II

This was a phase dedicated exclusively to restoration of the building, but with the intention of its being a library in the future. So all the structural parts and elements were repaired, and the lower parts of all the walls and supporting structures were treated in order to contain any damp in them. The basic structure was also strengthened, carrying out any reinforcements necessary to prepare them for the new working conditions and expected use loads. The fact that most of the reinforcement was done by the use of beams in the upper part of the rooms meant that the opportunity could be taken to improve the insulation between the floors and to install radiant heating panels, and make space for any future electrical duct work. Finally, the roofing elements were all completely rebuilt: the tiles, the flat roofs and the domes.

This last work was particularly complicated, since structurally only one angle of the supporting cube was actually working as a copula does, while on the other three corners the load was distributed onto a system of very rusty bearing beams. So a sophisticated system of pneumatic jacks was used, meaning the domes could be strutted and metal reinforcement sections put in. On the other hand, for the restoration of the major vaults – which had numerous cracks, some more than a centimetre wide – the original panels were used as formwork to create, on

top of them, a reinforced hemispheric slab. The operation also included improvements in thermal insulation.

Phases III and IV

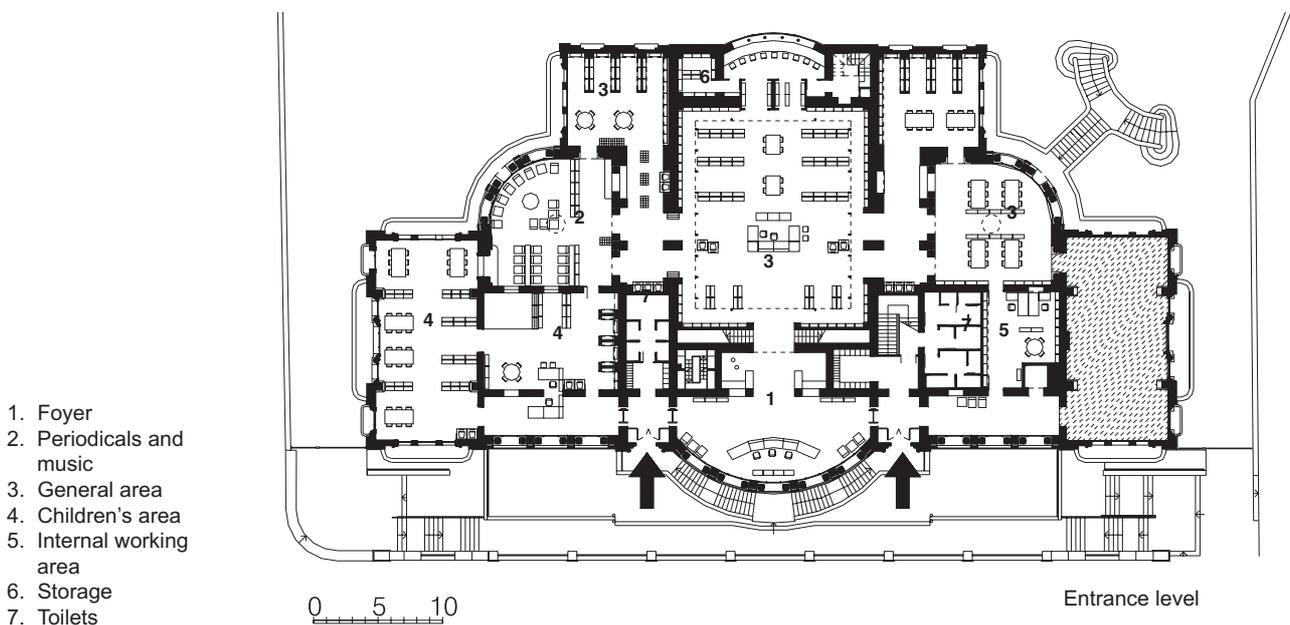
Project for the installation of the Regional Library on the Casino's main floor.

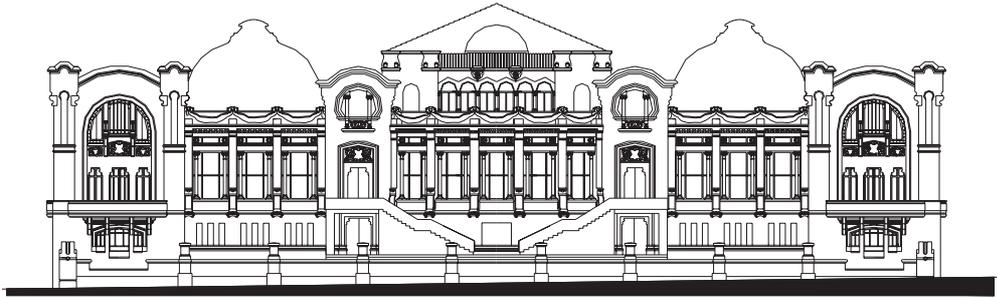
Phase III

This consists of the execution of all the construction work – interior and exterior – for the installation of the library. A new entrance and vertical communications system was worked out. The terrace that had been over the promenade was rebuilt a little lower than the previously in order to establish more visual clarity and fluidity between the public space and the new facility. To get directly from the terrace to the main floor, an exterior staircase was built, designed into two separate flights, so as to fit in better with the exedra on the central axis of the facade. But access up to the library from the inside was also included, from the same terrace level, via an overhead-lit stairway, and a third ramp-access entrance was opened for the disabled directly off the promenade. The new terrace and entrances solution has made it possible to open up the building to the promenade, previously completely cut off from the building by a high wall which has been shortened and lowered.

Phase IV

This is the phase where the definitive areas of the library were set down. Most of the old spaces, which have remained unfinished since the beginning of the building, have been redesigned specifically adapting them to the new needs, while in those rooms which retained the original decoration – done by Oms with formal references to the

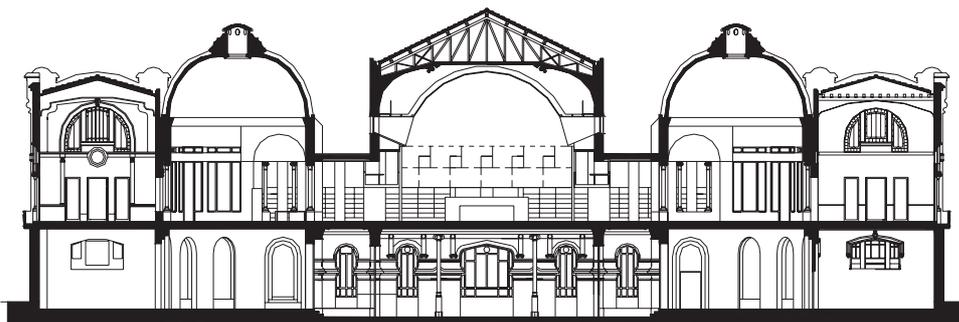




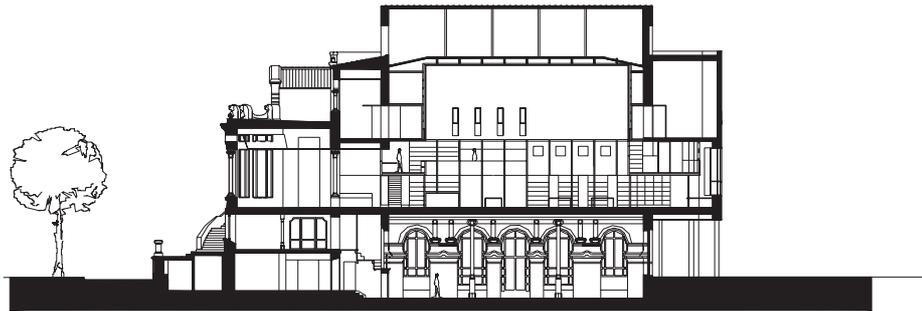
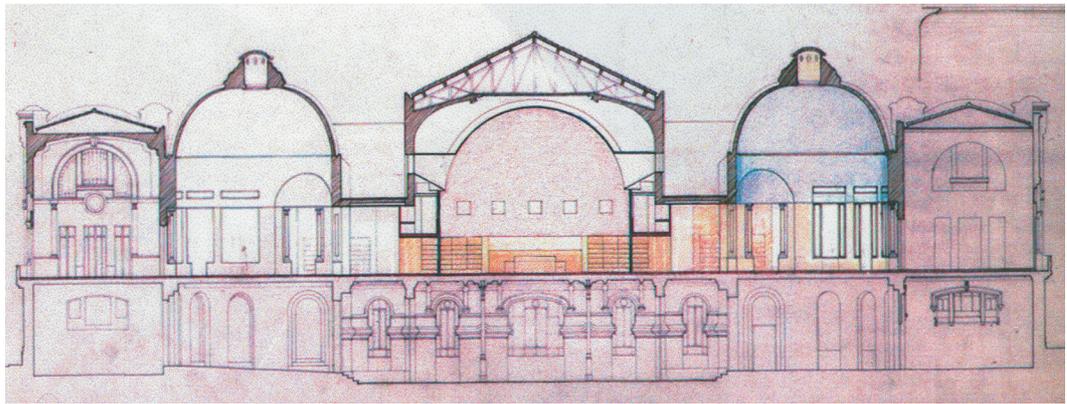
East elevation



West elevation



Longitudinal section



Cross section

late art nouveau of Domènech i Montaner and the Vienna Sezession – the operation has been mainly restorative. The main intervention took place in the great central hall which has been doubled in height creating a mezzanine level all the way round the inner wall, and covered by a full centre arch. These solutions have helped adapt it to its intended use, because its height made the scale totally disproportionate. They have also helped overcome the problems of echo and room temperature which the size produced. Major remodelling has also been carried out on the ceilings of the innermost rooms, to give them overhead lighting. All the electrics run down a technical column

joining the various floors of the building to the machinery and boiler rooms now in the already existent aedicules on the uppermost terraces, which have been adapted to this purpose.

Josep-Emili HERNÁNDEZ CROS, architect



## Central Library (Igalada, Barcelona)

Ignacio Font's cotton fabric and spinning factory had a major role in the development and industrialization of the town of Igalada. The wide expanse of its lands near the historical centre - and its later partial demolition as part of the Cal Font special ordinance Plan in April 1990, with the creation of the Cal Font square, one side of which is the same factory's Vicenzi loom building - has led to the choice of this building as the new headquarters of the Central Library of Igalada, the aim being to house the large collection of bibliographic documentation which already exists and to create a wider range of newer services.

The existent relationship between the building and the Cal Font Square, which with its large dimensions could act as an exterior hall and possible large reading room in a none-too-distant future, means that the project takes on an town-planning aspect, revitalizing the centre of the town.

The Vincenzi hall, consisting of a ground floor and mezzanine, was designed to take Vicenzi-type looms, and more conventional models. The machinery needed more power, and in 1920, four new furnaces were installed and a 35-metre tall chimney was built, planned by the industrial engineer F. Vives Pons. The bay has a support structure of masonry walls and cast iron pillars along the longitudinal axis, with a ground floor ceiling made of void infiller block and metal angular-section beams in a lattice design. The roof is made of 16m long wooden framework uprights resting on the perimeter walls, enclosed by brick sheets and curved ceramic tiles. The outside wall is of stucco plaster and large wooden-frame windows divided into small panes.

The excellent choice of this building as the representation and cultural illustration of the town's growth made it hard to fit in all the needs of the very complete programme created by the manifold needs of the populace, and that meant nearly doubling the floor surface of the building.

The aim of the adopted solution was to leave the outside appearance of the building unchanged. The building project went from the 1,140 m<sup>2</sup> of the old Vincenzi bay to the

### REGIONAL CENTRAL PUBLIC LIBRARY

Address:  
PLAÇA DE CAL FONT, S/N  
08700 - IGUALADA

Developer:  
IGUALADA COUNCIL

Architects:  
**PAU CARBÓ BERTHOLD** (Local Architectural Heritage Service – Provincial Council of Barcelona) (Project)  
**JOSEP XAVIER GARCÍA GARRIDO** (Project and management)  
**CARLES CRESPO VEIGAS** (Igalada Council) (Management)

Collaboration:  
JOAN CARLES SEGURA, JOAQUIM FARNÓS (building surveyors)  
GERARDO RODRIGUEZ (structures)  
MARC PUJOL (installations)

Construction Company:  
EMCOFA, S.A.

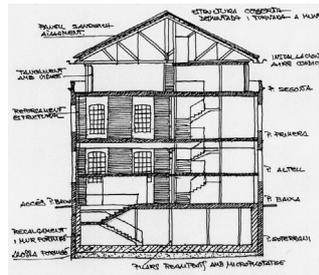
Furniture:  
COMERCIAL PROUS, S.A.  
INDUSTRIAS GAMA, S.A.

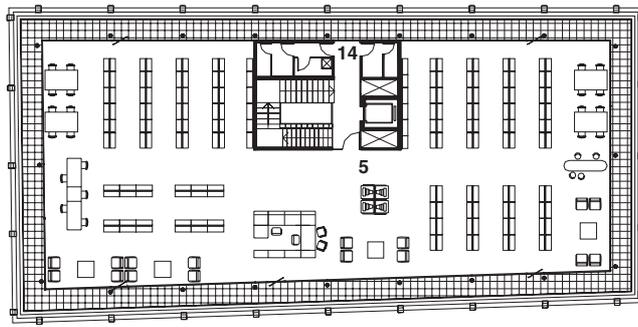
Dates:  
Project: 12-96  
Work begun: 12-97  
Work completed: 5-99  
Opening: 14-5-99

Useable Surface Area: 1,962.8 m<sup>2</sup>  
Built Surface Area: 2,346 m<sup>2</sup>

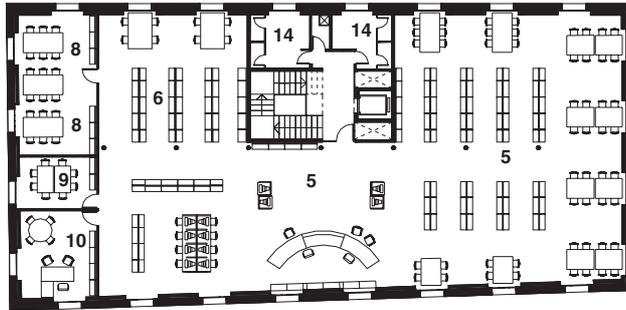
Total Cost of Construction  
(Execution by Contract Budget - ECB): 2,306,652.68 euros  
Cost/m<sup>2</sup> built (ECB): 983.23 euros/m<sup>2</sup>  
Cost of Furniture (ECB): 319,815.78 euros

Photography:  
ALBERT DE LA PEÑA (2, 3, 4, 5, 6, 7)  
JOSEP MAS (1)

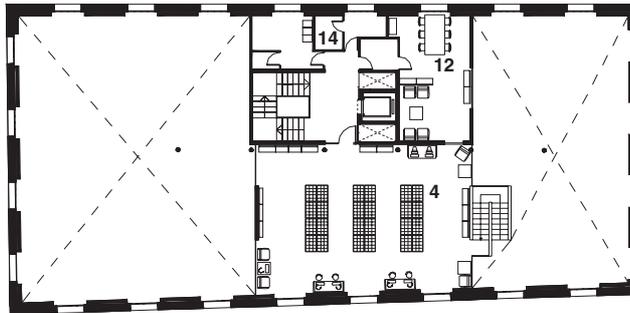




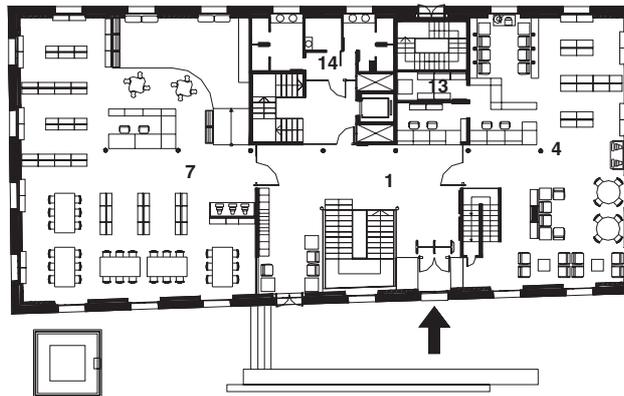
Second floor



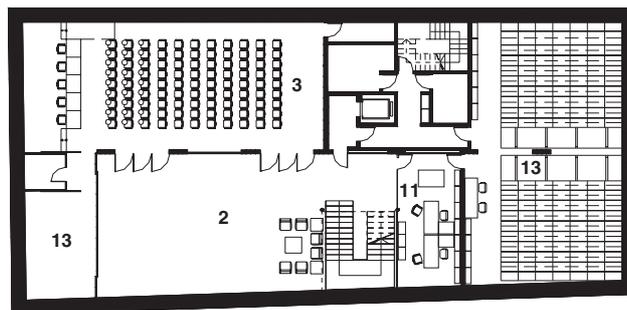
First floor



Mezzanine



Ground floor



Floor -1

1. Foyer
2. Exhibition room
3. Conference room
4. Periodicals and music
5. General area
6. Specialized collections area
7. Children's area
8. Group work room
9. Meeting room
10. Office
11. Internal working area
12. Staff rest area
13. Storage
14. Toilets

0 1 5

2,346 m<sup>2</sup> of the library. To achieve this, an underground floor was built beneath the whole floor of the building (the ground floor flooring was concrete flagstones); this meant shoring up the outside walls and propping up and lengthening the foundation pillars with micropiles and pile caps. The basement floor is sealed with a concrete basin (concrete flagstones and walls). The ground floor is an uninterrupted space, with the original vaults, except for a small gallery or mezzanine which enhances the entrance area and houses the electrics centre. The first floor is retained, reinforcing the ground floor ceiling above the vaults, and a new second floor is created at the level of the old roof. This floor, the idea of which is to enhance the outside appearance while giving it a feature which sets it apart from the rest of the building, is enclosed by a continuous glass wall onto which the old roof of wooden framework uprights has been put back, after cleaning and restoration.

The operation presents the building as a container which retains its historical and social responsibility while providing space for dynamic, constantly changing activity, as must be the case with libraries, whose interior layout has a value in relation to the speed of new technologies and the demands of the society which uses them. For this reason the location of the fixed elements and the interrelation of the spaces produced in the construction are of vital importance.

It seemed very important to group together all these fixed interdependencies and to centralize them so as to reduce distances and maximize the activity's control and services. This centre would house the core area: stairs, lift apparatus and the vertical passes for the electrics, as well as the hygiene / maintenance / cleaning services. The stairs and lift, and also the entrance hall, are closed off from the other floors in order to reduce the acoustic impact and to improve efficiency. The other floors are kept open-plan and flexible in terms of any changes in layout deemed necessary while the activity is carried out. The way the core area and the rest of the floor are laid out directs the visitor towards the floor's control and service centre, while at the same time opening up to the views of the Cal Font square. This solution frees up the maximum amount of exterior wall space so as to make full use of the natural light available.

The basement houses the rooms whose uses are most separate from the rest of the library, such as the archive, the conference room preceded by a foyer, the exhibition room, the installations rooms and storage areas. The communicating stairs are an open staircase within this two-storey space (ground and first



2



3



4



5



6

floor) so that more natural light and views can be brought to the lower level.

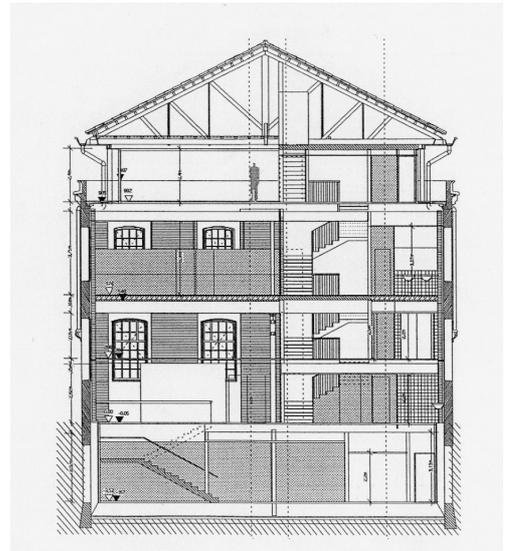
The choice of materials is what differentiates the existent solutions and materials from the new ones, such as the exterior reinforcing walls on the ground and first floor, made of solid white concrete blocks, or indeed the continuous outside glass wall on the second floor. The facades have been stuccoed, maintaining the original idea and colour of the building, and of the wooden frame windows.

Finally, the chimney has also been restored, and its crown, which fell off during bad weather, has been rebuilt after being dismantled and put back up by the council services, using very detailed plans. The new crown has been reinforced inside and sealed, once the damage to the shaft had been repaired. Lighting this element makes a unique feature of the old chimney, serving as a reminder of the power of the machines which gave it life.

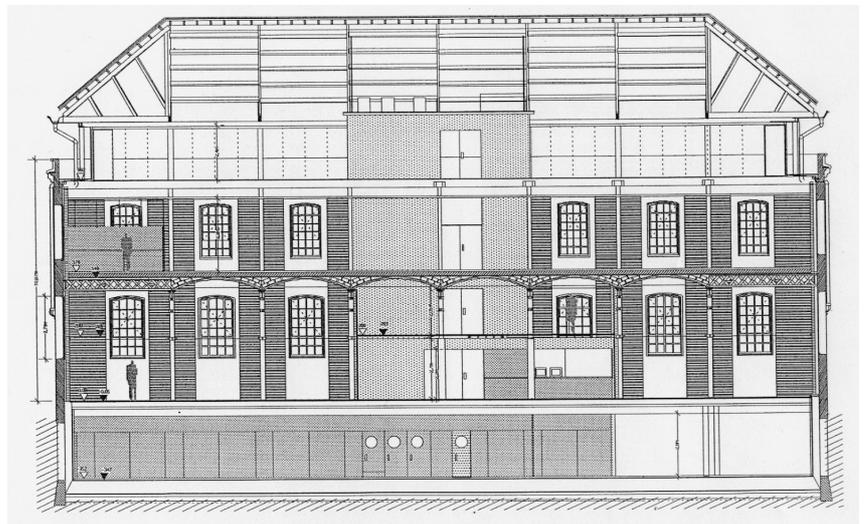
Josep Xavier GARCIA GARRIDO, architect  
Carles CRESPO, architect



7



Cross section



Longitudinal section

# Jaime Fuster Library (Barcelona)

## DISTRICT CENTRAL PUBLIC LIBRARY

Address:  
PLAÇA LESSEPS, 20-22  
08023 - BARCELONA

Developer:  
BARCELONA CITY COUNCIL

Architect:  
**JOSEP LLINÀS CARMONA**  
**JOAN VERA**

Collaboration:  
JORDI BERNUZ (structural calculus)  
J G & ASSOCIATS, S.A. (installations calculus)  
JAUME MARTÍ (building surveyor)

Construction Company:  
DRAGADOS

Furniture:  
INDUSTRIAS GAMA, S.A.

Dates:  
Project: 2002 - 2004  
Work begun: 11-02  
Work completed: 11-05  
Opening: 13-11-05

Library's Useable Surface Area:	4,405	m <sup>2</sup>
Built Surface Area:		
Library:	4,788	m <sup>2</sup>
Total Building:	5,818.68	m <sup>2</sup>

Total Cost of Construction (library and archive)  
(Execution by Contract Budget - ECB): 9,329,457.66 euros  
Cost/m<sup>2</sup> built (ECB): 1,603.36 euros/m<sup>2</sup>  
Cost of Furniture (ECB): 1,275,239 euros

Photography:  
RAFA ZUZA (CDI – COAC) (2, 3, 4, 5, 6, 8, 9)  
SANTI ROMERO (1, 7)

The project is based on two considerations:

a) To understand how important it is that the backdrop to the library site will be the "façade" –the sum total of all the huge façades of the buildings behind the site which line the *Avenida República Argentina*.

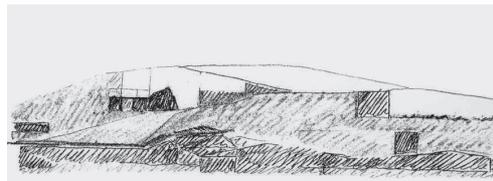
b) To signal the radical change in the use and concept of this part of the city which will be caused by the direct connection of the "green corridor" (limited to the space between *Av. Hospital Militar* and *c/ Bolívar*) with *Plaza Lesseps*.

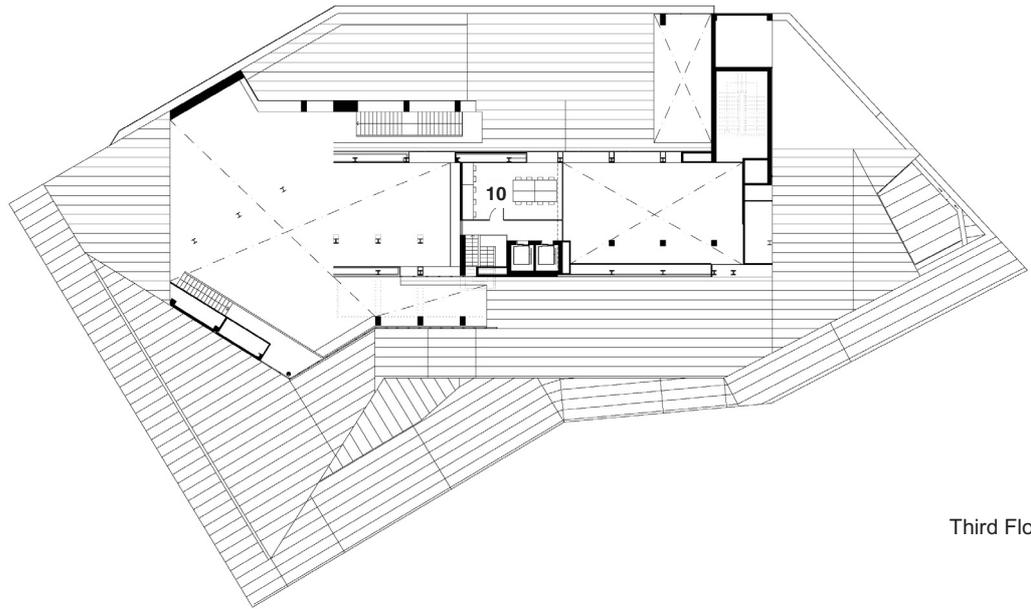
With reference to (a), the idea is for the library's volume to blend in with the buildings behind it. In the plan, this aim translates as its outlines being defined with rhomboidal lines to complete the architectural volume begun by these buildings themselves:

Through this operation, the library acquires a frontal position in relation to the huge open space of the *Plaza Lesseps*, through the scale and protection given to it by the mass volume formed by the aforementioned buildings.

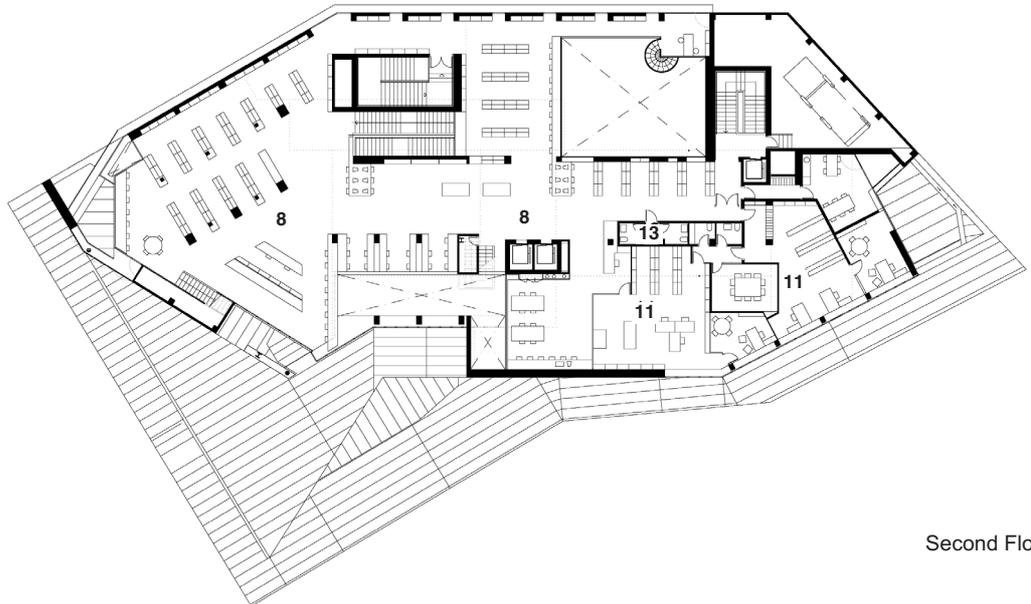
With reference to (b), the opening of this green corridor north of *Plaza Lesseps* is seen as a public axis. It will be an expression of, and a focus on, this part of the city's unusual topography - mountainside and greenery mixed with buildings – of which the square (*Plaza Lesseps*) can be considered the end or the beginning. One could say that the (*Collserola*) mountains come as far as *Plaza Lesseps* and, from that point on, the city has a whole other consistency, more to do with the street layout than the topography or the slope. The attempt to express this concept of the *Plaza Lessep's* situation as mountain/city border is what made us shape the library volumetrically, almost like a building which has come down from the *Collserola*, and now sits above the city, retaining the features of those mountains.

Josep LLINÀS, architect

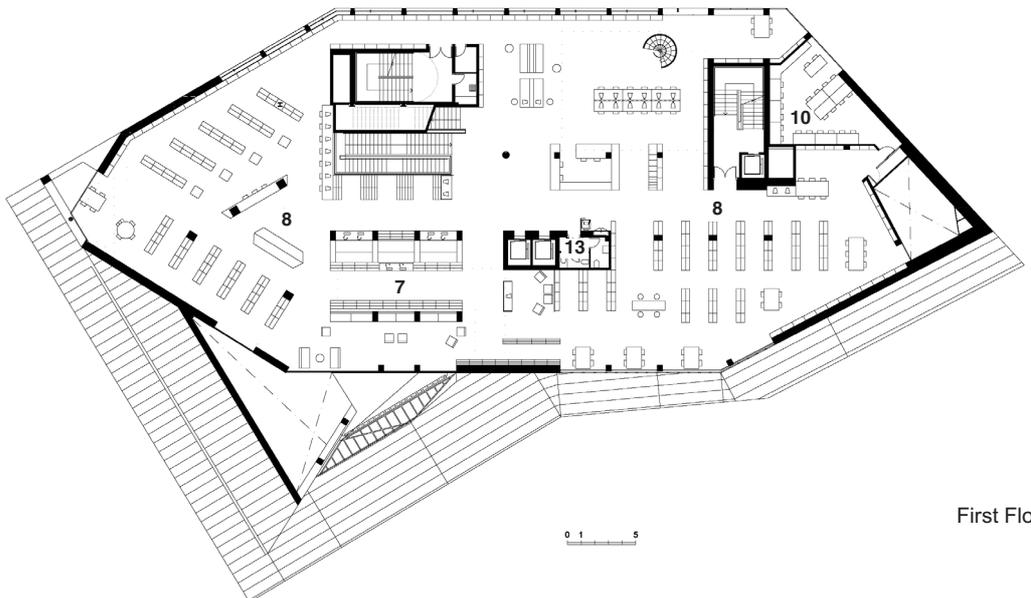




Third Floor

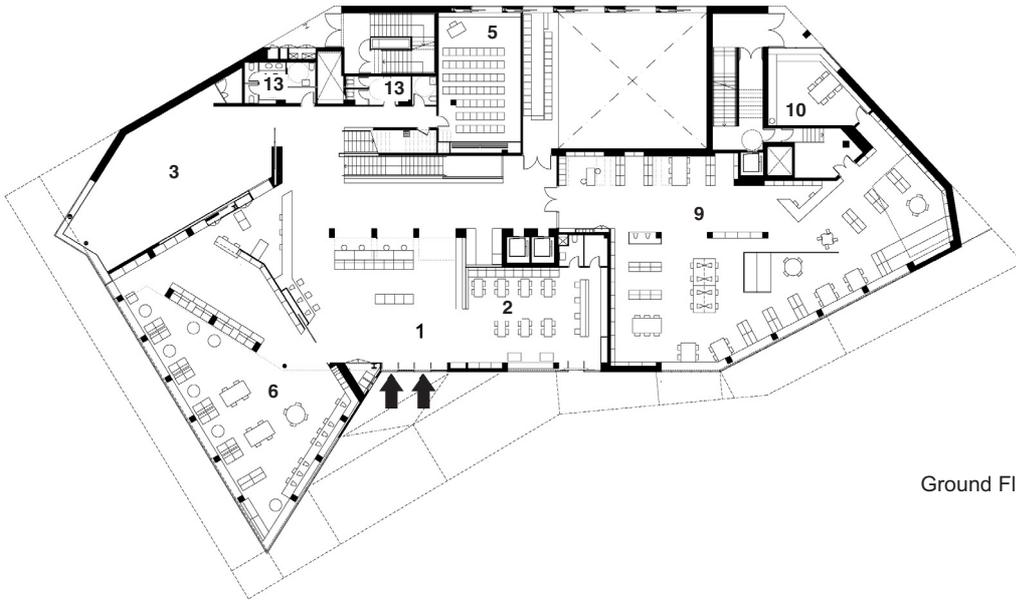


Second Floor

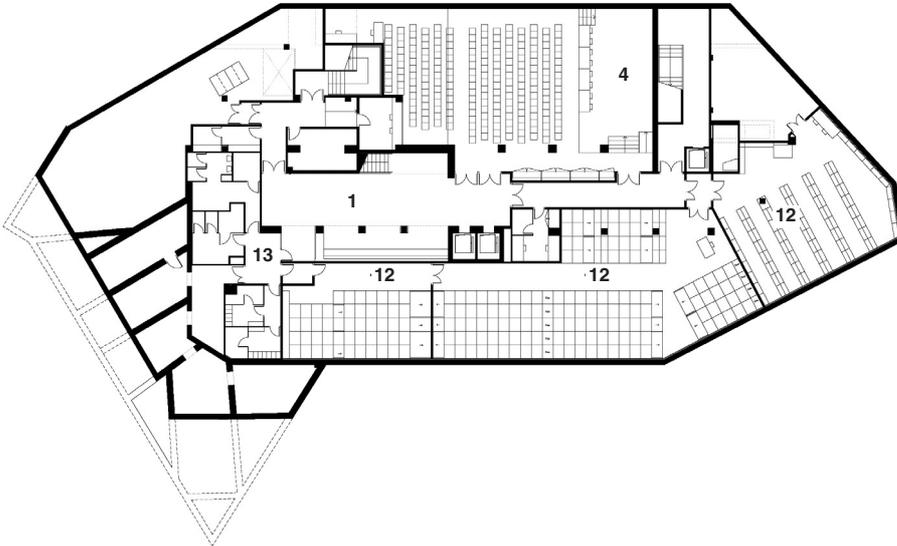


First Floor

1. Foyer
2. Bar
3. Exhibition room
4. Meeting room
5. Multipurpose room
6. Newspaper and magazine area
7. Music and film area
8. General area
9. Children's area
10. Support space
11. Internal working area
12. Storage
13. Toilets



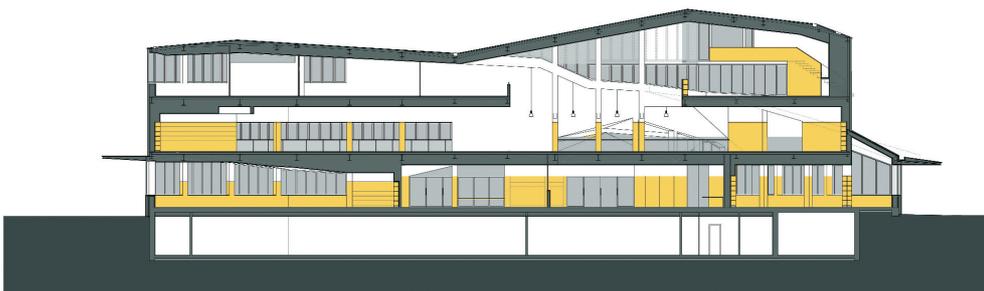
Ground Floor



Floor -1



2



Longitudinal section





3



4



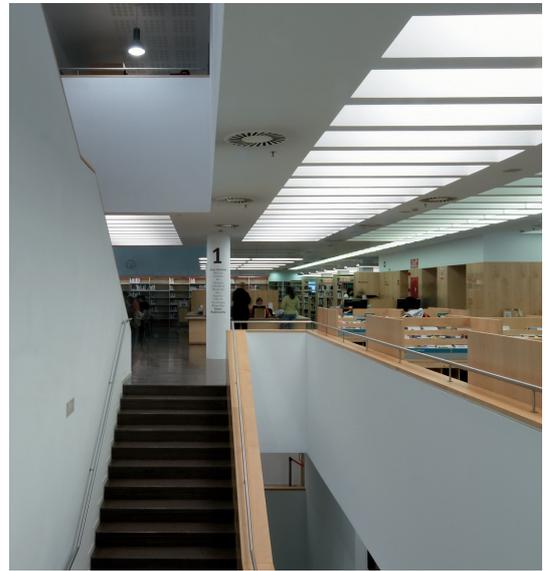
5



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## Joan Triadú Library (Vic, Barcelona)

On seeing the building for the first time, one can see in the brickwork all the history and various adaptations to different uses – which have not always been completely successful. There are visible additions, divisions and compartmentalisations of spaces using frankly poor architectural resources. The rundown state of the various structural components at one time led to some doubts as to whether it was worth conserving it and adapting it to a working condition, but that option was finally rejected when the building was added to the catalogue of listed buildings, in a category which demands the conservation of its most emblematic and characteristic features.

The structural deterioration actually suggested that the best solution was demolition of the building down to the level of the keystones of the arches of the cloister's ground floor. Using this conserved base as a starting point, the building was restored using contemporary techniques and materials, but keeping the original dimensions; the original surrounding walls were substituted by a twin-sheet structure, forming a chamber for the electrics to pass through.

The roof structure was the element which underwent the biggest changes; because of the use the floor beneath the roof would be put to, and the very poor original structural solution, this was replaced by a series of wooden trusses, a framework of wooden beams and plywood sandwich panels, and thermal and acoustic insulation.

Once the operation began, the developers partially reconsidered the first functional proposal, incorporating into it the initial programme of the Regional Archive, and a public library. The impossibility of including these new requirements in the space available was solved by building a roof over the cloistral patio which overarches the whole in a tree-like structure, which is totally independent of the original building, so does not alter any of its architectural or mechanical features.

### REGIONAL CENTRAL PUBLIC LIBRARY

#### Address:

ARQUEBISBE ALEMANY, 5  
08500 - VIC

#### Developer:

AUTONOMOUS GOVERNMENT OF CATALONIA

#### Architects:

**BOSCH – CUSPINERA ASSOCIATS**

#### Collaboration:

STATIC (structure)  
MILIAN ASSOCIATS, VENTURA ASSOCIATS  
(installations)  
FREDERIC DE BUEN NOGUERA,  
JAUME CABEZA FONTDEVILA (building surveyors)

#### Construction Company:

PRHOSA

#### Furniture:

INDUSTRIAS GAMA, S.A.

#### Dates:

Project: 1990 - 1994  
Work begun: 12-90  
Work completed: 6-95  
Opening: 24-4-96

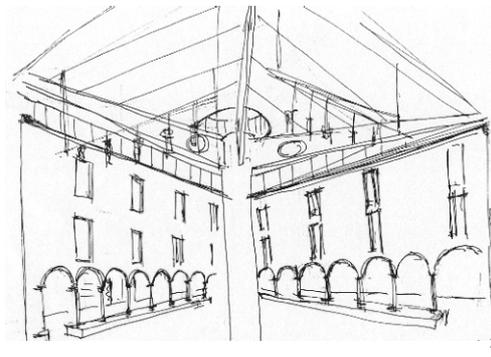
Library's Useable Surface Area:	1,123 m <sup>2</sup>
Built Surface Area:	
Library:	1,280 m <sup>2</sup>
Total building:	3,996 m <sup>2</sup>

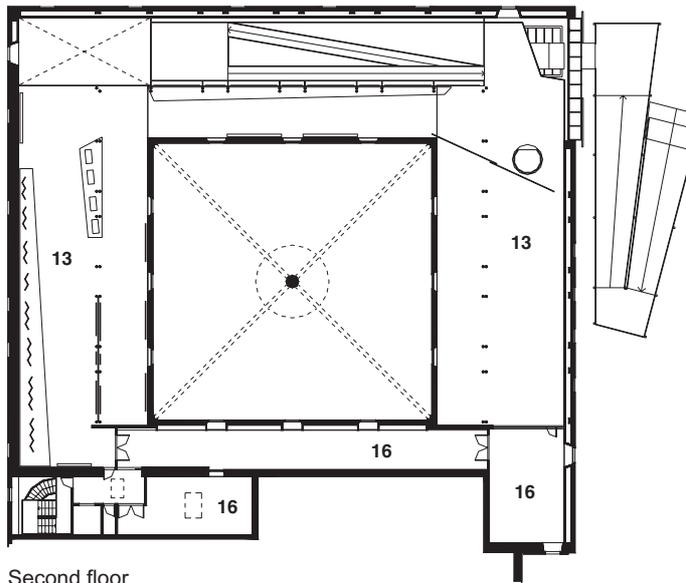
#### Total Cost of Construction (library)

(Execution by Contract Budget - ECB): 1,539,995.55 euros  
Cost/m<sup>2</sup> built (library) (ECB): 1,203.12 euros/m<sup>2</sup>  
Cost of Furniture (ECB): 155,124.23 euros

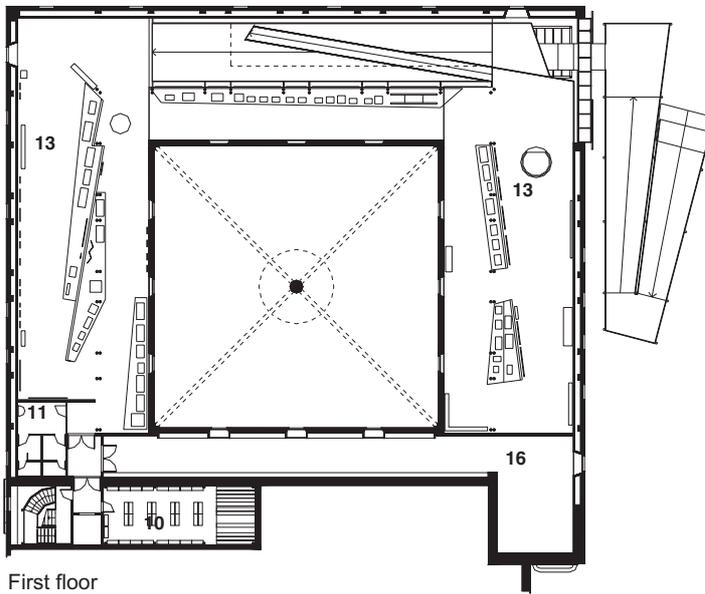
#### Photography:

ALBERT DE LA PEÑA (2, 4, 5, 6, 7, 8, 9)  
MARC PARÉ (1, 3)

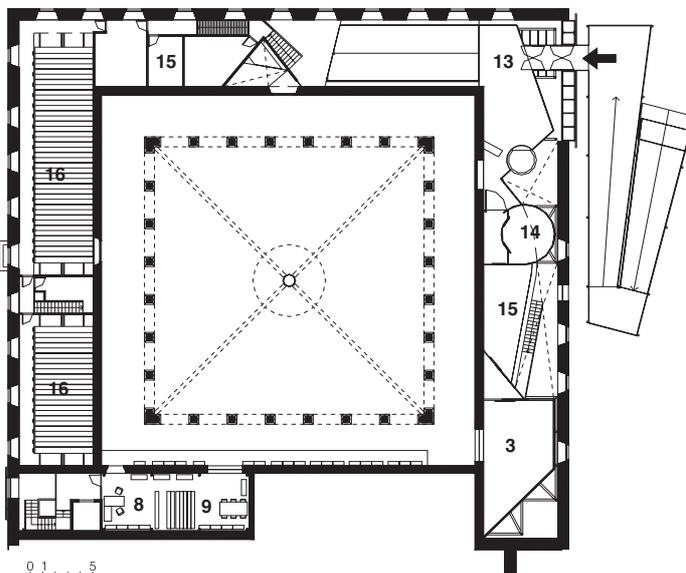




Second floor



First floor

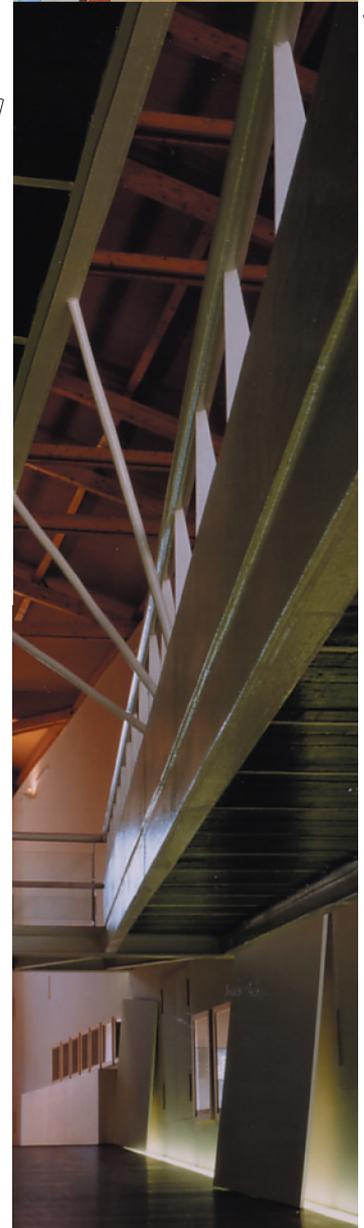


Mezzanine

1. Foyer
2. Bar
3. Conference room
4. Periodicals and music
5. General area
6. Specialized collections area
7. Children's area
8. Internal working area
9. Staff rest area
10. Library storage
11. Toilets
12. Regional archive
13. Museum
14. Meeting room
15. Office
16. Storage



2



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Analysis of the existent building showed that the north facing façade was a later addition. The demolition of part of the façade created a large gap, which was immediately used for the new main entrance to the building. The presence of this space also suggested the idea of adding an exterior walkway, a major horizontal structure to counterbalance the dominant vertical created by the disappearance of the demolished section.

One enters the ground floor directly from the outside, through a hall which occupies the northeast corner and allows direct access to the general services and the administrative offices in the north wing. This entrance hall also allows access to the Regional Archive reference rooms which occupy part of the west side. These in turn lead to the offices and general archives, which, on the entresol floor, go all round the perimeter of the cloister as far as the south east corner. In the centre of the southern bay, there is an entrance directly from the outside which makes direct access to these archives easier.

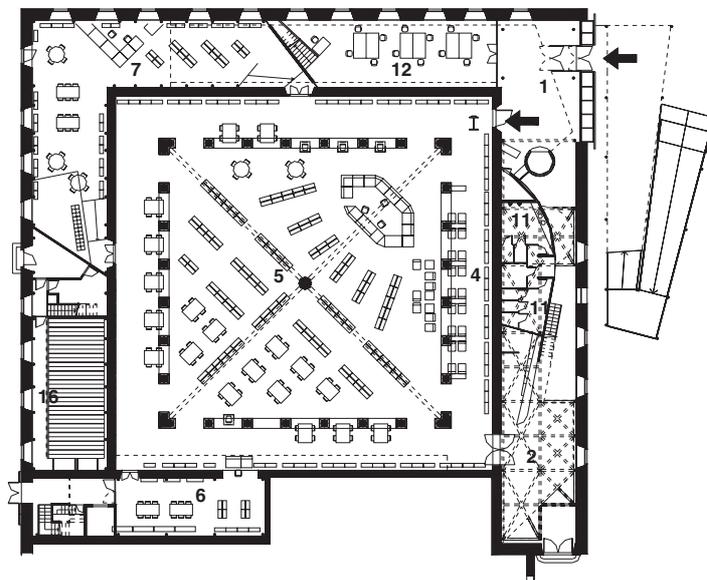
The library's general reading rooms occupy the central patio of the cloister, while the

children's library is in the southwest corner, giving directly onto the garden outside.

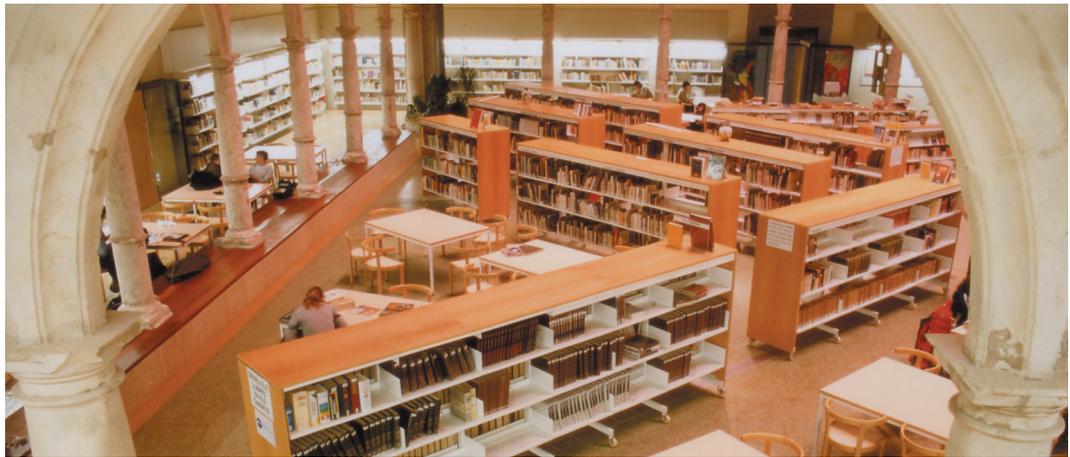
Entrance to the museum is through a hall on the entresol level, served directly by an exterior system of ramps. Then there is a large sloping plane creating a connection between this entrance space and the exhibition spaces on the first floor. A second system of ramps, set out as a projection of



6



Ground floor



7

the sloping plane, connects this level with the level beneath the roof. The museum exhibition spaces form a “U” shape around the empty space of the cloister, with which they have constant visual communication to encourage interrelation between the various activities carried out in the building.



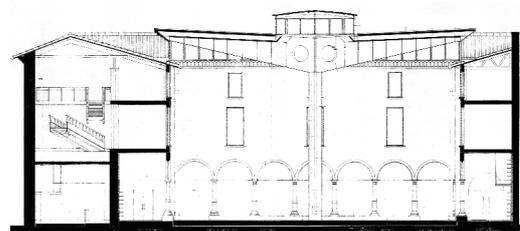
8

Certain elements deemed necessary for the building’s maintenance were introduced into the exterior walls, such as the protective socles. On the north wall, the socle is used, raised in height, to give some control to the composition of the windows which had previously lacked any clear compositional rhythm, and for obstruction-free support of the exterior communicating element. As for the openings in the façade, the existent ones were kept, and the originals were recuperated. However, they were dealt with in such a way as to maximize control of the museological space, which is to say, their transparency is maintained at the end of any walkways in order to conserve visual contact with the outside, whereas in cases in the middle, they are treated so as to keep the opening on the outside while closing it on the inside. The main opening on the north façade has the job, from the outside, of differentiating the entrances to the various functional areas of the building.

9



Andreu BOSCH, architect  
Lluís CUSPINERA, architect



East-West section

# Library (Santa Perpètua de Mogoda, Barcelona)

The functional side of this facility is based on the idea of achieving maximum versatility of use, flexibility and adaptability.

The proposal tries to respect the pre-established financial provisions regarding the definition of the type of building, specific kitting out, choice of materials, structural system, installations, the most suitable solutions with regard to maintenance and a layout which makes savings in both staff and technology.

The proposal makes a clear functional separation between the library programme and that of the archive and the exhibition rooms.

Before arriving at the main entrance, there is an exterior pre-vestibular space which works well topographically and creates some independence from the street itself.

The library consists of two separated floors. The rest of the building allows a certain amount of independence with regard to this exclusive library-area use.

The general shape of the building is a basic rectangular prism, in accordance a regulation which was in place before the general planning, while the internal layout gives the subordinate areas maximum flexibility.

It is the surrounding walls, the structure, the plumbed areas and the vertical inter-floor communication installations which create this box-like defining context, enclosing one continuous interior space, with no unnecessary partitions, only modified by the zigzag effect of the "saw-tooth" façade onto the patio.

The sloping aspect of the space means that it feels more open, and allows outside views and better control over the natural light.

The general layout of the library puts more static use for longer reference consultations on the top floor, where the adult, children's, magazine and newspapers and audiovisual areas are.

The existent environment has been taken into consideration – both the natural surroundings

## PUBLIC LIBRARY

Address:  
PTGE. DE MAS GRANOLLACS  
08130 – SANTA PERPÈTUA DE MOGODA

Developer:  
SANTA PERPÈTUA DE MOGODA COUNCIL

Architect:  
**COQUE BIANCO LABORDE**

Collaboration:  
JOSEP ANTONI DOLS TORRES (co-managing architect)  
JOAN BOSQUET CERDÁN (building surveyor)

Construction Company:  
FOMENTO DE CONSTRUCCIONES Y CONTRATAS, S.A.

Furniture:  
COMERCIAL PROUS, S.A.

Dates:  
Project: 1996  
Work begun: 11-97  
Work completed: 1-99  
Opening: 18-4-99

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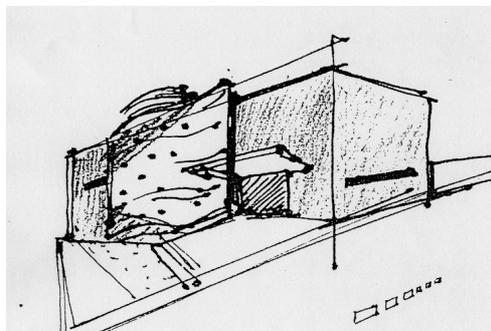
Library's Useable Surface Area:	1,400	m <sup>2</sup>
Built Surface Area:		
Library:	1,580	m <sup>2</sup>
Total Building:	2,272.94	m <sup>2</sup>

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Total Cost of Construction (library, archive, museum and exhibition room)  
(Execution by Contract Budget - ECB): 1,864,640.22 euros  
Cost/m<sup>2</sup> built (ECB): 820.36 euros/m<sup>2</sup>  
Cost of Furniture (ECB): 193,162.32 euros

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Photography:  
ALBERT DE LA PEÑA



and the buildings of the Granja Soldevila development, as well as the imminent construction of the Music School, which will have a direct covered way to the ground floor of the new building.

The technical criteria used for the building of the facility are the country's traditional methods. No extras, but simply an attempt to get the most out of certain technological advances. The concrete structure, the exposed brickwork of the walls, the inverted roof and the compact installations avoiding long distances between connections, all contribute to getting the best from the various components.

The building has three levels: the entrance level, which we shall call the middle floor, the upper floor and the lower floor.

The rest of the project, which is for the archive and the exhibition rooms, occupy the lower floor at the patio level. All the floors are connected by stairs and lifts.

On the entrance or middle floor, is the library's main foyer which leads directly on to the multi-purpose room and the toilet area. The foyer

also becomes a control centre by means of the location of the children's information desk and an office. A little further on, we find the library information and loan centre for the children's, and occasionally other, areas. These areas have their own exits and the independent use of two other terraces.

On the lower floor, the layout is such that the exhibition room is as closely connected to the patio-enclosure as possible, so the space seems like a usable continuation of it, for complementary activities.

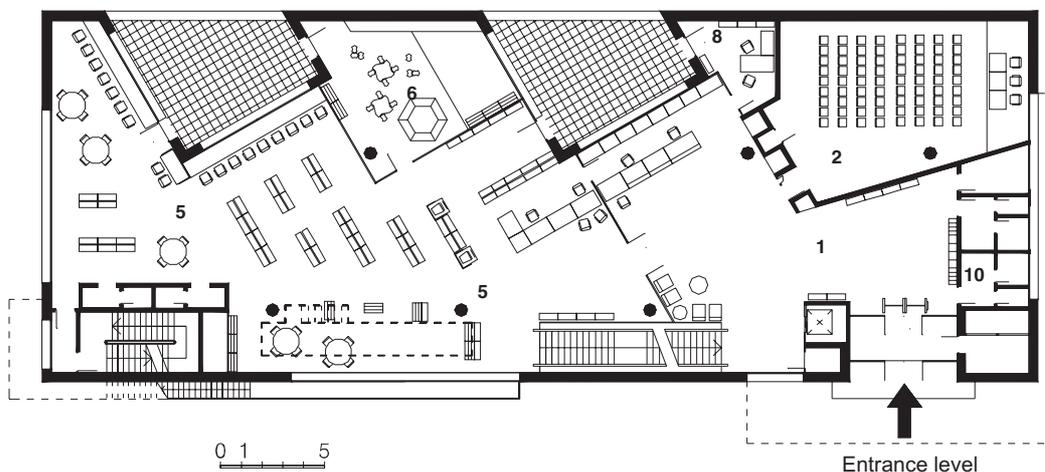
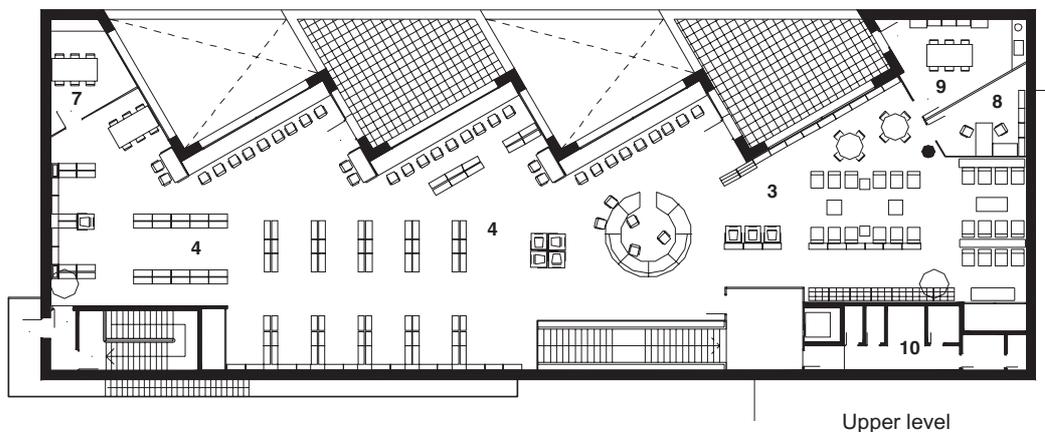
This also makes for smoother integration with the permanent exhibition and work rooms.

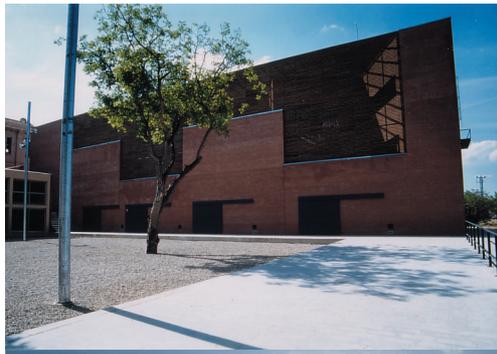
The urban presence of the new public building is highlighted on the outside by a huge show window and a series of skylights pointing upwards, whose night-illumination is the reverse of the daytime, so that they seem like torches shining up into the sky.

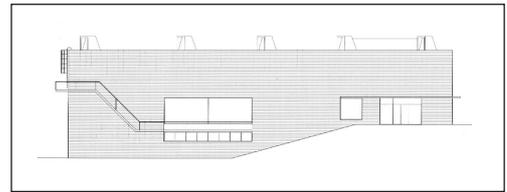
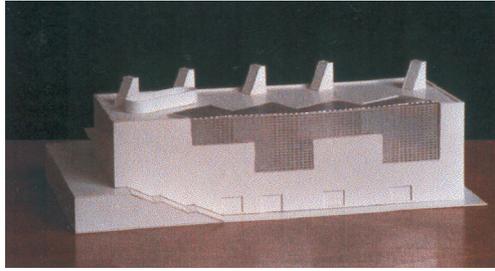
COQUE BIANCO\*, architect

\*(text provided by architect's family)

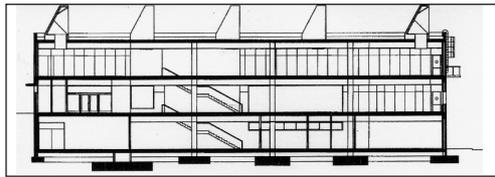
1. Foyer
2. Conference room
3. Periodicals and music
4. General area
5. Children's area
6. Little Readers Corner
7. Group work room
8. Office
9. Staff rest area
10. Toilets



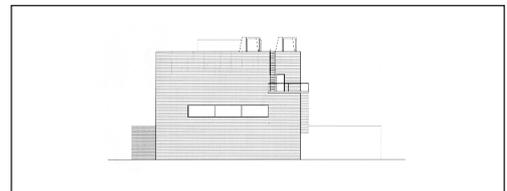
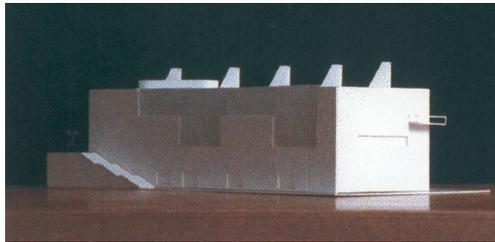




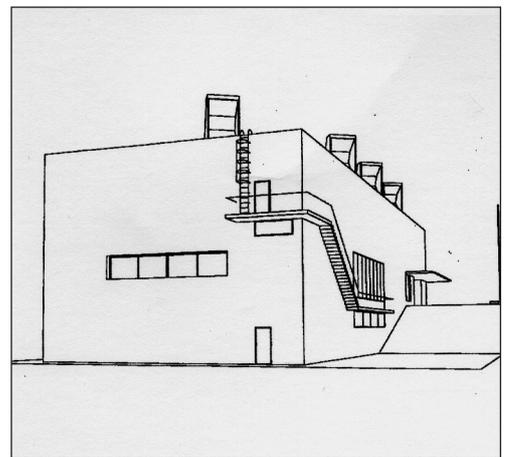
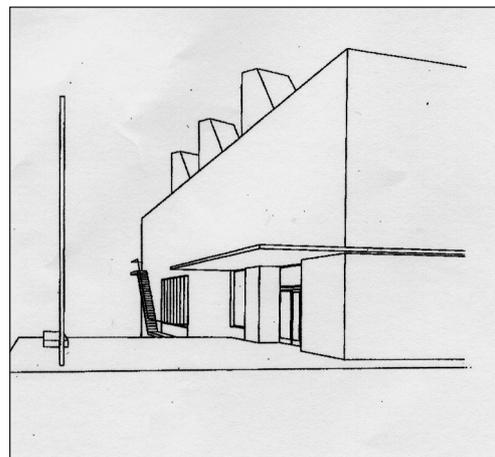
Northwest elevation



Cross section



Northeast elevation



# Library (Viladecans, Barcelona)

## CENTRAL CITY PUBLIC LIBRARY

Address:  
AV. JOSEP TARRADELLAS, 16  
08840 - VILADECANS

Developer:  
VILADECANS COUNCIL

Architects:  
**ARTIGUES & SANABRIA ARQUITECTES**

Collaboration:  
JOAN RAMÓN FREIRE, ARANTXA DRAPER (architects)  
VIDAL GARCÍA, VIRGINIA OTAL (building surveyors)  
AREA 5 (structure)  
IMOGEP (installations)

Construction Company:  
ALDESA CONSTRUCCIONES  
COPCISA

Furniture:  
COMERCIAL PROUS, S.A.

Dates:  
Project: 7-94  
Work begun: 10-95  
Work completed: 5-98  
Opening: 20-1-99

Useable Surface Area:	1,580 m <sup>2</sup>
Built Surface Area:	1,919.06 m <sup>2</sup>

Total Cost of Construction (Execution by Contract Budget - ECB):	1,606,819.38 euros
Cost/m <sup>2</sup> built (ECB):	837.29 euros/m <sup>2</sup>
Cost of Furniture (ECB):	179,295.56 euros

Photography:  
ALBERT DE LA PEÑA (3)  
EUGENI PONS (1, 2, 4, 5, 6, 7)

Computers, the Internet, CD-roms, audiovisual equipment ... information in general... How should public architecture respond to these new changes? What should a library be like these days?

These and other questions were very much in the air during the development of this project. On the one hand, the programme established some fairly clear divisions (children's area, multi-purpose room) and on the other, attempted to achieve maximum mobility and flexibility.

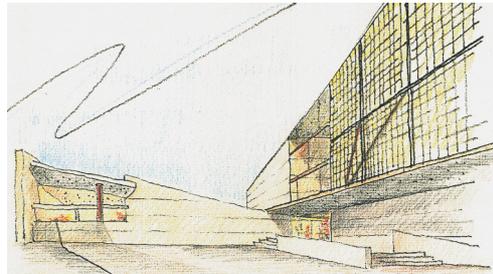
With these as our premises, we conceived the building as an "enclosure" which could provide a number of functional answers as and when needed. An enclosed space which could shut out the street and the noise and could open onto the library's own garden / park.

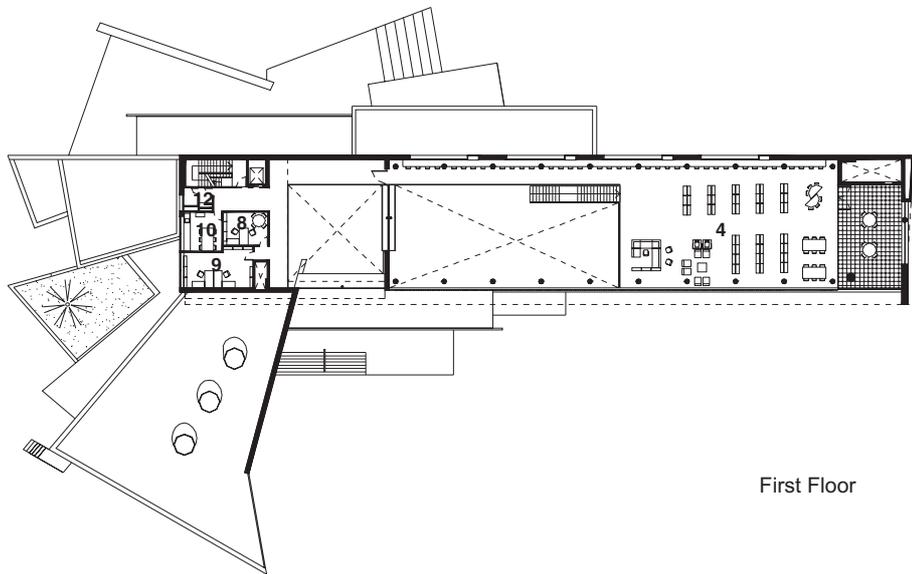
The entrance is unquestionably one of the most important parts of the building, insofar as it really acts as an indoor public square, given its strategic location as the connection between the street outside and the garden / park.

This functional differentiation between the most clearly designated areas and the volume of the enclosed space, will be used from a formal point of view to make the outside appearance of the building more complex, and to make it stand out more.

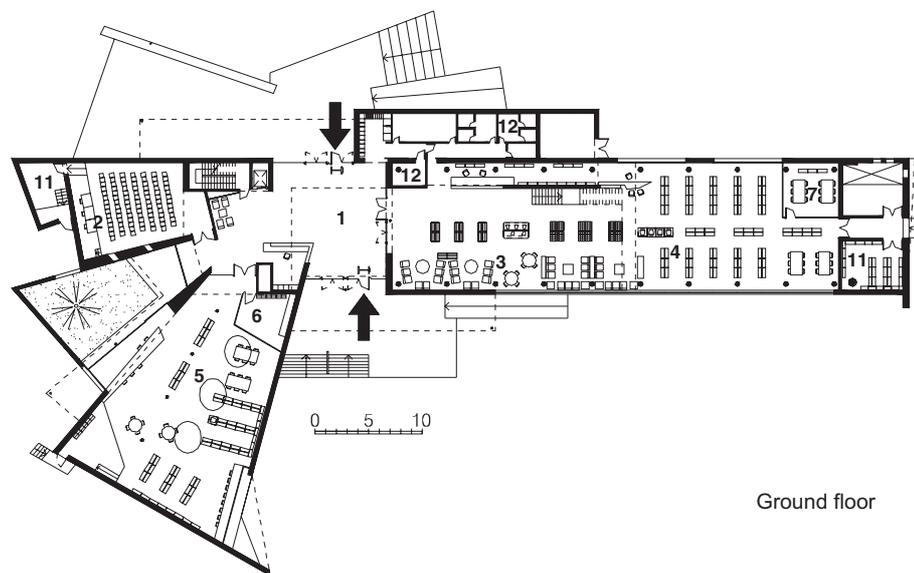
Finally, mention must be made of the connection established between building and the garden / park. The connection is not only a formal one, whereby a whole series of the library's forms can be seen, but also a functional one, because during the day the outside light from the park enters the library through the façade of glass blocks, whereas at night this same façade becomes a kind of urban torch shining light onto the park.

Ramon ARTIGUES, architect  
Ramon SANABRIA, architect





First Floor

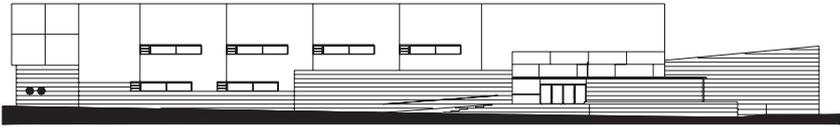


Ground floor

1. Foyer
2. Conference room
3. Periodicals and music
4. General area
5. Children's area
6. Little Readers Corner
7. Group work room
8. Office
9. Internal working area
10. Staff rest area
11. Storage
12. Toilets



2



0 5 10

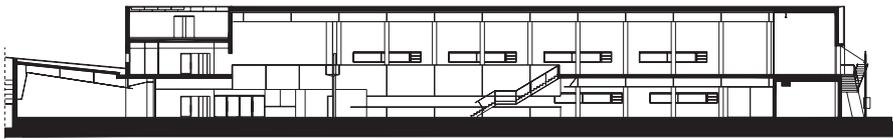
Southwest elevation



3



4



0 5 10

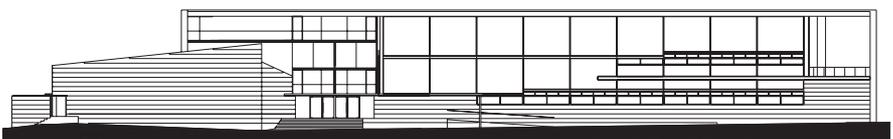
Longitudinal section



5

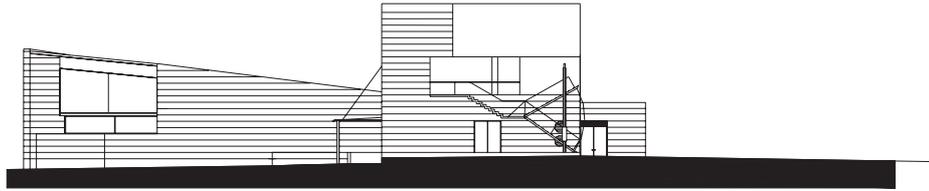


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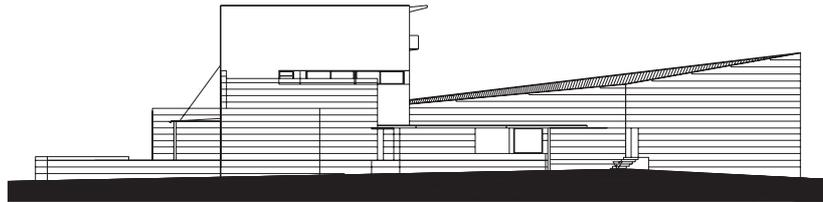


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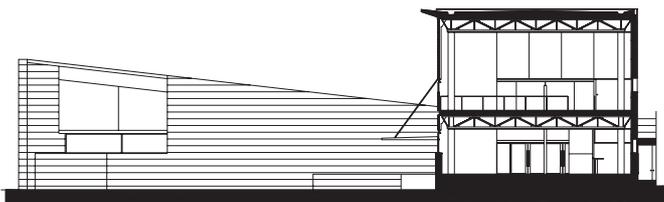
Northeast elevation



Northwest elevation



Southeast elevation



Cross section



# Mercè Rodoreda Library (Barcelona)

The surface area of the site resulting from lengthening the road up to the Camèlies is 3,315 m<sup>2</sup>, 2,101.30 of which are the urbanisation surface area obtained by adding together the surfaces of: the Camèlies Street pavement, lengthening the garden path, the access ramp to the library and multi-use room patio. The other 1,213.70 m<sup>2</sup> of the site's surface area, is occupied by the library building, whose layout covers a first floor with an entrance off the Calle Camèlies, a lower floor at garden level and an upper floor over the lower floor.

The building is over the underground car-park, approximately in keeping with its outside perimeter. The floor dimensions of the car-park are 48,35 × 30,00 m, the longer of the two being basically parallel to the Calle Camèlies. So we could say that the location of the library was determined by the car park and that the construction's final shape is adapted to the needs and shape of the site.

The distribution of the programme was done as follows:

- Lower floor, sea level 107.85: children's area.
- Access floor, sea level 111.05: entrance hall, multi-purpose room and general area.
- Upper floor, sea level 114.25: general area and internal work area.

Access to the building is on the first floor, off the Calle Camèlies via a ramp or from the Submarí garden via stairs. From the entrance hall there is direct access to the lower floor, the multi-purpose room and the general area.

The building and the urbanization surrounding it is the culmination of the renewal of one part of the city through several works over time: the construction of the Rovira tunnel's southern entrance, the urbanization of the Submarí garden and the building of an underground car-park as an extension of the one in the building above the tunnel.

The library has an entrance off the Calle Camèlies, but at the same time there is access via the Submarí garden, and with that, the lateral façade of the library becomes the main entrance from which the building as a whole can be appreciated. The steep slope

## DISTRICT CENTRAL PUBLIC LIBRARY

Address:  
CAMÈLIES, 76-80  
08024 - BARCELONA

Developer:  
BARCELONA CITY COUNCIL

Architect:  
**MÀRIUS QUINTANA CREUS**

Collaboration:  
ENRIC JANÉ, DAVID BAILLIF, SYBILLE MAURER  
(architects)  
EDUARDO DOCE (structures)  
IMOGEP, S.A. (installations)  
RAMÓN AUSET (building surveyor)

Construction Company:  
CLOSA ALEGRET, S.A. (Phase I)  
COPIA (Phase II)

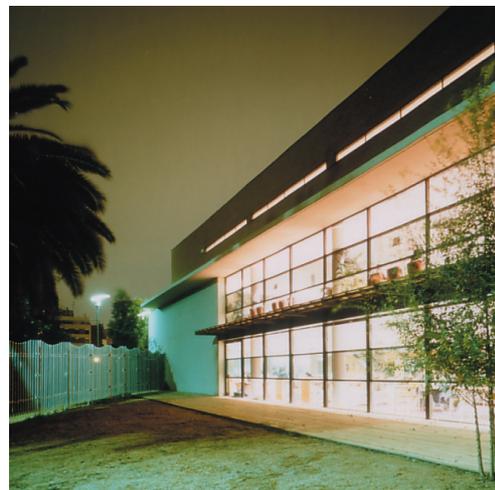
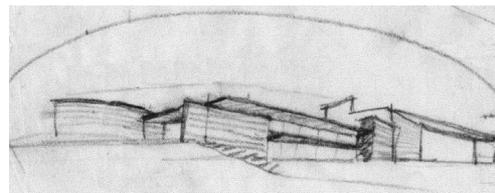
Furniture:  
COMERCIAL PROUS, S.A.

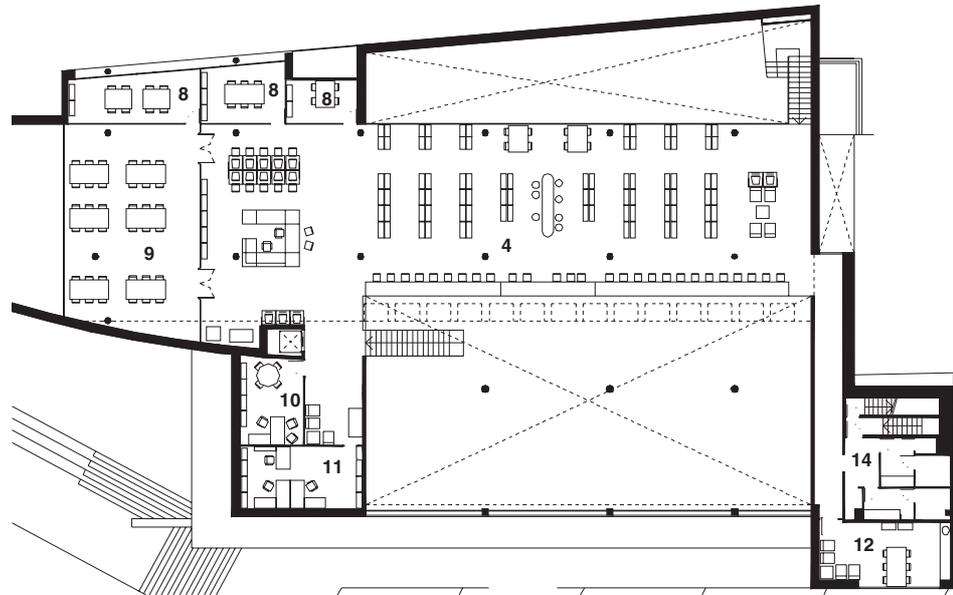
Dates:  
Project: 2-95 and 5-97  
Work begun 1<sup>st</sup> phase: 10-95  
Work begun 2<sup>nd</sup> phase: 10-97  
Work completed: 10-99  
Opening: 11-4-99

Useable Surface Area:	2,063 m <sup>2</sup>
Built Surface Area:	2,336 m <sup>2</sup>

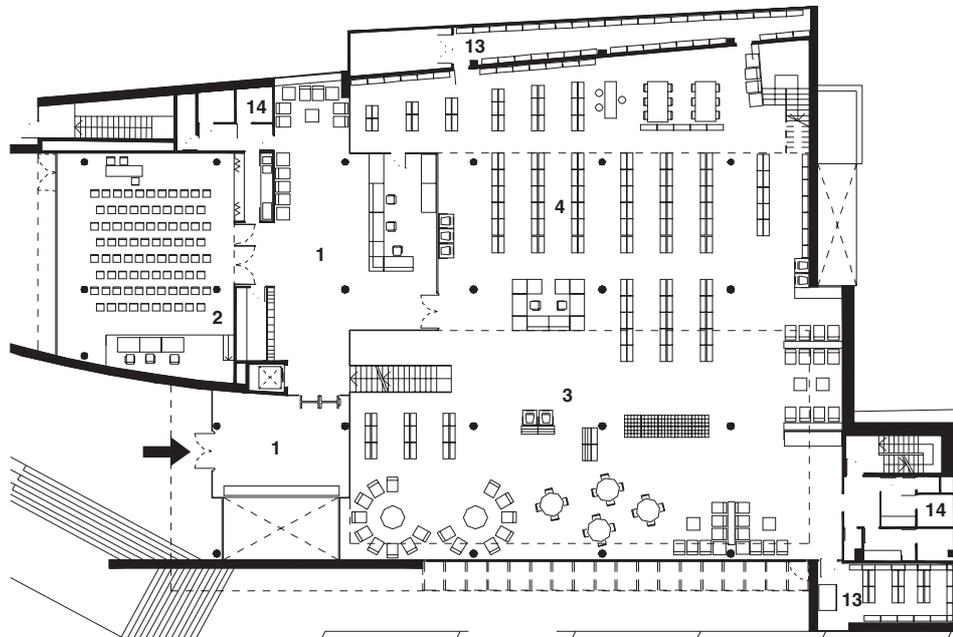
Total Cost of Construction (Execution by Contract Budget - ECB):	2,023,887.79 euros
Cost/m <sup>2</sup> built (ECB):	866.39 euros/m <sup>2</sup>
Cost of Furniture (ECB):	251,607.36 euros

Photography:  
JORDI BERNADÓ (2, 6)  
ALBERT DE LA PEÑA (3, 4, 5, 7)  
EUGENI PONS (1, 8, 9)





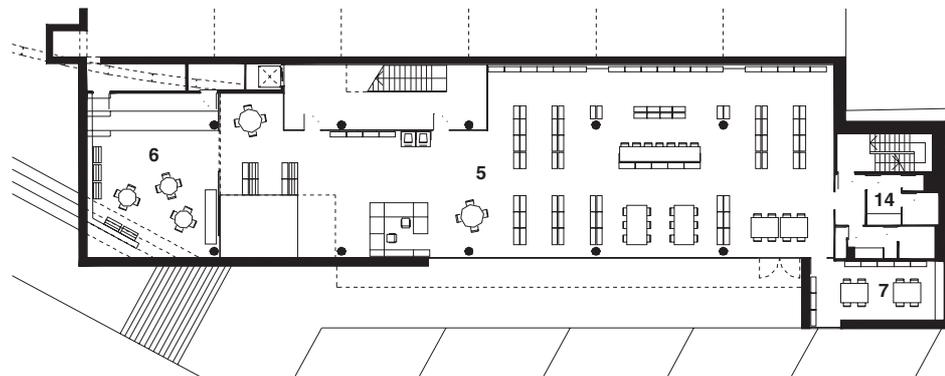
Upper level



Entrance level

Lower level

- 1. Foyer
- 2. Multipurpose room
- 3. Periodicals and music
- 4. General area
- 5. Children's area
- 6. Little Readers Corner
- 7. Workshop
- 8. Group work room
- 9. Study room
- 10. Office
- 11. Internal working area
- 12. Staff rest area
- 13. Storage
- 14. Toilets



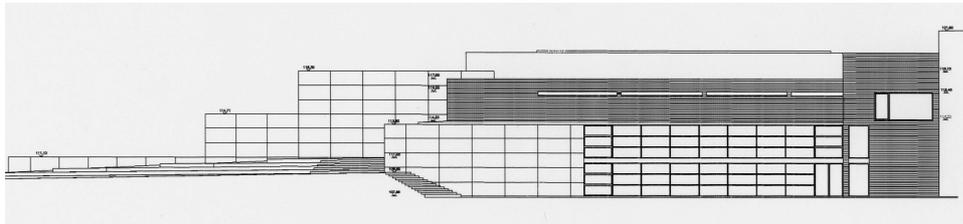
Lower level



2



3

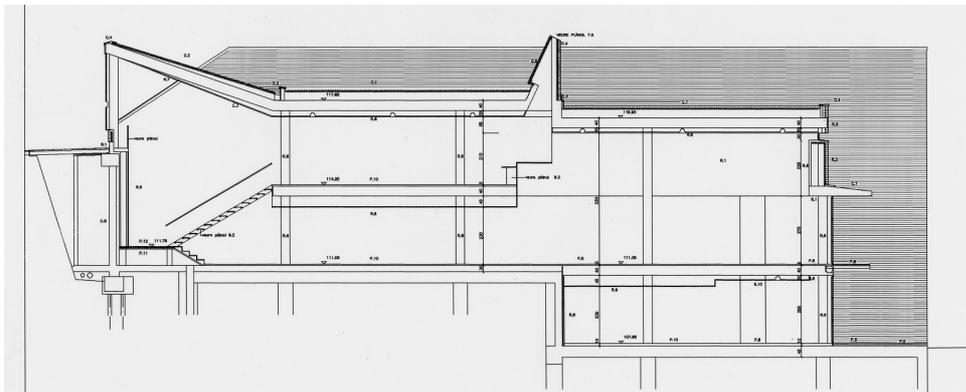


South elevation



4

5



Cross section



6

of Calle Camèlies, and the divided double-bay section of the car-park, mean that a cross-section of the library has to be at three separate levels.

The depth of the building between the southern façade (Submarí garden) and the north façade (Calle Camèlies) means the roof brings light through in its cut out, zigzag design, so the interior gets different qualities of light from the roof, the double-height spaces and the outside walls.

The library is envisaged as a series of different spaces where each visitor can find his/her place to carry out whatever activities s/he wishes. This being the case, individual reading, in the style of the traditional libraries, uses up very little space. There are generous spaces for the newspaper library, the music library, individual or group work, reference and the loan service.

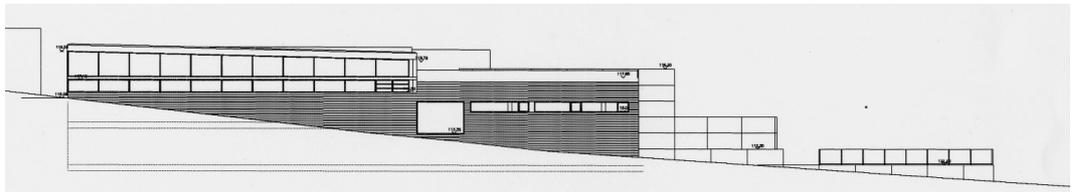
Màrius QUINTANA, architect



7



8



North elevation

9



# Montserrat Roig Library (Sant Feliu de Llobregat, Barcelona)

REGIONAL CENTRAL PUBLIC LIBRARY

Address:  
AV. MONTSERRAT, 1-3  
08980 – SANT FELIU DE LLOBREGAT

Developer:  
SANT FELIU DE LLOBREGAT COUNCIL

Architect:  
**ALBERT VIAPLANA VEÀ** (Project)  
**VIAPLANA / PIÑON Arquitectes**

Collaboration:  
RICARD MERCADÉ, DAVID VIAPLANA,  
AURORA FERNANDEZ (architects)  
BRUFAU-OBIOLS-MOYA ASSOCIATS (structure)  
J&G ASOCIADOS (installations)

Construction Company:  
CONTRATAS Y OBRAS, S.A.

Furniture:  
INDUSTRIAS GAMA, S.A.

Dates:  
Project: 1990  
Work begun: 2-91  
Work completed: 10-93  
Opening: 22-4-93

Library's Useable Surface Area:	1,249.93	m <sup>2</sup>
Built Surface Area:		
Library:	1,396	m <sup>2</sup>
Archive:	657.7	m <sup>2</sup>
Total:	2,053.7	m <sup>2</sup>

Total Cost of Construction  
(Execution by Contract Budget - ECB): 1,359,179.86 euros  
Cost total library (Execution by Contract Budget - ECB):  
957,463.6 euros  
Cost/m<sup>2</sup> built (library) (ECB): 685.86 euros/m<sup>2</sup>  
Cost of Furniture (ECB): 224,762.99 euros

Photography:  
LLUÍS CASALS (1, 2)  
JAUME SOLÉ (3, 4)  
MARC VIAPLANA (5, 6, 7, 8)

The Torre dels Rosers (Rosers Mansion) is in the upper part of the park to which it gives its name. You enter the library at the level where the mansion itself is, through a portico formed by the two upper storeys.

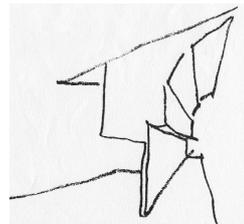
Over the portico, a 45° cut angle opens up the two storeys to the north by way of a huge opening while at the same time enlarging and shaping the space between the new building and the old.

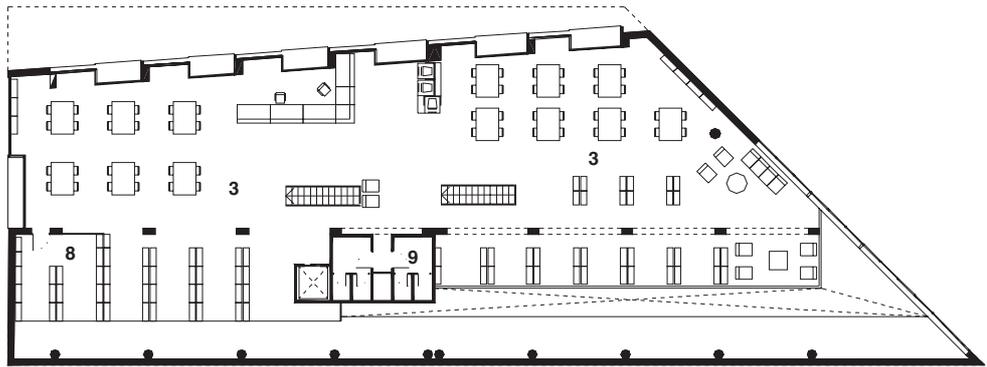
Along the street at the side, both storeys begin the formation of a longitudinal vault, leaving space for a portico over the pavement.

On the opposite side, the reading rooms open on to the garden via glass covered walls.

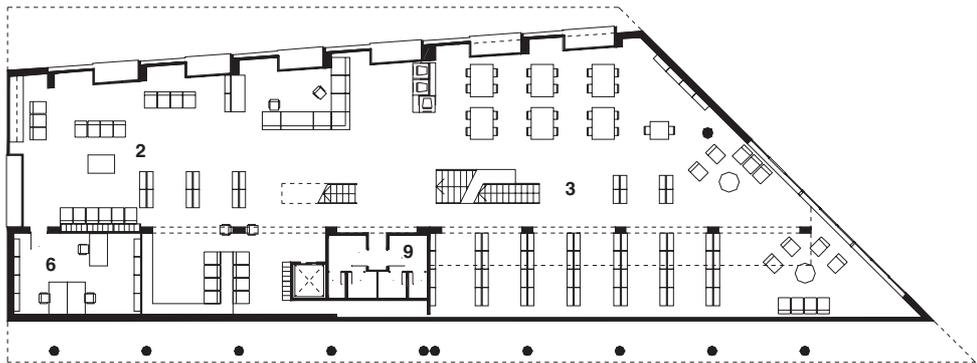
The lower part of the park extends, untouched, from one extreme of the land to the other, just as it was found. The archive on this level is buried beneath the square which gives access to the library and the tower.

Albert VIAPLANA, architect



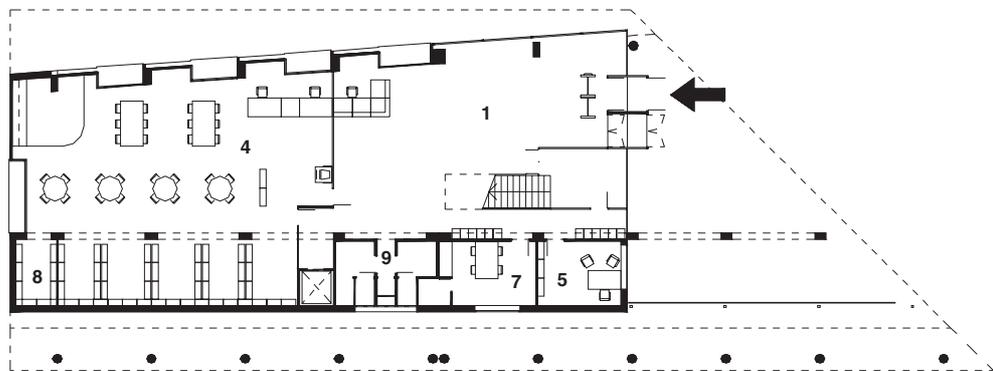


Second floor



First floor

1. Foyer
2. Periodicals and music
3. General area
4. Children's area
5. Office
6. Internal working area
7. Staff rest area
8. Storage
9. Toilets

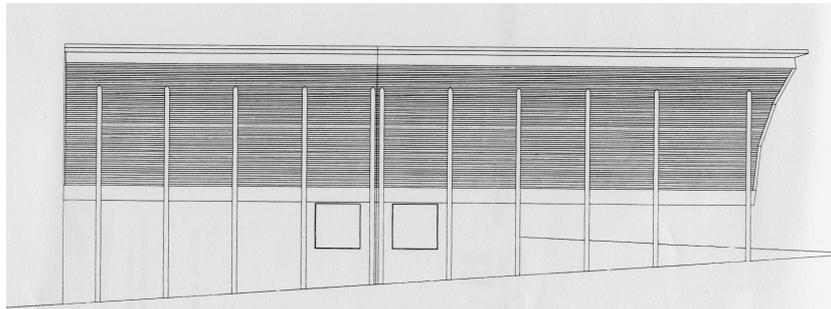


0 1 5

Ground floor



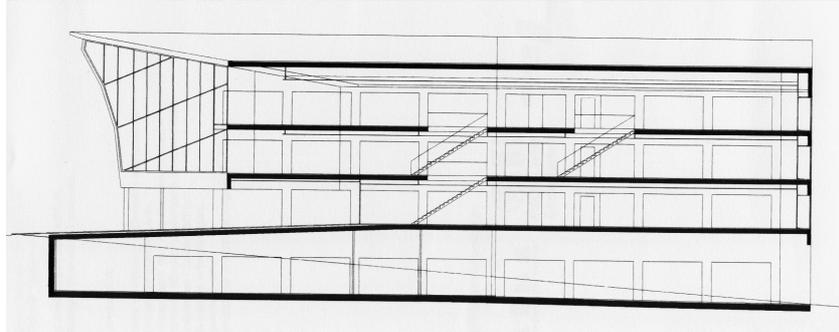
2



Elevation



3



Longitudinal section



4



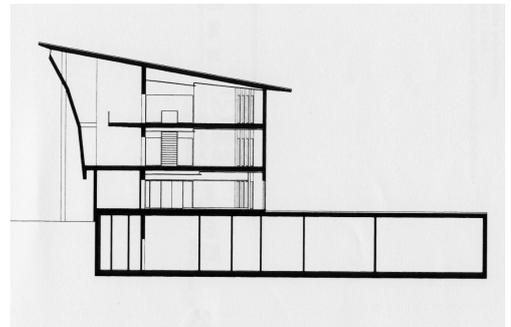
5



6



7



Cross section



8

## Murcia Regional Library (Murcia)

In June 1988, the Department of Books and Libraries commissioned me to produce a project for the Murcia Library. The work, over eleven months, consisted of giving substance on the execution project to all the ideas and rationale behind what we think the Murcia Regional Library should be. This came into being after a series of reports by the Department of Books and Libraries: Logroño, Granada, Palencia, Zaragoza, etc. This meant that all the thoughts and experiences could be gathered together, particularly – because of the point that the project was at – those that dealt with the relationships or interaction between the site and the project itself.

Faced with various locations which were over-conditioned by their proximity to the town centre, population density, ordinances, style and so on, the site which we were offered by the Murcia Local Government had conditions of its own that were no less remarkable. It was a rectangular piece of land of 50 × 100 metres - a rectangle that was perpendicular to the recently built street Juan Carlos I, which is 60 metres wide, and around which practically the whole of Murcia's future development will be built. This place, with its excellent orientation, lack of major obstructions, good connections with the city, generous dimensions and recently built well-separated public and private buildings on all sides, seemed to be the ideal place for the library.

In this way a kind of fusion could be made between the place, the programme's needs and the architecture. Up until this moment, the 50 × 100 m site was just that – an empty site and nothing more: no voices, no history, no landscape. It was like a modern platform, clean and versatile, which we had been looking for to unload the needs of a library. It was enough to understand that the place was the architecture and that it was enough simply to repeat it three times - to superimpose an identical platform of 36 × 83m three times – to show the relationship between the architecture, the programme and the place: on the ground floor, the major public information and culture centre; on the first floor, the main communications room; and on the second, the place to study Murcia itself – the Murcia Regional Library. Each floor "identical" to the others. Each floor "identical" to the place it had originated from. Each floor, separated by nearly five metres, focusing – from that single unique idea of location and surface area – on the relationship between

### PROVINCIAL PUBLIC LIBRARY

#### Address:

AV. JUAN CARLOS I, 17  
30008 - MURCIA

#### Developer:

MINISTRY OF CULTURE – DIRECTOR GENERAL OF BOOKS, ARCHIVES AND LIBRARIES

#### Architect:

**JOSÉ M. TORRES NADAL**

#### Collaboration:

ENRIC SERRA GRAU, JULIO MARTÍNEZ TORREBLANCA, EUGENIA RODRÍGUEZ and XAVIER ROVIRA (architects)

E. TROPA – JOSÉ LUIS MONTERO  
(interior design/signage)

#### Construction Company:

CUBIERTAS Y MZOV, S.A.

#### Furniture:

ESQUITINO MARTÍNEZ, S.A.

#### Dates:

Project: 1988-1989  
Work begun: 11-90  
Work completed: 9-93  
Opening: 10-6-96

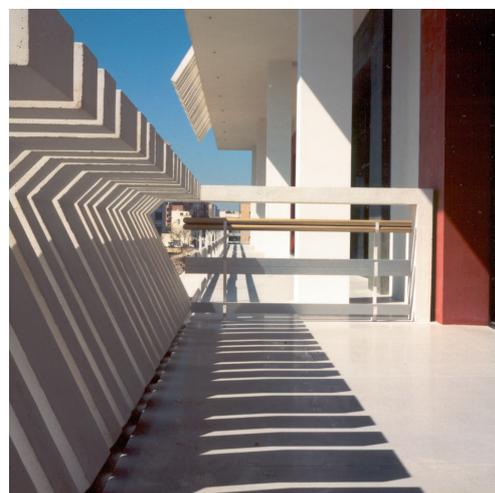
Useable Surface Area:	9,970 m <sup>2</sup>
Built Surface Area:	11,004 m <sup>2</sup>

#### Total Cost of Construction

(Execution by Contract Budget - ECB): 6,616,602.84 euros  
Cost/m<sup>2</sup> built (ECB): 601.29 euros/m<sup>2</sup>  
Cost of Furniture (ECB): 585,287.01 euros

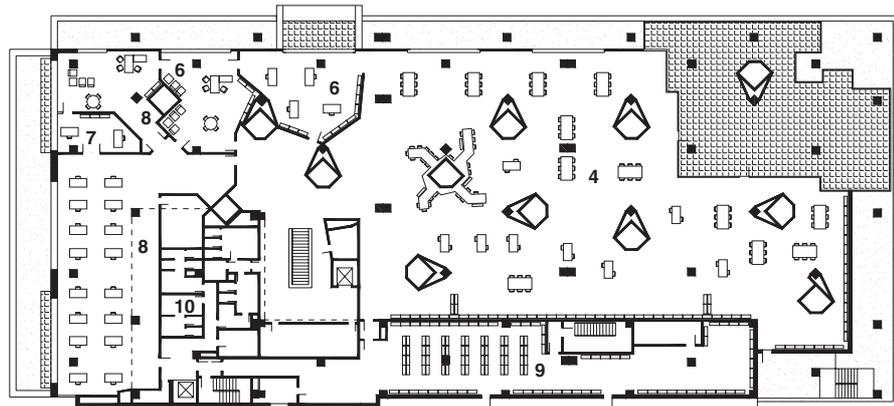
#### Photography:

JUAN DE LA CRUZ MEGÍAS

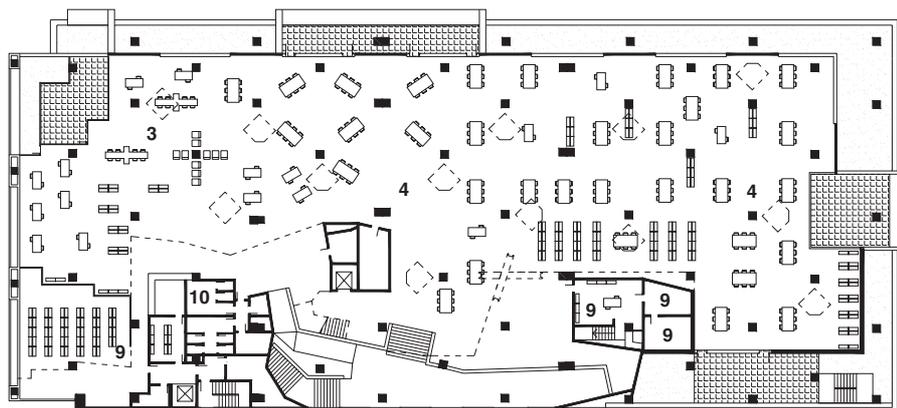


the programme and the architecture. Each part of the programme took up the space it needed on each floor, leaving the rest empty. Only the programme applied to the floor established the differences between one and the other. Differences which neither needed nor sought any previous architectural definition which meant that there was a guaranteed versatility of use. It was a question of applying a law to each floor's programme, an unseen form of order which

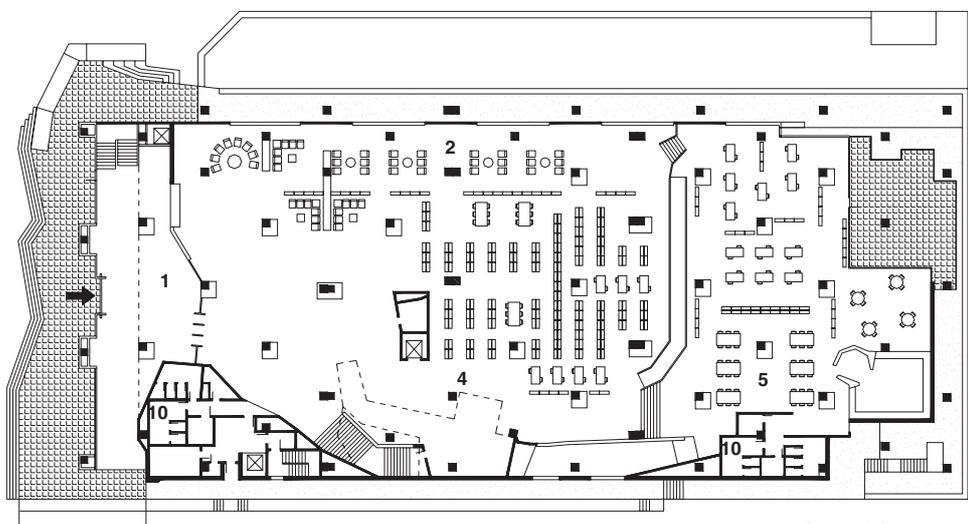
enabled one to discuss activities without necessarily connecting them to specific locations, to talk about uses without the differences between them necessarily tying them to fixed compartmentalisation. This lack of functional differentiation automatically coincided with getting rid of the architecture of useless materials, stripping away all kinds of ideology – particularly the most conventionally modern – accepting that, when it comes down to it, the library could and



Second floor

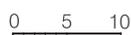


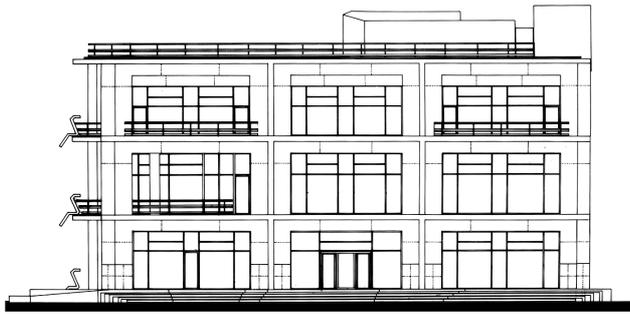
First floor



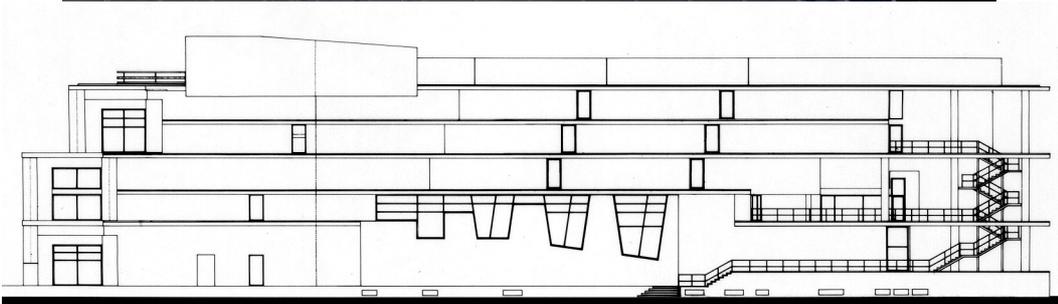
Ground floor

1. Foyer
2. Periodicals
3. Music
4. General area
5. Children's area
6. Group work room
7. Office
8. Internal working area
9. Storage
10. Toilets



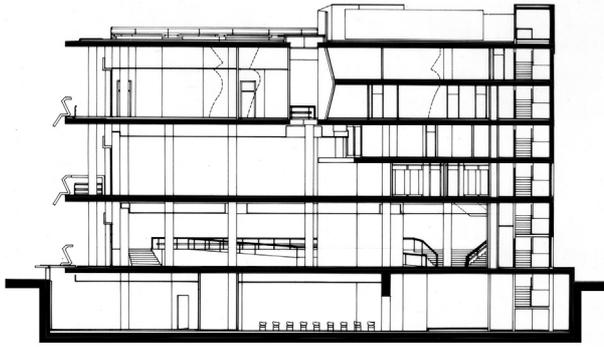


East elevation



North elevation





Cross section

indeed should be only a floor and a roof. Because it is that strange simultaneity which the exterior look has, which makes one certain that, drawing after drawing, analysis after analysis, the project has been progressing along that very narrow path where architecture is not yet architecture, but at the same time, precisely because of that, is actually on the verge of ceasing to be architecture.

1989

1992. The rest of the project's architecture, lighting or shapes of given areas for example, being of paramount importance to us, as well as the very thing which separates what is from what is not architecture is, being so personal and subjective, indisputable. Something which, rather than be talked about, can only really be shown.

The main experience of this work continues to be the realisation that library architecture – like the architecture of other projects – has to accept the changing and provisional nature of the programmes it contains. And it will always come into being hugely dependent on the cultural content of each era, and also on the management processes (the way the library is run) or the different information processes and access supports. And also the realisation – though it may seem paradoxical – that one has to go further with this knowledge, and show these programmes not as containers but as architectures, and go further with those challenging materials which have always been the basis of architecture: light, space, shape and two or three other things.

1992

1995. It may be that, six years ago when the library was begun, there really was a different architecture coming into being which was richer, more complex, more complete, more multi-cultural and more chatty. Now it is reality, and now that I can see the finished library in its totality – its colours, its ornament and the radicality of a programme - I see that the library actually adds to the movement wherein architecture grows from real experience into an aesthetic experience.

José M. TORRES NADAL, architect



## Nou Barris Library (Barcelona)

As I arrived at the first meeting to discuss the project in the Virreina with Oriol Bohigas, the Culture Councillor of the time, the Liceu fire broke out, and we had to help move the *Cercle's* works of art, as the main room fell in, much to everyone's despair. Perhaps such a sad beginning gave us the will to overcome, because the later meetings were the most creative, rigorous and effective, that I remember.

We chose to restore the halls of the old *Hospital Mental*, at first against my personal opinion, but later with my full support, and we came up with a sensible, economic and highly satisfactory project.

Within the much-adapted barrack-type structure, the main project was to acquire a cohesive and meaningful interior space. The main piece is a magnificent staircase of natural cement, painted bright "Swinging London" orange, which connects the old and new levels, and the areas with transparent divisions, which all create an interesting interior dimension. It has an elegant free-standing banister which allows one to see the neat, precise design of the steps.

The rest of the project was simply a matter of following the logic of a building which we had been restoring for nearly ten years and whose key features we knew well.

We also got some very clear transparent divisions which used a very effective opaque and glazed section fastening system, from one facade to the other with no carpentry – a method which we had already tried in other parts of the Nou Barris council headquarters in the halls of the old *Hospital Mental* itself. A similar system is used to make the entrance portico really stand out with very modern simplicity.

I have a certain amount of nostalgia for this work, perhaps the last I have seen done with a sensitive and intelligent contractor. Just as well, since the councillor who took over the district during the works did not bother to see us, or even speak to us. It seems he was against the building of libraries.

Ricard PÈRDIGO, architect

### CENTRAL DISTRICT PUBLIC LIBRARY

Address:  
ALBERT EINSTEIN, 2-4  
08042 - BARCELONA

Developer:  
BARCELONA CITY COUNCIL

Architect:  
**RICARD PÈRDIGO NÁRDIZ**  
**TOMÁS RODRIGUEZ COLL**

Collaboration:  
JOAN SOLÀ BALAGUER (structure)  
JOSEP M<sup>a</sup> MILIAN, FRANCESC VENTURA  
(installations)  
SANTIAGO LOPERENA JENÉ (building surveyor)

Construction Company:  
SAPIC

Furniture:  
FRI-TEL, S. L.

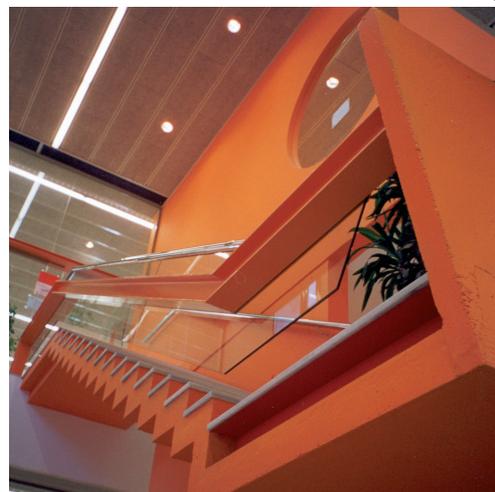
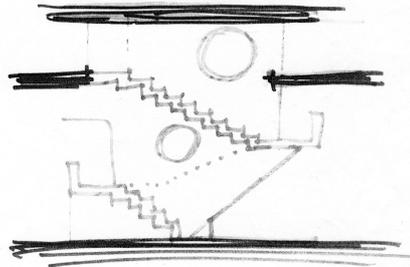
### Dates

Project: 4-94  
Work begun: 6-95  
Work completed: 2-97  
Opening: 4-11-97

Useable Surface Area:	2,008.31 m <sup>2</sup>
Built Surface Area:	2,578.59 m <sup>2</sup>

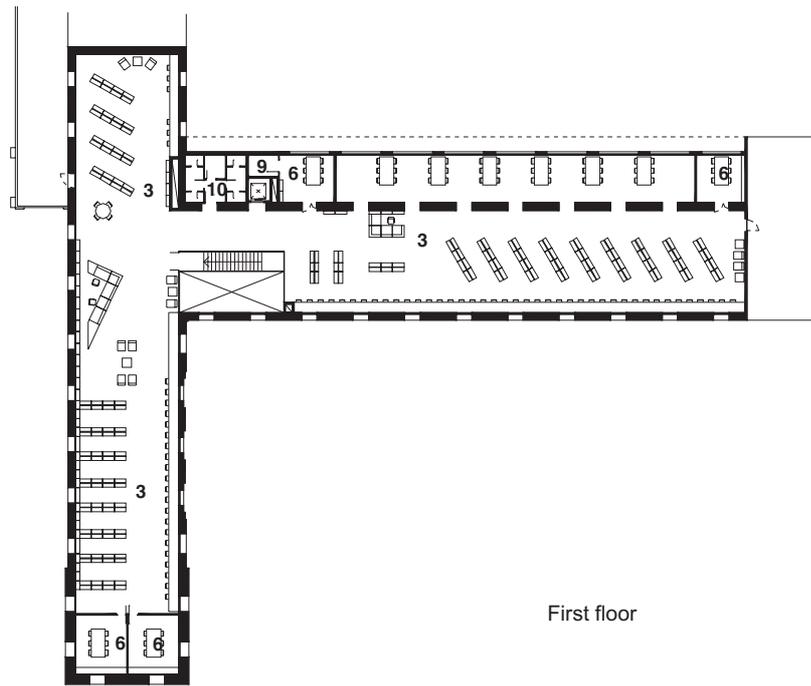
Total Cost of Construction (Execution by Contract Budget - ECB):	1,494,320.51 euros
Cost/m <sup>2</sup> built (ECB):	579.51 euros/m <sup>2</sup>
Cost of Furniture (ECB):	199,456.81 euros

Photography:  
ALBERT DE LA PEÑA (2, 4, 5, 7, 8)  
RICARD PÈRDIGO NÁRDIZ (1, 3, 6)

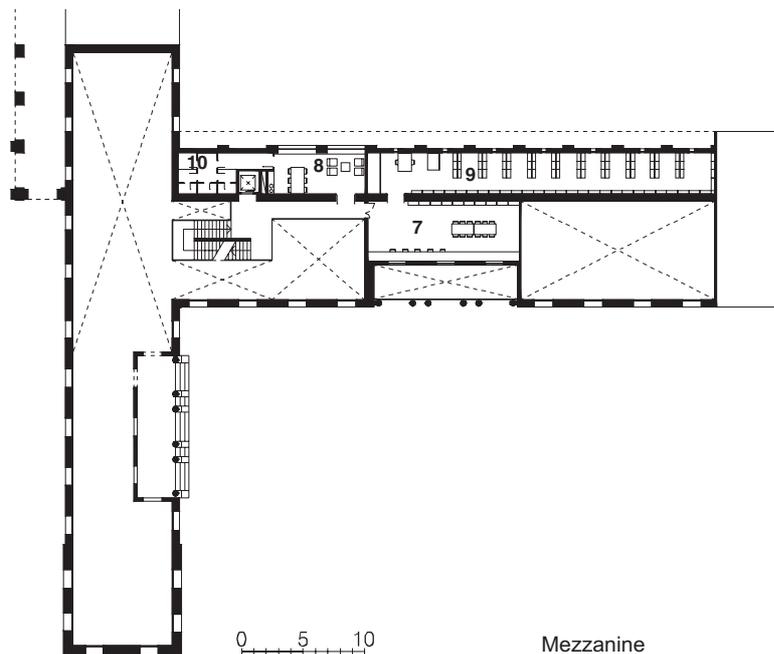




2



First floor



Mezzanine

1. Foyer
2. Periodicals and music
3. General area
4. Children's area
5. Little Readers Corner
6. Group work room
7. Internal working area
8. Staff rest area
9. Storage
10. Toilets

0 5 10



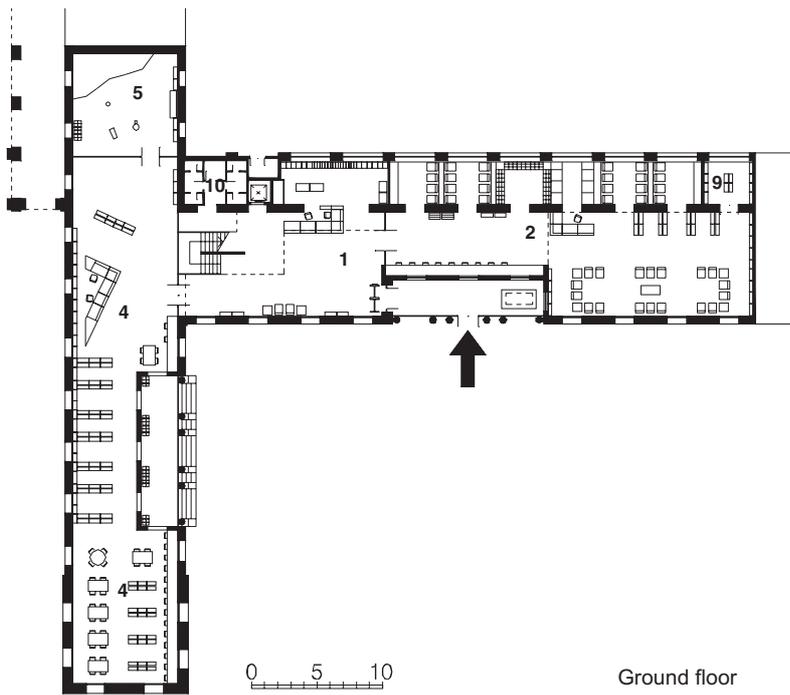
3



4



5





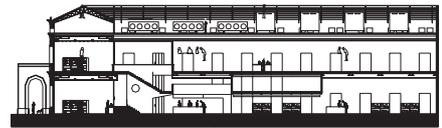
6



Section 1



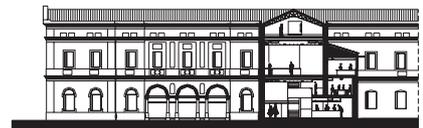
7



Section 2



8



Section 3

## P. Gual i Pujadas Library (Canet de Mar, Barcelona)

*This essay, signed by Pere Armadàs Bosch, refers to the initial project which has undergone modifications due to the intervention of other professionals, and to the extended period of time that the completion of the works has taken.*

### The restoration

The few old photographs that have been found have made it possible to create a surprisingly acceptable reconstruction of the original state of the façade's murals.

One of the first operations was to chip away the existent rundown stucco and to go over the surface with lime mortar, then put the stucco back cold across all of the façades, including that of the added-on house in Carrer Ample. The frames of all the façade's windows, which had rotted beyond recovery, were also replaced.

Among other things, one should point out the recuperation of the windows in the turret on the corner, which had been bricked up, and also the replacement of the ironwork in the upper part of the façade, above the rose window.

### The project

Nothing done by Domènech on the inside could be saved, because it had all disappeared. Even the structure and the roof itself were in such state of deterioration that the best thing was to completely replace them. Knocking down the roof, the interior dividing walls and, later on, the floor structures and masonry walls of the original house left the remaining available space divided into four large spaces.

Having the entrance on the side façade facing the ravine was not advisable, because of the danger of flooding.

It was not put on the Carrer Ample side either, but in the space left after the demolition of the theatre stage, dressing rooms and bakery on the ground floor, which separated the Ateneu from the neighbouring Roura house. The demolition produced a small space, a kind of mini-square, which created a convenient widening of the pavement which allowed the

PUBLIC LIBRARY

Address:  
RIERA DE SANT DOMÈNEC, 1, A  
08360 – CANET DE MAR

Developer:  
CANET DE MAR COUNCIL

Architect:  
**PERE ARMADÀS BOSCH** (Initial Project)  
**JOAN DOMÈNECH** (Final Project)

Collaboration:  
JAUME ARDERIU (building surveyor)  
LLUÍS MOYA (structure)  
J&G ASOCIADOS (installations)

Construction company:  
COPROSA  
PIPSA (façade restoration)  
ICICT

Furniture:  
FRI-TEL, S.L.

Dates:

Initial Project: 12-87 and 7-93

Final Project: 7-95

Work begun in phases: 5-88

Work completed: 9-97

Opening: 21-3-99

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Library's Useable Surface Area:	760	m <sup>2</sup>
Built Surface Area:		
Library:	1,080.38	m <sup>2</sup>
Whole building:	1,406.3	m <sup>2</sup>

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Total Cost of Construction

(Execution by Contract Budget - ECB): 887,756.77 euros

Cost/m<sup>2</sup> built (ECB): 631.27 euros/m<sup>2</sup>

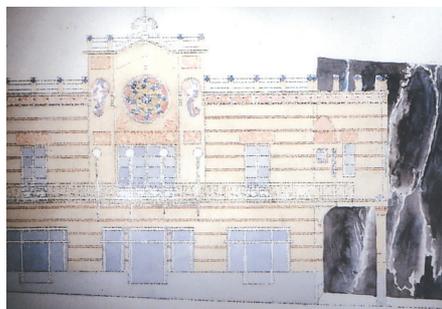
Cost of Furniture (ECB): 98,586.71 euros

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Photography:

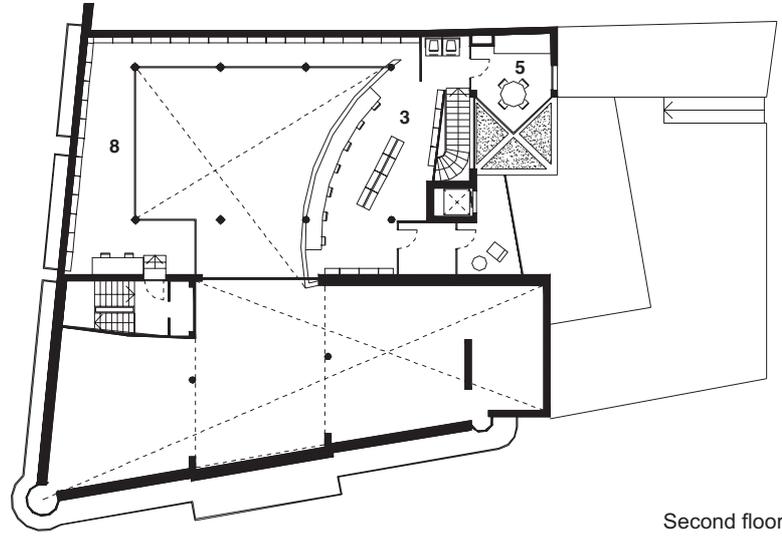
PERE ARMADÀS BOSCH (1, 3)

ALBERT DE LA PEÑA (2, 4, 5, 6, 7, 8, 9)

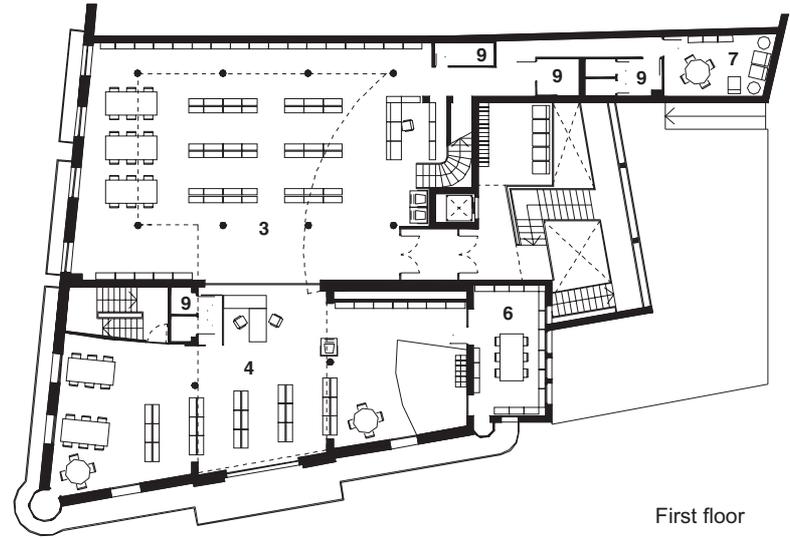


principal access to be through a new lateral façade creating a space containing the entrance. The space resulted from a seemingly disorganized composition of different planes, which interacted in an alternative way with the modernist buildings in the area.

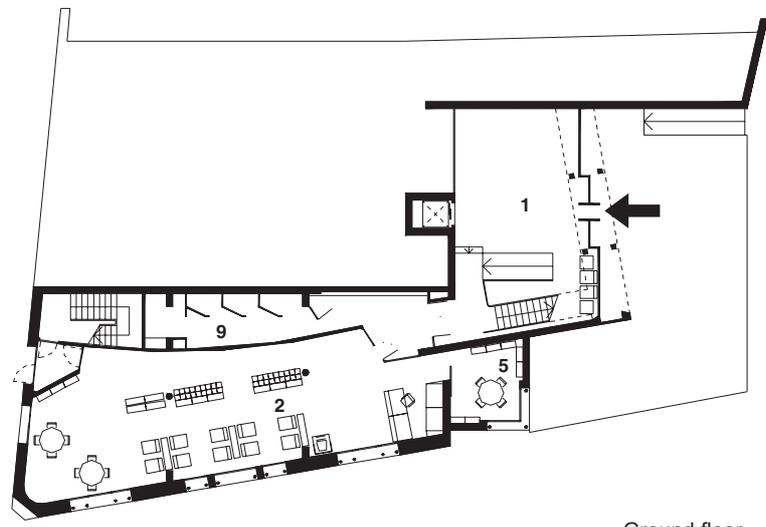
The dialogue between the Ateneu and the Roura house is produced through fragmented elements – walls – each with its own material appearance, abstract in their bareness: words from a modern sentence from the tale of dragons and fairies of Catalan modernist rhetoric.



Second floor

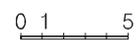


First floor



Ground floor

- 1. Foyer
- 2. Periodicals and music
- 3. General area
- 4. Children's area
- 5. Group work room
- 6. Internal working area
- 7. Staff rest area
- 8. Storage
- 9. Toilets





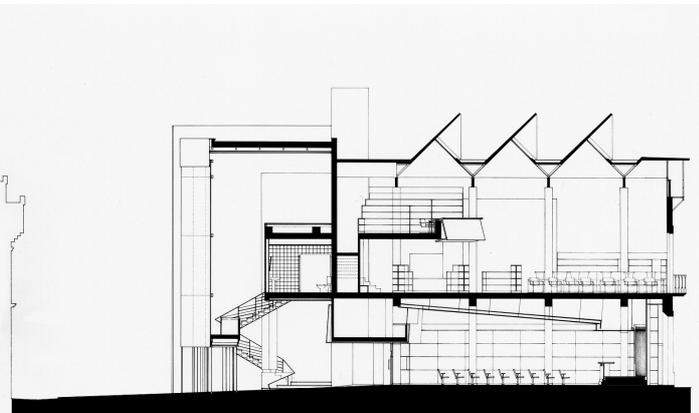
2



North elevation



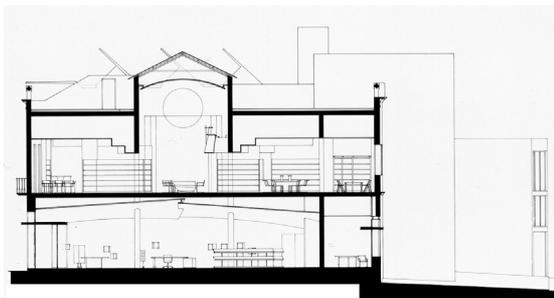
3



South-North section  
(initial project)



4



North-South section  
(initial project)



5



6



7

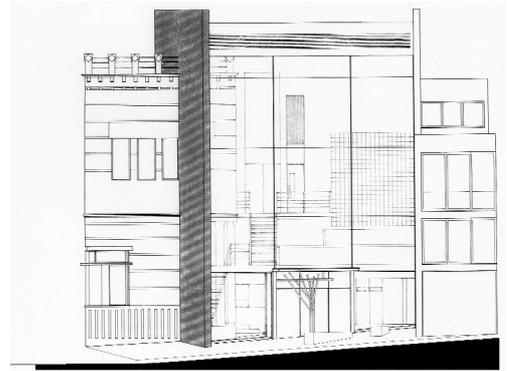
### Strategies of organization

On Carrer Ample, there is ground floor access to the meeting room. In order to free up the floor above, the newspaper library is also located on the ground floor. This contains music listening posts and a small video library.

At the end of the original façade, a black granite wall leads to another of corrugated aluminium sheeting which forms an area containing the entrance and communication with the upper floor, where the library is: the main room and the mezzanine containing the historical collection, both inside the area occupied by the theatre pit and stage, now lit from above by a series of north-facing skylights in the new roof.

The layout in Domènech and Montaner's building is completed by the young

8



South elevation (initial project)

people's/children's library and a space which – overseen by the rose window – is an attempt to create a direct relationship between adults and the young.

The library architecture creates substantial points of union between the street and the interior.

As has been said, the solution has kept in mind the formation of a major entrance structure which has those elements of interrelation which are only suspected when looking from the outside, so that when one actually enters the library there is a kind of revelation, just like what happens in reality with the learning process which begins with choosing a book, opening it and beginning to read.

Pere ARMADÀS, architect



# Pare Miquel d'Esplugues Central Library (Esplugues de Llobregat, Barcelona)

## CENTRAL CITY PUBLIC LIBRARY

Address:  
ÀNGEL GUIMERÀ, 106-108  
08950 – ESPLUGUES DE LLOBREGAT

Developer:  
ESPLUGUES DE LLOBREGAT COUNCIL

Architect:  
**ARTIGUES & SANABRIA ARQUITECTES**

Collaboration:  
LLUÍS X. COMERON, JOAN IÑIGUEZ (architects)  
ANTONIO MASSAGUÉ (installations engineer)  
VIDAL GARCÍA, VIRGINIA OTAL (building surveyors)

Construction Company:  
FOMENTO DE CONSTRUCCIONES Y CONTRATAS, S.A.

Furniture:  
INDUSTRIAS GAMA, S.A.

### Dates:

Project: 7-95  
Work begun: 7-97  
Work completed: 3-99  
Opening: 5-5-99

Useable Surface Area:	2,298.55 m <sup>2</sup>
Built Surface Area:	2,568.2 m <sup>2</sup>

Total Cost of Construction	
(Execution by Contract Budget - ECB): 1,693,763.84 euros	
Cost/m <sup>2</sup> built (ECB):	659.51 euros/m <sup>2</sup>
Cost of Furniture (ECB):	209,173.15 euros

### Photography:

ALBERT DE LA PEÑA (1, 5, 6, 7, 9, 10)  
JOAN MUNDÓ (8)  
EUGENI PONS (2, 3, 4)

The conversion of a school into a library, which is the case here, is not something that can be generalized since the buildings and programmes fulfil very different demands.

The project is organized into a rectangular floor with the main entrance off Calle Àngel Guimerà, and a separate entrance on the opposite side.

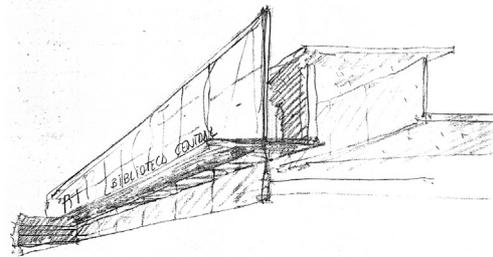
On entering, you are faced with the main entrance hall. This space conserves some of the defining elements of the previous building and has a very high ceiling, producing two light inlets – one facing north, one south, whose light is diffused by the marble wall opposite the main façade of the building, which serves almost as a huge billboard.

On one side of the entrance hall, there is the children's section, with a space for pre-readers and a large area where the children can read and spread themselves out. This space is lit by a skylight which runs the length of the space between the room's two ceiling levels, and a series of small windows strategically placed at a suitable height for the children.

On the other side of the main entrance hall is the services wing. This part contains the following rooms/areas :

- Lockers for personal effects, and vending machines.
- Area with men's, women's and disabled toilets
- Electrics zone and access stairs for roof maintenance .
- Connection ducts to main storeroom, which is also in this area.

Passing through the entrance hall and into the library itself we find a low-ceilinged area housing the music and periodicals sections. Beyond this area, we come to the main reading room, the more cultural demands of which take us towards something like the great Victorian libraries. This generously-proportioned room is punctuated by a grid of



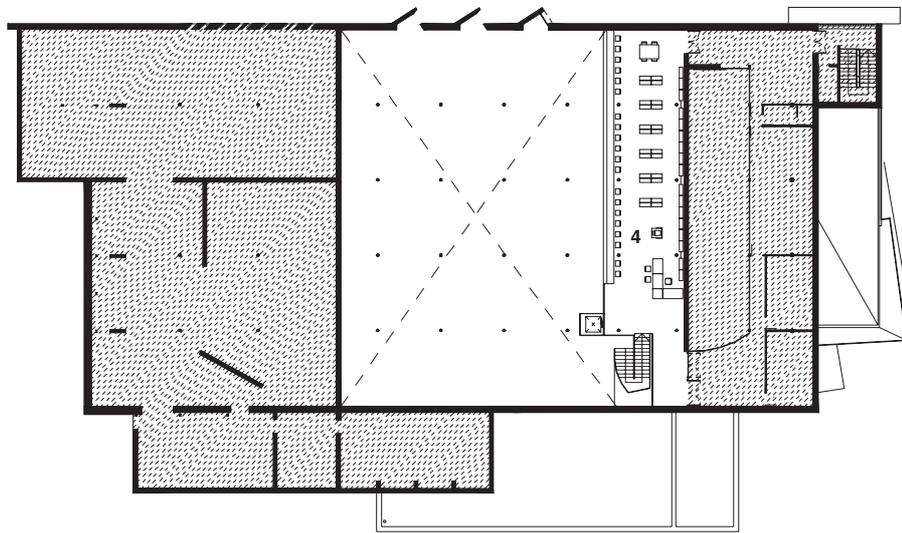
metal columns with large skylights between them. The height of the room is one of the most striking features, since it creates a deliberate change in scale between the entrance and the enclosed space.

On the wall at the end of the room, there is a series of shelves, and two fairly important features – the free-standing metal staircase and the glass elevator. These two elements serve as communication with a mezzanine, which visually fits the room, and which will perform more specific functions. The rest of the first floor is made up of a series of offices, meeting rooms and an internal use staffroom for the librarians and technicians.

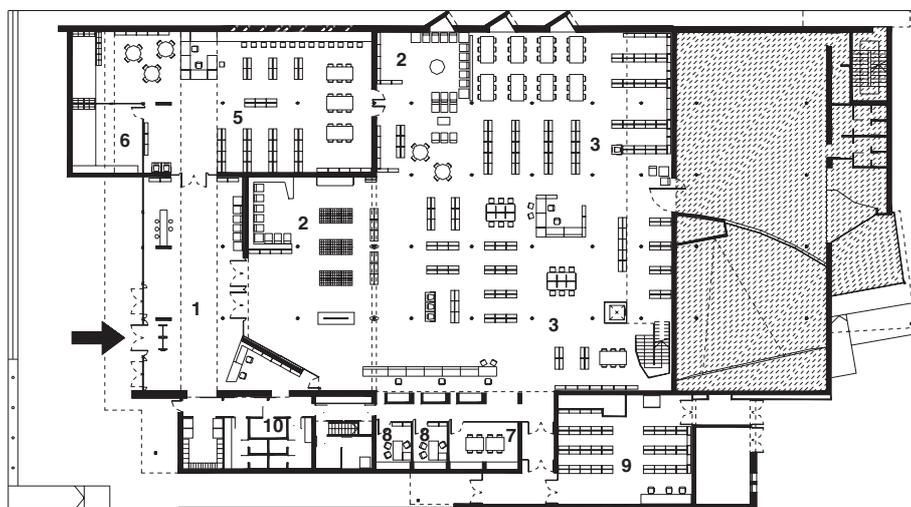
Finally, the ground floor of the rear part of the building will house those functions most

closely connected with the public and customer service, such as the temporary exhibition space, which also serves as a foyer the multi-purpose room. This exhibition room can be incorporated into the main library hall by means of a huge communicating screen-door which can be used at particular times to unite the spaces. At the same time, this rear section includes a small janitor's area and toilets.

Ramon ARTIGUES, architect  
Ramon SANABRIA, architect



Mezzanine



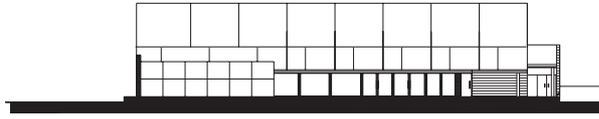
1. Foyer
2. Periodicals and music
3. General area
4. Specialized collections area
5. Children's area
6. Little Readers Corner
7. Group work room
8. Office
9. Storage
10. Toilets

0 5 10

Ground floor



2



Southeast elevation

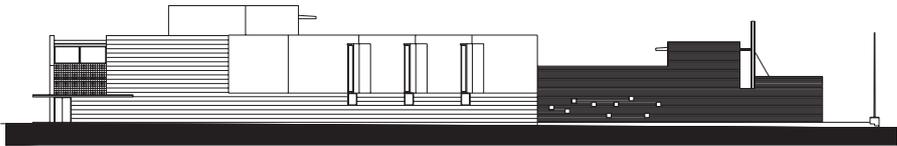
0 5 10



3



4



Southwest elevation

0 5 10



5



6



Longitudinal section

0 5 10



7



8



9



10

## State-run Public Library (Sevilla)

The building is next to Maria Luisa Park, on what were the grounds of the 1929 Ibero-american Exhibition, surrounded by the old pavilions of the USA, Peru and Uruguay, which create a pointedly socially committed environment. The library has the same singularity and separateness as the neighbouring buildings, partly in response to the various urban situations of the surroundings, while creating its own unity.

The wide gallery which runs round the perimeter of the site creates an interior patio which gives twice the light to the reading areas. This unexpected space – a patio inside a park – means that books can be read in the open air during much of the year, away from the traffic noise of the surrounding streets. Everything, from the zinc roof to the way the gardens are kept, underlines the centripetal character of the project. The patio is like a secret discovery for the visitor to the building, because at no time do the outside walls give any indication that this open-air space exists, defined by the concave face of the building.

The structure is on two levels, and has six exterior sides, the same number as the site itself, bordering the Avenue of Chile on the north side, the USA pavilion site – in a discontinuous line – on the south, the Avenue of María Luisa on the east, the Paseo de las Delicias on the southeast and the old Uruguay pavilion site on the west side. Between this last and the western façade, there is a plot reserved for the car park. Another, smaller, car park occupies the space between the USA pavilion and the library's southern façade, made up of two walls which enclose the patio.

Both entrances, beneath similar low porches, open on to the Avenue of Chile and the Paseo de las Delicias. Passing through the revolving doors, one comes to the first room – reception and information. An area with stairs, lifts, toilets and auxiliary offices separates one from the interior of the library, delaying the appearance of the patio. The various functions are set out around it. On the lower floor there is a book

### PROVINCIAL PUBLIC LIBRARY

#### Address:

PARQUE DE MARÍA LUISA  
RECINTO DE LA EXPOSICIÓN IBERO-AMERICANA DE  
SEVILLA DE 1929

#### Entrances:

AVENIDA DE CHILE and PASEO DE LAS DELICIAS

#### Developer:

MINISTRY OF CULTURE – DIRECTOR GENERAL OF  
BOOKS, ARCHIVES AND LIBRARIES

#### Architects:

**ANTONIO CRUZ – ANTONIO ORTÍZ**

#### Collaboration:

BLANCA SÁNCHEZ, MIGUEL VELASCO (architects)  
MANUEL DELGADO, J. ANTONIO MOLINA  
(building surveyors)  
BET FIGUERAS (gardens)  
ENRIQUE CABRERA (structures)  
TOMÁS RUIZ (installations)

#### Construction Company:

DRAGADOS Y CONSTRUCCIONES, S.A.

#### Furniture:

DRACE

#### Dates:

Project: 1995  
Work begun: 9-96  
Work completed: 12-98  
Opening: 6-99

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Useable Surface Area:	4,510.67 m <sup>2</sup>
Built Surface Area:	5,516.71 m <sup>2</sup>

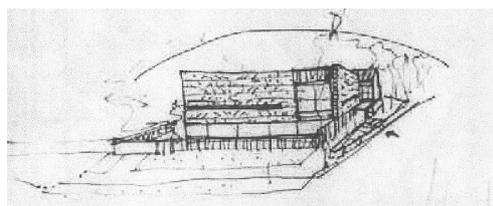
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Total Cost of Construction (Execution by Contract Budget - ECB):	4,934,296.37 euros
Cost/m <sup>2</sup> built (ECB):	894.43 euros/m <sup>2</sup>
Cost of Furniture (ECB):	916,574.87 euros

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#### Photography:

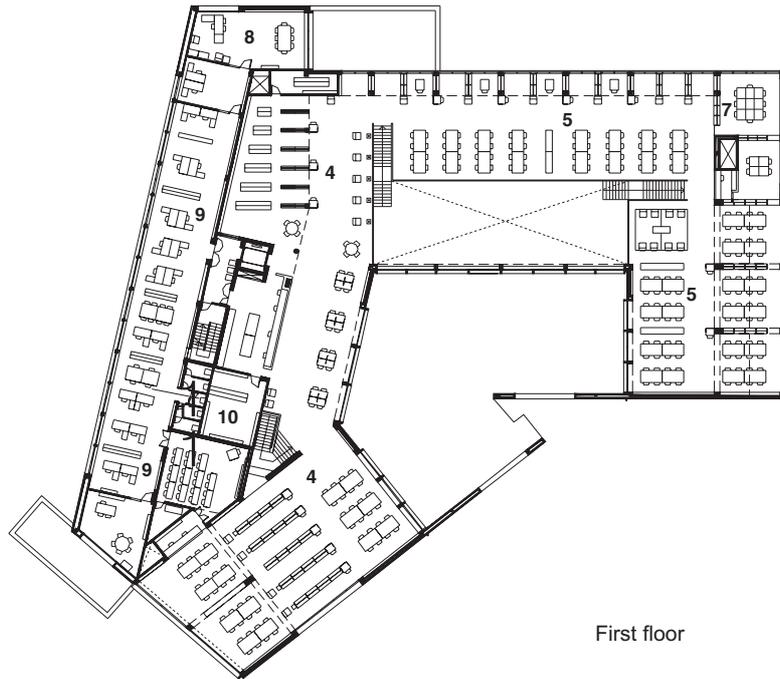
DUCCIO MALAGAMBA



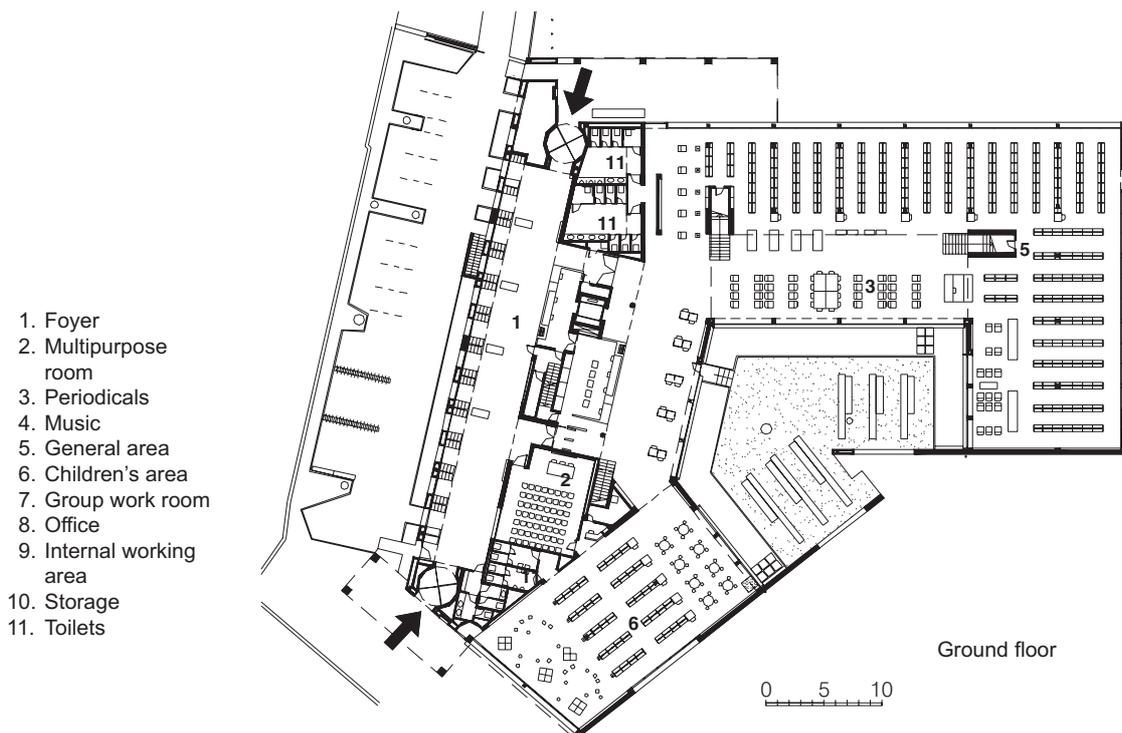
lending area which takes up the northeast corner – a high-ceilinged space for newspaper and magazine reading, and a children’s section in the extreme southwest. The cultural activity room and monitoring and toilet areas are, as mentioned before, between the entrance hall and the area around the patio. On the west wing of the first floor we find the administration and management offices – above the entrance hall – and a classroom, the video / sound library and monitoring and toilet areas. The reading rooms are above the children’s section and the book lending area.

The colour white is used for the walls and ceilings of the interior spaces, which are very well-lit thanks to large glass surfaces – large or continuous windows with grey aluminium carpentry –, opening on to the redbrick facing which makes up the exterior surface of the outside walls, in keeping with the bricklaying methods of many of the buildings constructed during the Ibero-american Exhibition.

Antonio CRUZ, architect  
Antonio ORTIZ, architect

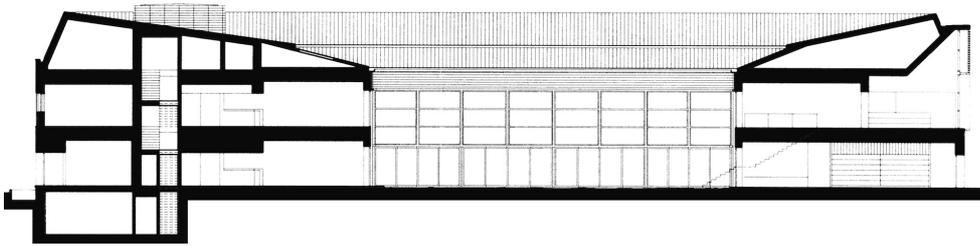


First floor

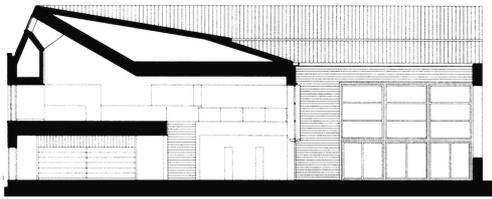


- 1. Foyer
- 2. Multipurpose room
- 3. Periodicals
- 4. Music
- 5. General area
- 6. Children's area
- 7. Group work room
- 8. Office
- 9. Internal working area
- 10. Storage
- 11. Toilets

Ground floor

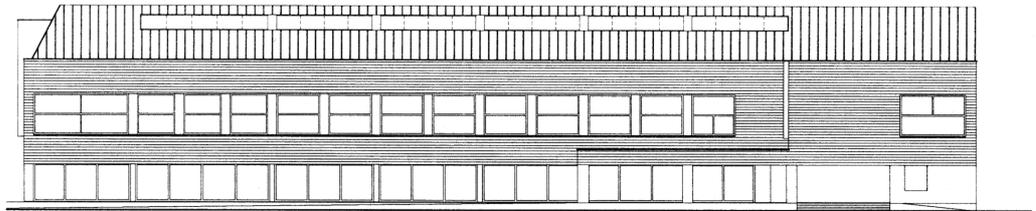


Section 1



Section 2





Northeast elevation



# Tecla Sala Library (L'Hospitalet de Llobregat. Barcelona)

REGIONAL CENTRAL PUBLIC LIBRARY  
Address:  
AV. JOSEP TARRADELLAS, 44  
08901 – L'HOSPITALET DE LLOBREGAT  
Developer:  
HOSPITALET DE LLOBREGAT COUNCIL  
Architect:  
**ALBERT VIAPLANA VEÀ** (Project)  
**ALBERT VIAPLANA / DAVID VIAPLANA Arquitectes, S.L.**  
Collaboration:  
DAVID VIAPLANA, MÓNICA SERRA (architects)  
XAVIER VILA (civil engineer)  
ROSA SABARICH (building surveyor)  
LLUÍS MOYA (structure)  
J&G ASOCIADOS (installations)  
Construction Company:  
FOMENTO DE CONSTRUCCIONES Y CONTRATAS, S.A.  
Furniture:  
COMERCIAL PROUS, S.A.

Dates:  
Project: 1.997  
Work begun: 9-97  
Work completed: 10-00  
Opening: 17-12-00

Library's Useable Surface Area:	4,608 m <sup>2</sup>
Built Surface Area:	
Library:	5,243 m <sup>2</sup>
Whole building:	9,106.74 m <sup>2</sup>

Total Cost of Construction (library)	
(Execution by Contract Budget - ECB):	3,665,978.12 euros
Cost/m <sup>2</sup> built (library) (ECB):	704.33 euros/m <sup>2</sup>
Cost of Furniture (ECB):	579,404.53 euros

Photography:  
ALBERT DE LA PEÑA (4)  
JORDI POL (1, 2, 3, 5, 7)  
MÓNICA SERRA (6)

The Central Library of L'Hospitalet de Llobregat and an exhibition room, which had been on the premises for a long time, had to share a three-storey ex-textile factory of 94 × 28 metres. Because the surface areas had to be divided up equally, the middle floor had to be shared, which meant the best idea was to have one multi-purpose room in common. This meant the entrance hall of both sections being on the first floor. From this shared entrance hall, there is access to one part of the library and exhibitions, from which one can go up or down to the other rooms.

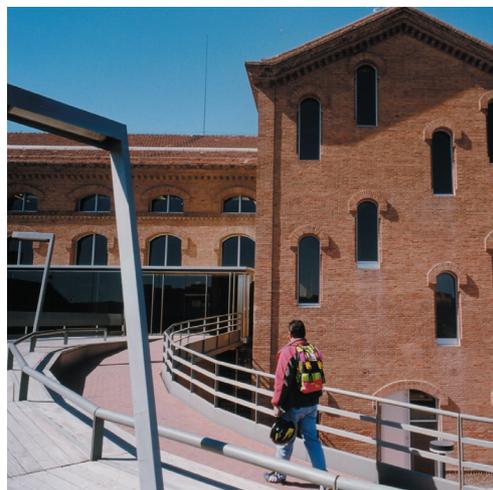
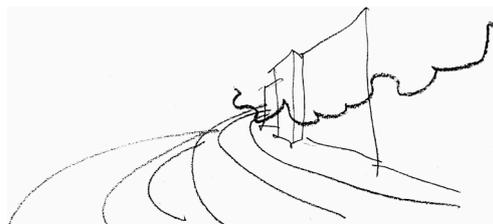
Everything pointed towards this entrance to the first floor being as far as possible a continuation of the street. So a pedestrian ramp was built, starting at one end of the building and leading the visitor to the shared entrance hall. Once there, one passes to the library area, where a staircase leads through the double height space up to the upper part where the main area is.

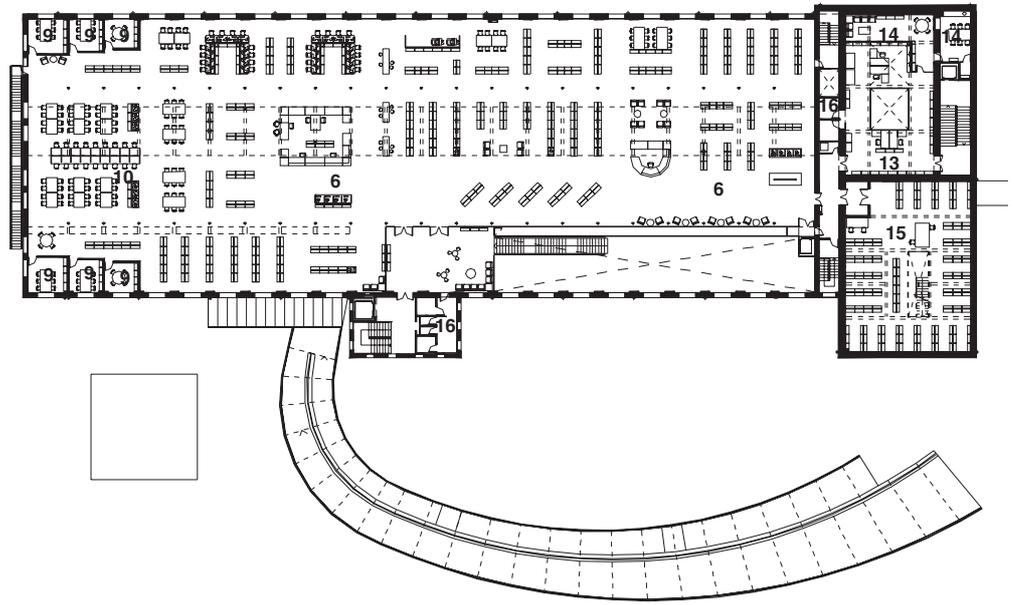
Analogously, on the other side of the first floor, one passes to the exhibition hall, the smaller hall and, via a double ramp, to the grand hypostyle hall of the lower floor. This floor leads directly to the outside.

All the smaller offices which serve the library and the exhibitions are in the divided part of the old factory.

The public gardens are ranged according to the most singular of the outside elements, the ramp. On the site plan, wide promenades with no discernable beginning or end, give order to the whole space. There are short cuts to solve any practical problems.

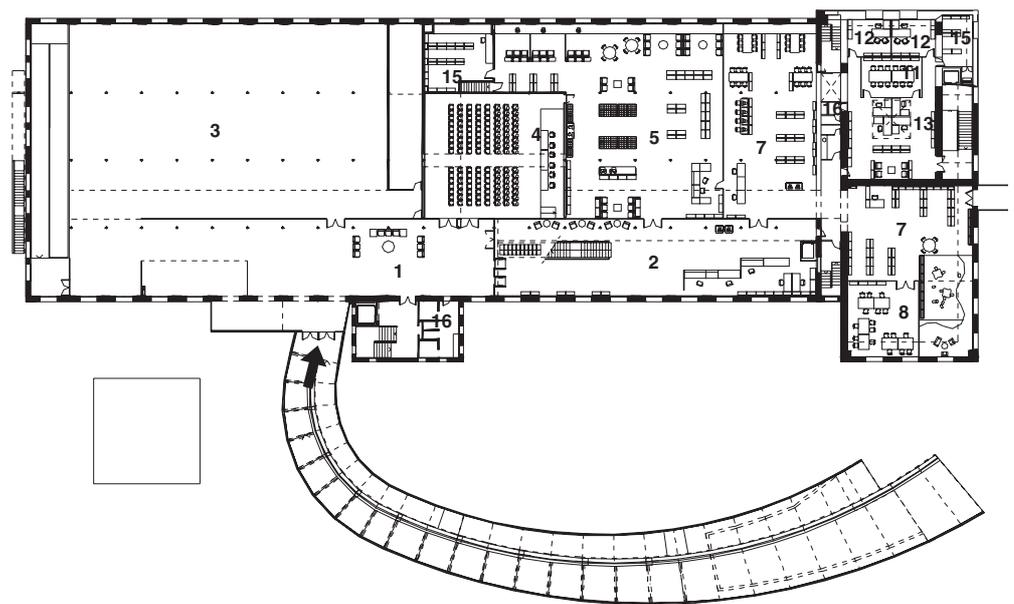
Albert VIAPLANA, architect





Upper level

1. General foyer
2. Library foyer
3. Exhibition room
4. Conference room
5. Periodicals and music
6. General area
7. Children's area
8. Workshop
9. Group work room
10. Study room
11. Meeting room
12. Office
13. Internal working area
14. Staff rest area
15. Storage
16. Toilets

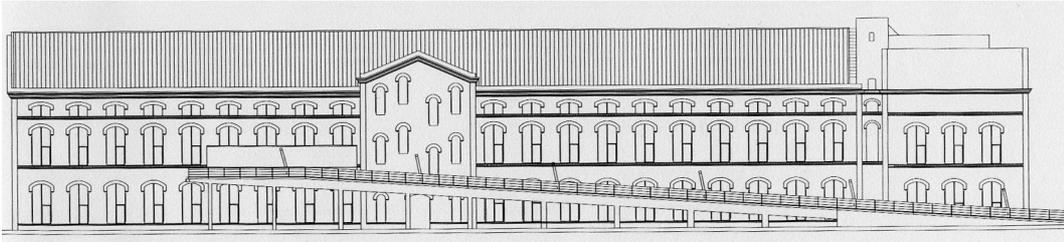


Entrance level

0 5 10



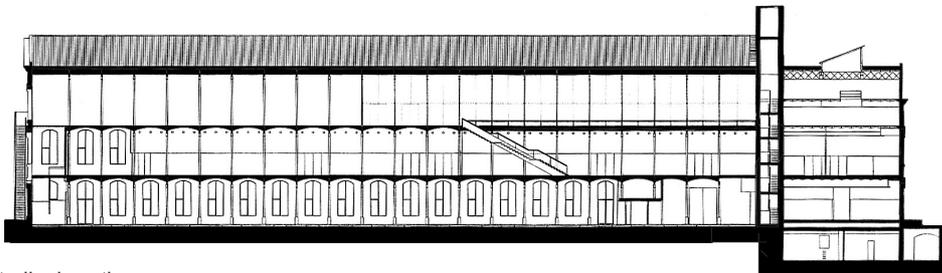
2



Main façade



3



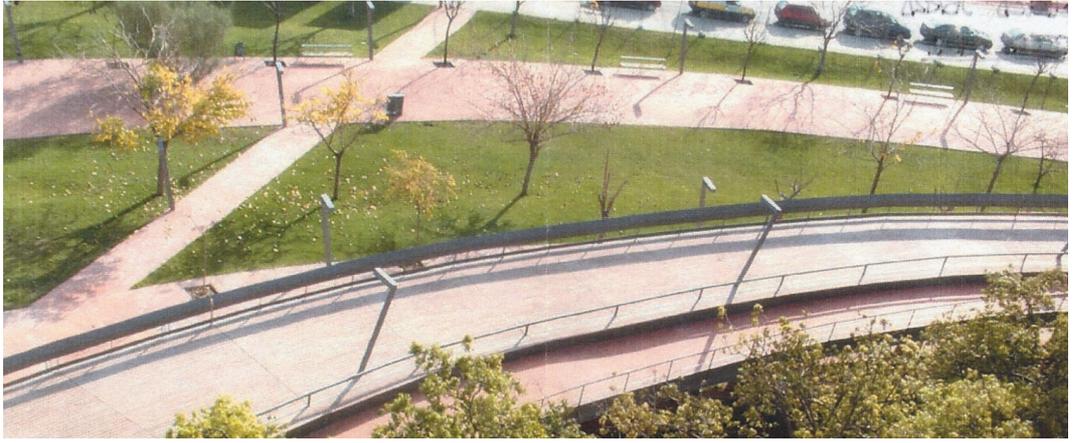
Longitudinal section



4



5



6



7

# Terrassa Central Library (Terrassa, Barcelona)

## REGIONAL CENTRAL PUBLIC LIBRARY

Address:  
PASSEIG DE LES LLETRES, 1  
08221 - TERRASSA

Developer:  
TERRASSA COUNCIL

Architect:  
**JOSEP LLINÀS CARMONA**

Collaboration:  
ROBERT BRUFAU (structural calculus)  
J G & ASSOCIATS, S.A. (installations calculus)  
JAUME MARTÍ (building surveyor)

Construction Company:  
FERROVIAL, S.A.

Furniture:  
COMERCIAL PROUS, S.A.  
INDUSTRIAS GAMA, S.A.

### Dates

Initial Project: 1991  
Final Project: 1995  
Work begun: 3-95  
Work completed: 5-98  
Opening: 10-5-98

Useable Surface Area:	3,389.7 m <sup>2</sup>
Built Surface Area:	3,659.2 m <sup>2</sup>

Total Cost of Construction (Execution by Contract Budget - ECB):	2,753,969.2 euros
Cost/m <sup>2</sup> built (ECB):	752.62 euros/m <sup>2</sup>
Cost of Furniture (ECB):	410,677.59 euros

### Photography:

ALBERT DE LA PEÑA (2, 3, 4, 5, 6, 7, 8)  
LOURDES JANSANA (1)  
MIQUEL QUEROL (9, 10)

The features of the surroundings mean that the library has to have the lowest possible number of floors, which in turn means using the maximum possible square metrage for the ground floor.

Since there is a town planning project for a private six-metre green belt between the neighbouring construction and our land, the idea of creating a new pedestrian street running parallel to this belt has been suggested, so that there is access to the building via a silent space, which at the same time creates a fourth wall for the library.

On the southern side, a building-free garden area is planned, belonging to the facility.

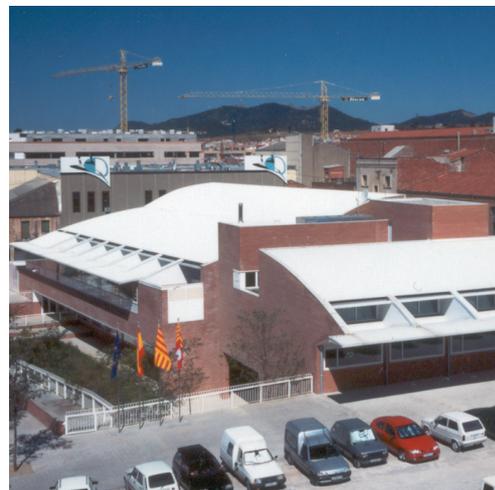
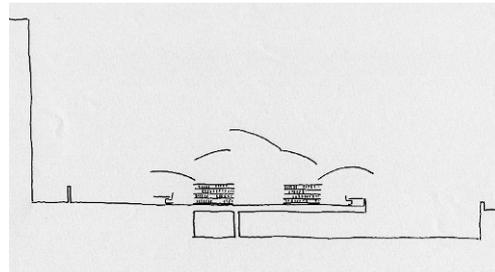
Building over two floors means that the maximum space on the ground floor can be used. This is where the entrance, information and reference areas are, as well as the general collection and the periodicals and music sections.

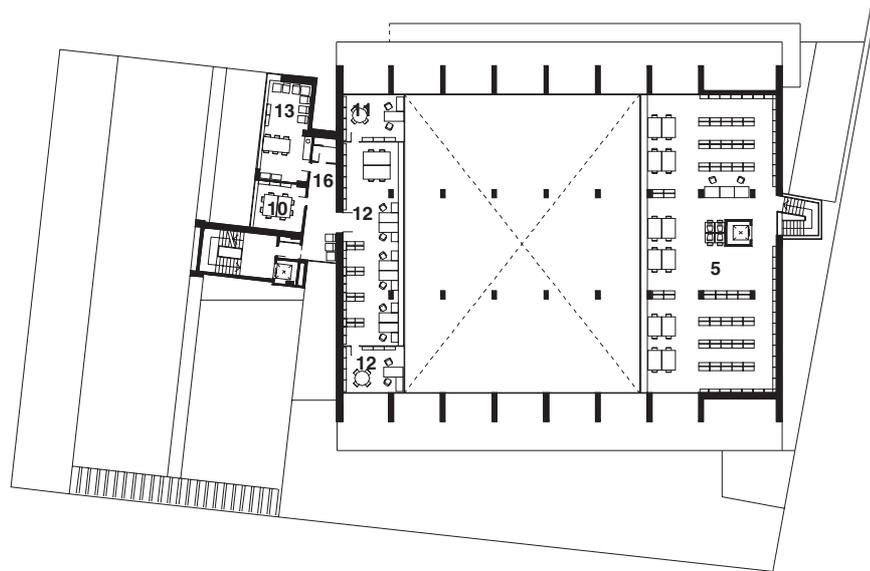
The specialist sections and the internal work areas are on the mezzanine of the ground floor.

On the lower floor, in front of the garden area on the southern side, the children's library and the multi-purpose room are to be built.

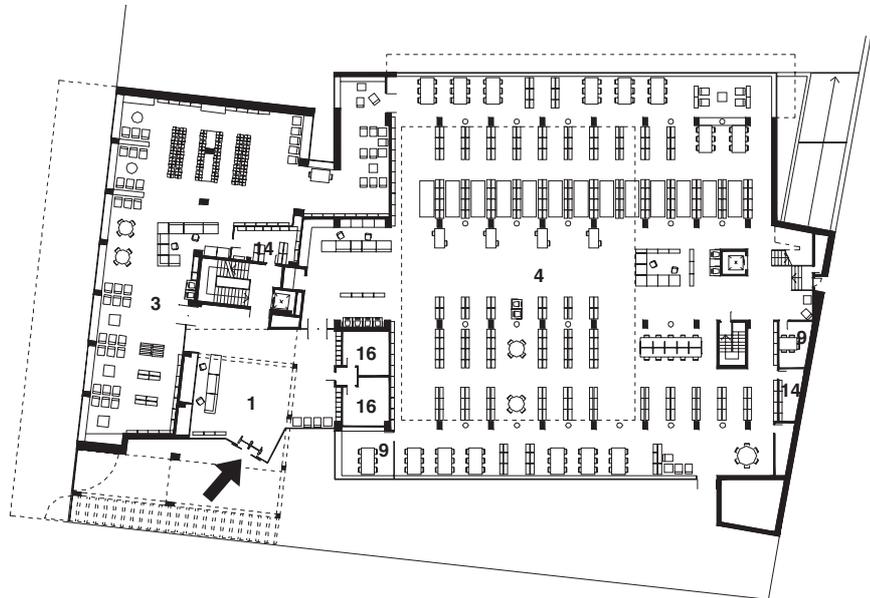
Because the Calle Pantà is a major street, it has been chosen as the Eastern limit, where the periodicals and music areas are to be, and this is emphasized by the construction of a portico.

Josep LLINÀS, architect



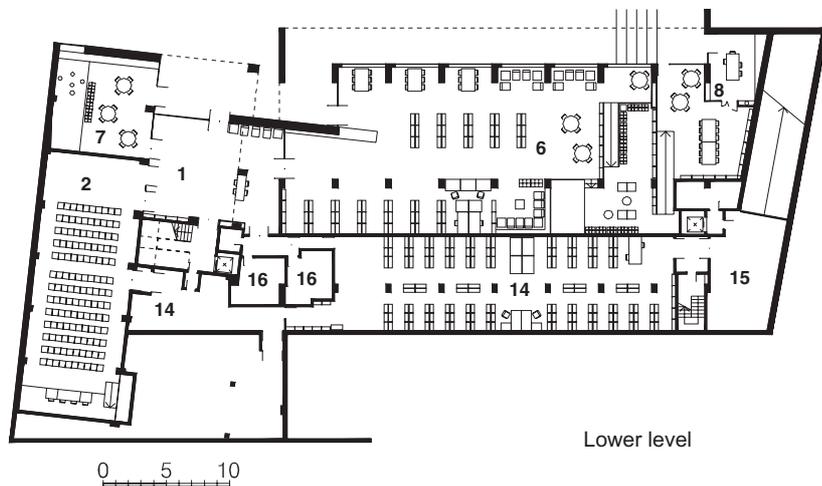


Mezzanine



Entrance level

1. Foyer
2. Conference room
3. Periodicals and music
4. General area
5. Specialized collections area
6. Children's area
7. Little Readers Corner
8. Workshop
9. Group work room
10. Meeting room
11. Office
12. Internal working area
13. Staff rest area
14. Storage
15. Mobile Library Bus parking space
16. Toilets



Lower level



2



3



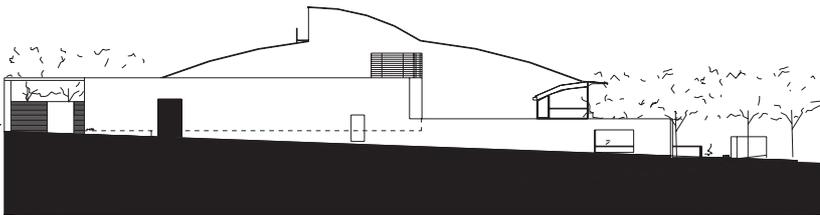
East elevation



4



5

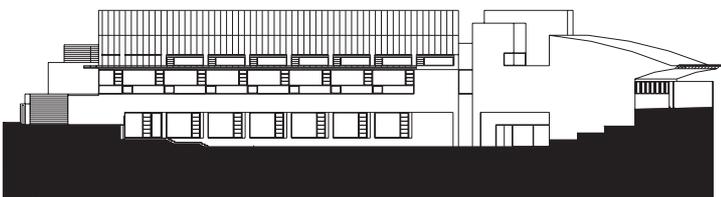


West elevation

6



7



South elevation

0 5 10



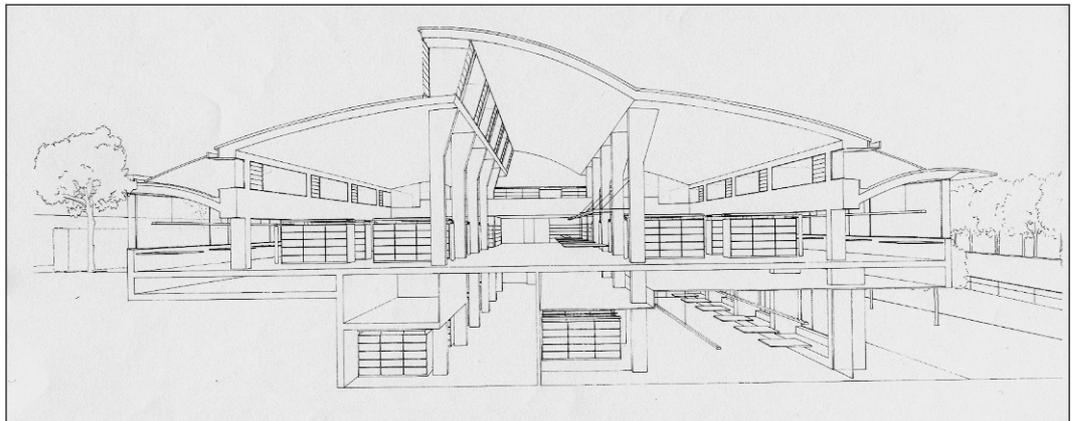
8



9



10



# NATIONAL LIBRARIES

## The Library of Catalonia (Barcelona)

The Library of Catalonia was founded in 1907 by the Institut d'Estudis Catalans (Institute of Catalan Studies) and had its first central offices on the second floor of the Palau de la Generalitat government building, where it opened to the public in 1914 with a collection of nearly 24,000 registered works and something like 250 manuscripts. The rapid growth of the library led to the Institute's proposal in 1922 to move it to the old Santa Creu Hospital, which the city had purchased.

In 1929, the adaptation works began, but were interrupted by the outbreak of the Civil War. In 1940, the first floor transept was opened to the public as a reading room, and thereafter there was a long list of partial conversion works which was to go on for decades.

The result of all this is that the central Library of Catalonia, despite having the most beautiful reading rooms in all Europe, is actually completely ill-adapted, functionally disorganized and has a lack of space which has actually led to a situation fairly close to total collapse.

The proposal for reform bases the reorganization of the library around the demolition of later buildings which hide the gothic hospital both in the Calle Egipcíacs and Gardunya Square, and in the construction of deposit and underground working areas.

The reading rooms occupy the upper floor of the whole's gothic naves. The remodelling of these rooms had a double aim: on the one hand, the interior restoration of the Gothic naves and, on the other, the installation of some versatile spaces which would have up-to-date equipment and be suitable for reference and research.

In Istanbul's larger mosques, thousands of naked light bulbs hang inside spaces of monumental proportions. Not too high up, these little lamps create a cushion of light

### NATIONAL LIBRARY

Address:  
HOSPITAL, 56 - 08001 - BARCELONA  
Developer:  
AUTONOMOUS GOVERNMENT OF CATALONIA  
Architect:

#### JOAN RODON BONET

Collaboration:  
MANUEL ARGUIJO, CARLES FRANCESCH, WALTER HEGNAUER, ISABEL RODON (architects)  
ANNA FORNT (interior design)  
XAVIER PUCHADES (painter)  
TERESA SERNA, FRANCESC BURGUÉS (building surveyors)  
J.G. & ASOCIADOS (installations)  
Construction Company:  
DRAGADOS Y CONSTRUCCIONES, S.A.  
SAPIC  
Furniture:  
Moveable shelving: INDUSTRIAS GAMA, S.A.  
Carpentry work: DEMETRI, S.L.  
Office furniture: SEUBA, S.A.

### Dates:

Project: 1991-1996  
Work on reading rooms: 1992-1994  
Work on deposits: 1993-1996  
Opening - reading rooms: 10-94  
Opening - deposits: 10-98

### Useable Surface Area:

Reading rooms:	2,200 m <sup>2</sup>
Deposits:	6,491 m <sup>2</sup>
Total:	8,691 m <sup>2</sup>

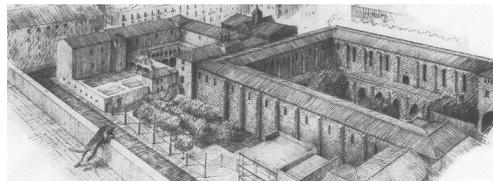
### Built Surface Area:

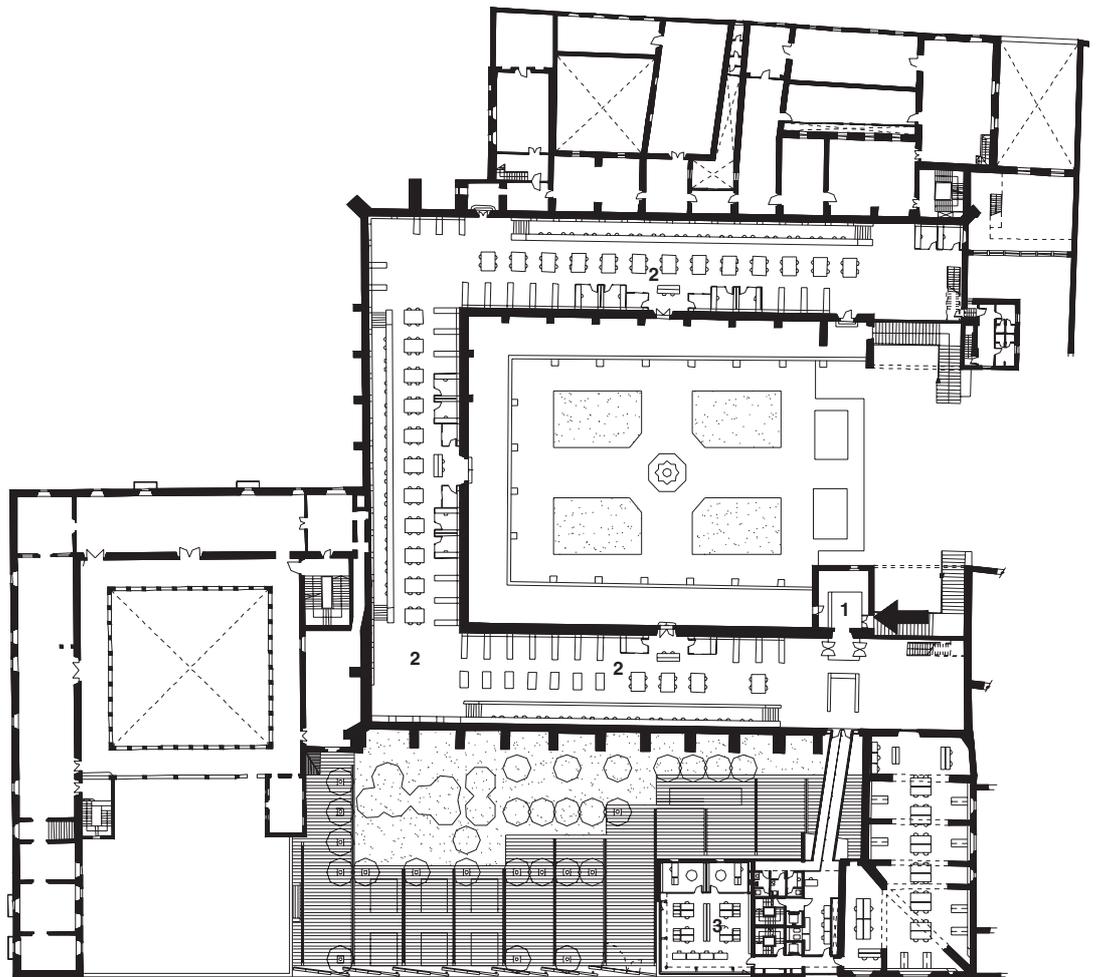
Reading rooms:	2,993 m <sup>2</sup>
Deposits:	7,641 m <sup>2</sup>
Total:	10,634 m <sup>2</sup>

Total Cost of Construction (Execution by Contract Budget - ECB): 13,526,505.94 euros  
Cost/m<sup>2</sup> built (ECB): 2,422.07 euros/m<sup>2</sup>  
Cost of Furniture (ECB): 1,885,860.22 euros

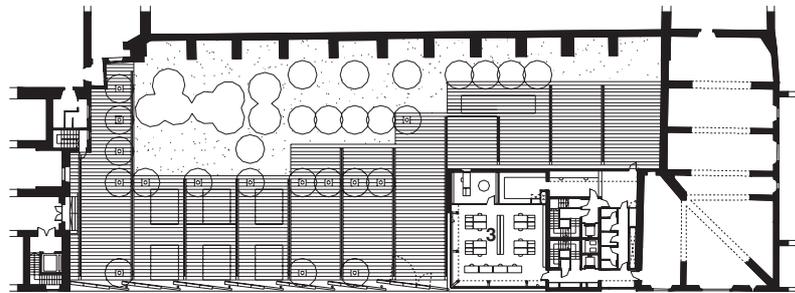
### Photography:

FERRAN FREIXA (5, 6) / EUGENI PONS (1, 2, 3, 4)



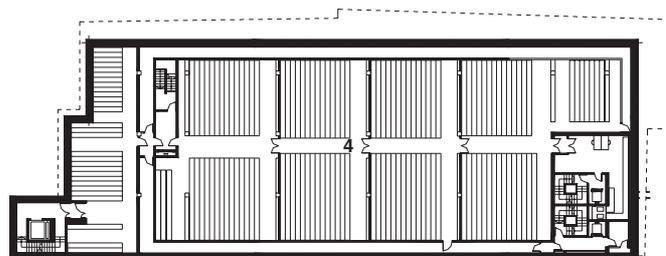


Floor +3



Ground floor

1. Library entrance
2. Reference rooms
3. Internal working area
4. Book storage

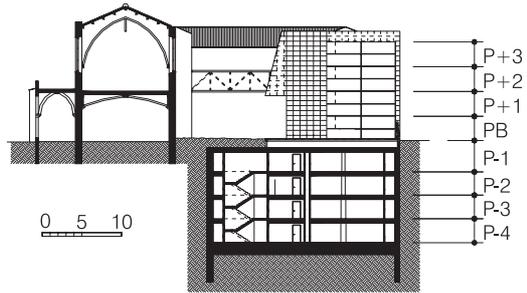


0 5 10

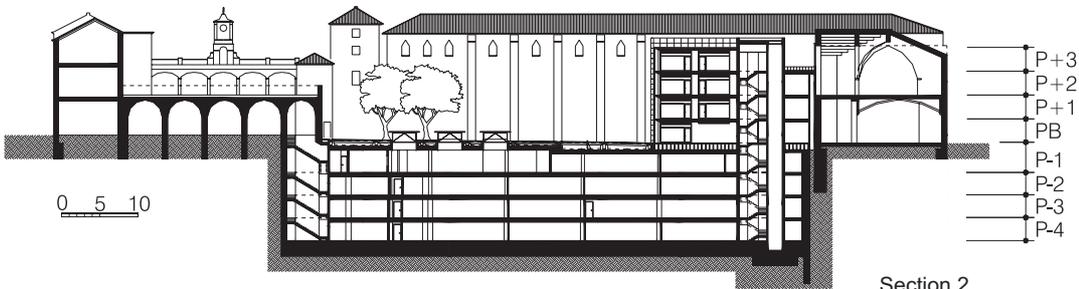
Lower levels,  
-1, -2, -3 and -4



2



Section 1



Section 2

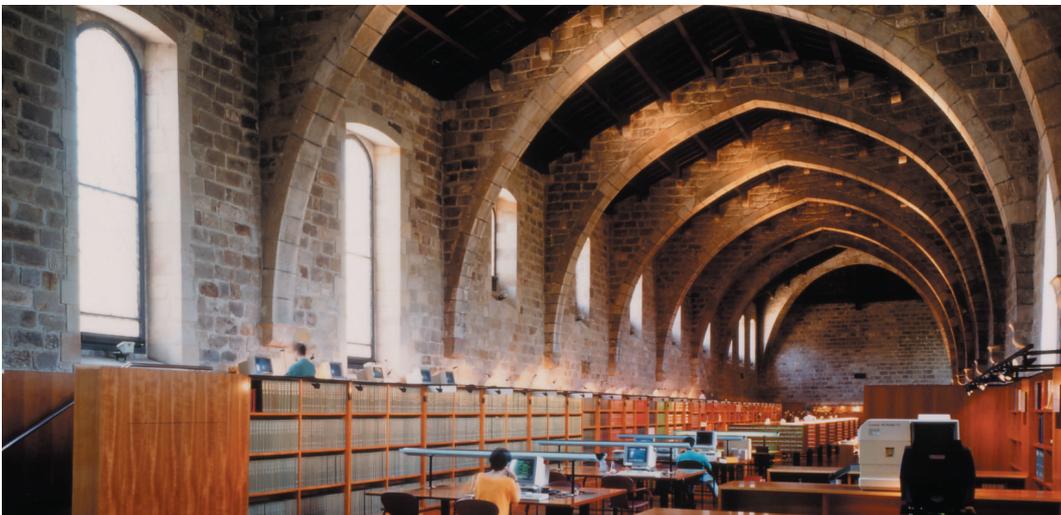


3



4

5



which gives an atmosphere of intimacy within the hugeness of the mosque, suitable for prayer meditation. The same criterion has been followed in the library. The rooms have been restored and, like a space within a space, the furniture has been designed with all the equipment necessary on a smaller scale, creating a united space within the general space, which encourages study and research.

Access for the readers is via the monumental staircase on the east wing where there is a cloakroom the windproof entrance door and the security desk. The catalogue room is found in the old humanities room, and book distribution to other reading rooms is done from the reserved books tower.

The lower floor naves which are not occupied by either the Sant Pau Library nor the children's section, are given over to complementary library facilities such as the exhibition room, the shop, the Marès collection and so on.

The deposit building was demolished and a major four-storey underground deposit was

built, on the site obtained by joining the demolished deposit's site to the Egipcíiques patio.

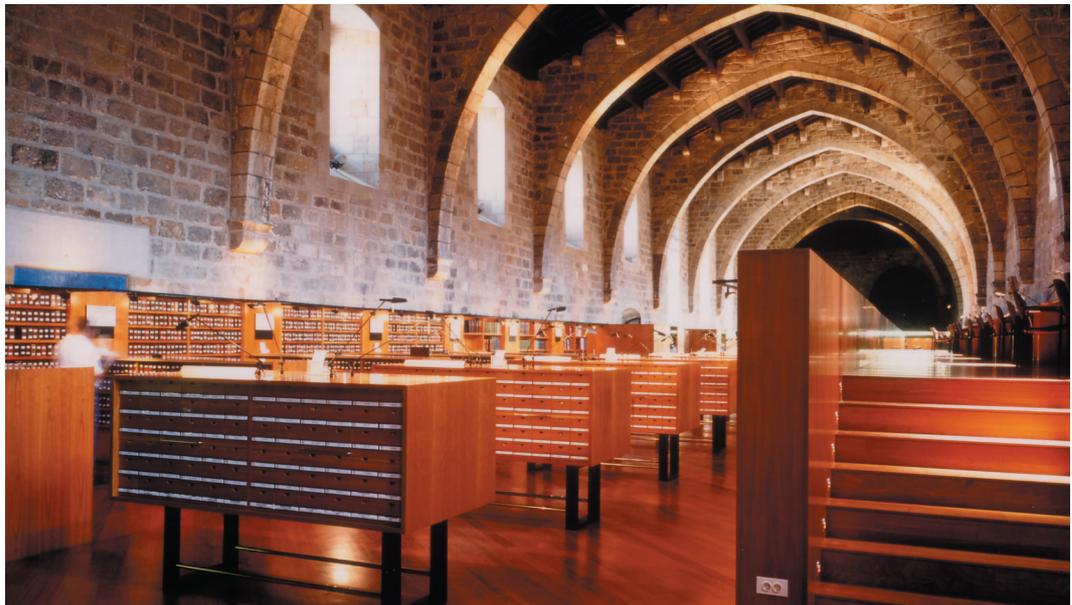
The buildings which back on to the east wing, in Gardunya square, were knocked down, and in their place a new underground working area was built, lit by large skylights.

Communication between the deposit and the working area is via an underground passage which crosses the garden of the old Santa Creu Hospital.

The reserved books reference room is in the current auditorium. A small tower next to the auditorium houses the reserved books work rooms, and connects the deposit to the reading rooms.

A similar tower to the reserved books tower one (built at one end of the east wing) houses the management offices, administration, and services, and joins the underground working area to the reading rooms.

Joan RODON, architect



6

# UNIVERSITY LIBRARIES

## Central Library of Vigo University (Vigo, Pontevedra)

### UNIVERSITY LIBRARY

Address:  
CAMPUS LAGOAS MARCOSENDE  
36200 - VIGO

Developer:  
VIGO UNIVERSITY

Architects:  
**ALBERTO NOGUEROL + PILAR DÍEZ**

Collaboration:  
BÁRBARA NOGUEROL, ESTANISLAO PUIG (architects)  
FRANCISCO LORENTE (structural calculus)  
FRANCISCO SENRA, FERNANDO SANCHEZ  
(installations calculus)

Construction Company:  
DRAGADOS Y CONSTRUCCIONES, S.A.  
MALVAR CONSTRUCCIONES

Furniture:  
Shelving: ESQUITINO MARTÍNEZ, S.A.  
Seating: PLUS-MER, S.L.  
Other furniture: OFTEGA, A.B., S.L.

### Dates:

Project: 1995  
Work begun: 11-95  
Work completed: 2-99  
Opening: 5-99

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Useable Surface Area:	6,381.74 m <sup>2</sup>
Built Surface Area:	7,038.36 m <sup>2</sup>

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Total Cost of Construction (Execution by Contract Budget - ECB):	4,686,629.09 euros
Cost/m <sup>2</sup> built (ECB):	665.87 euros/m <sup>2</sup>
Cost of Furniture (ECB):	312,145.32 euros

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Photography:  
LEOPOLDO ALONSO LAMBERTI

A huge cut and folded plane, part sloping, like a roof, a square and a bridge. Beneath this, the library.

From the access street viewpoint, there is one scale, that of the smaller entrance, air-conditioning housing, light tunnels and cafeteria buildings. From the valley, another, much larger scale.

Sunk into the hillside, and of the same colour as the mountains it faces. As if it were all one piece, the walls, the floor, the roof, all of the same material.

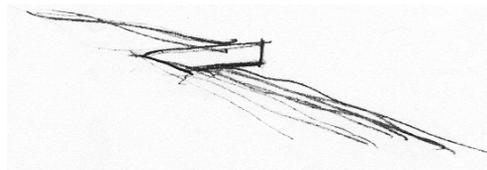
Below the horizontal area of the square, the administration offices. Below the slope, the reading rooms and book deposit, set out in platforms of different heights, interconnected by ramps, lifts and stairways.

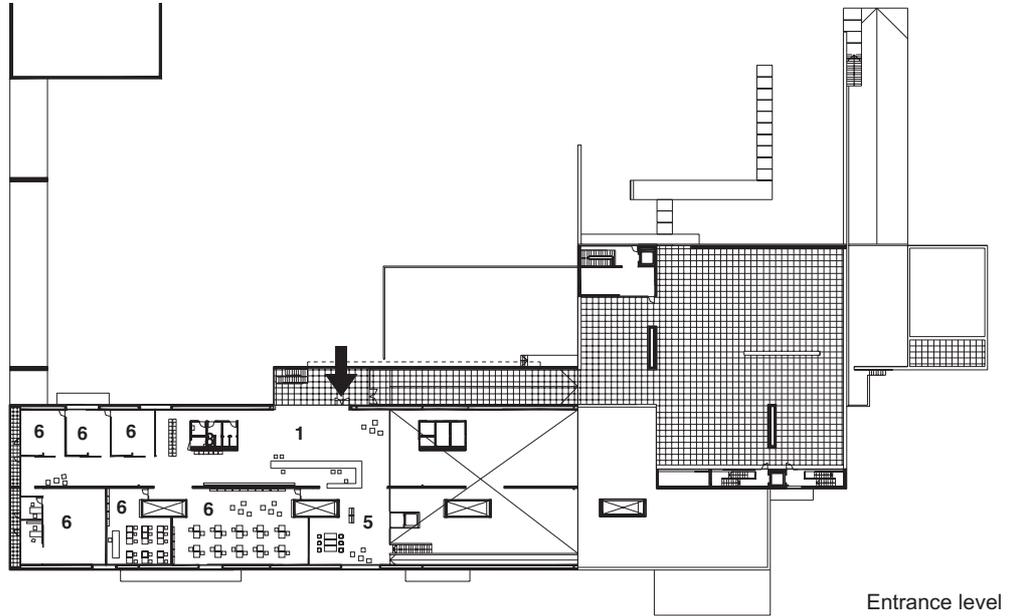
A prismatic shape contains the cafeteria and the shops, and underneath that, a ramp – sloping in the opposite direction to the building – constitutes the library's main entrance. Other smaller ramps lead to the admin and service area.

The skylights are also structures and lighting for the square.

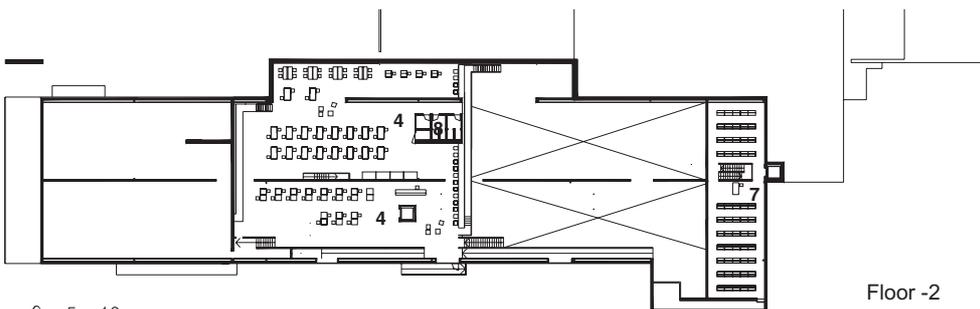
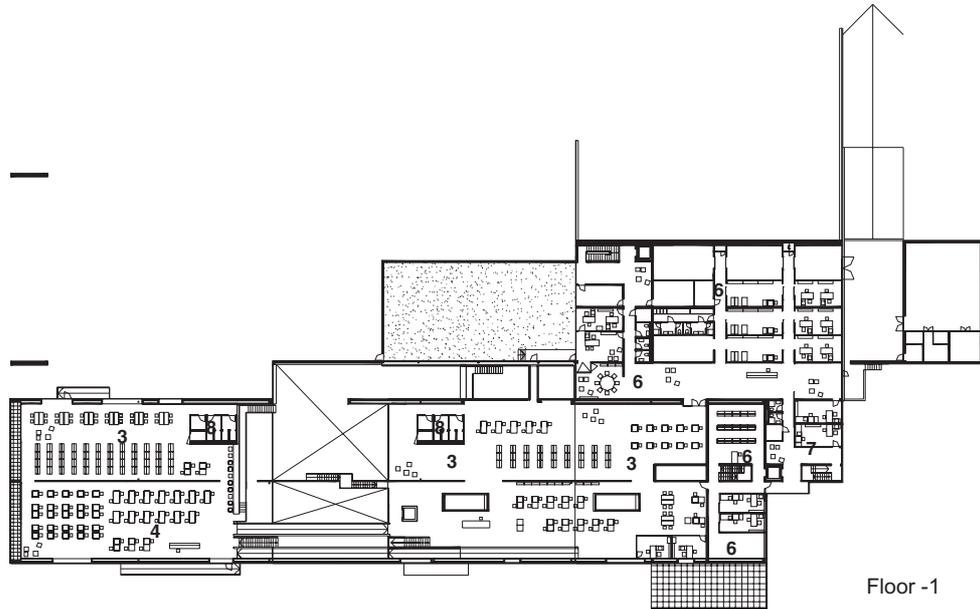
On top of a complex and problem-ridden construction process, furniture quite foreign to us and the building was added.

Alberto NOGUEROL, architect  
Pilar DÍEZ, architect

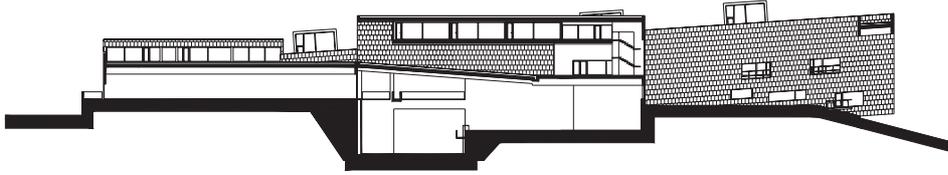




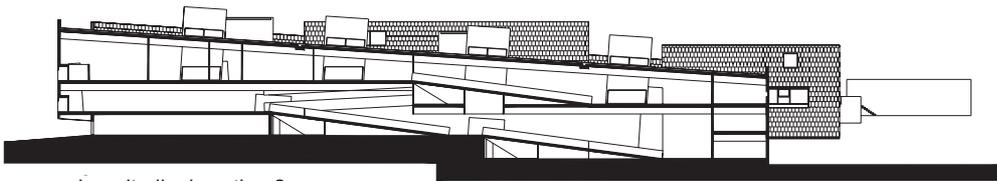
1. Foyer
2. Shop
3. General area
4. Study room
5. Rest area
6. Internal working area
7. Storage
8. Toilets



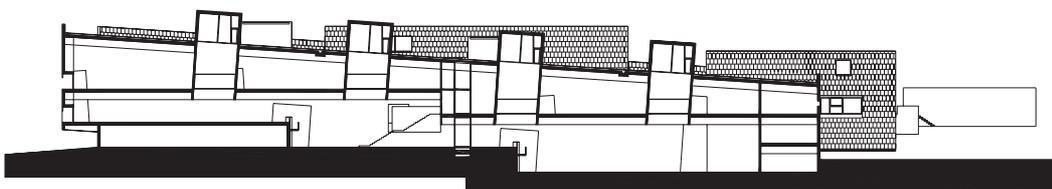
0 5 10



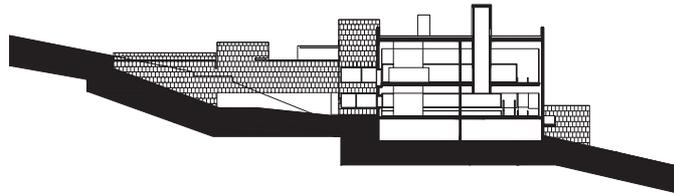
Longitudinal section 1  
(from the access ramp)



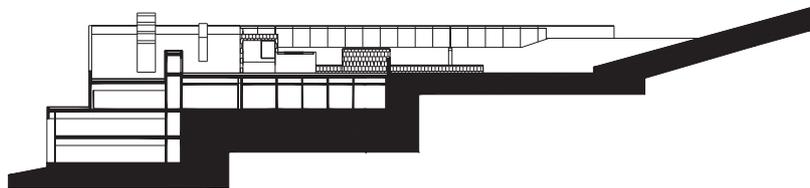
Longitudinal section 2



Longitudinal section 3



Cross section 1



Cross section 2

# General Library of the University of Alicante (Alicante)

The problem of a library is not the space. It is not a question of a student, or any other user, standing open-mouthed in wonder as soon as he enters the “vestibule”. It is a question of easy and immediate – almost intuitive, even - identification of where he needs to go to find the information he is looking for, and it is a question of encountering the ideal conditions for working with it.

A library must be, as Eco said, a place that is pleasant to go to, and pleasant to be in. We must realise that achieving that end needs extraordinary control of the scale and the relationship between the inside and the outside (the ‘contained’ and the ‘container’) – these are questions that are so basic to architecture that they are sometimes overlooked.

We changed the programme round, and produced, in a way, the concept of a “one level” building. We separated noisy areas from quiet ones, and light from shadow. We turned our back to the sun, and decided not to puncture the roof, not to “make holes in our parasol or umbrella”. We got rid of those two and three storey single spaces that produce major costs and complexity for us when it comes to air-conditioning and heating.

We separated the reading rooms in the programme, putting them in a special place which is clearly differentiated and identifiable for the user. We design them according to their specific needs and the environmental conditions of Alicante and the specific planning of the university campus.

The rest of the programme consists of a space conceived as a slice of a Mediterranean city where plants, rocks and natural land invade the patios and the roofs, creating a series of walks which are a continuation of the university, and natural control of light and heat.

The reading area is seen as an abstract piece, standing upon the “natural terrain”,

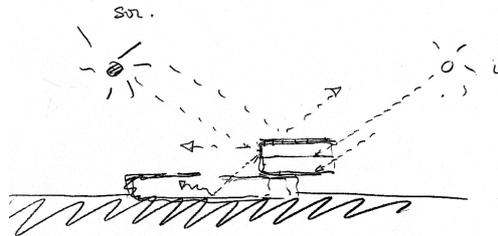
UNIVERSITY LIBRARY  
Address:  
EDIFICIO LIBRARY GENERAL. UNIVERSIDAD DE ALICANTE  
CARRETERA ALICANTE-SAN VICENTE S/N  
03690 – SAN VICENTE DEL RASPEIG. ALICANTE  
Developer:  
ALICANTE UNIVERSITY  
Architects:  
**PEDRO PALMERO CABEZAS**  
**SAMUEL TORRES DE CARVALHO**  
Collaboration:  
ALFONSO GÓRRIZ, RICARDO TENDERO,  
ÁLVARO GARCÍA DEL RÍO (architects)  
Construction Company:  
GINÉS NAVARRO, S.A.  
Furniture:  
ESQUITINO MARTÍNEZ, S.A.

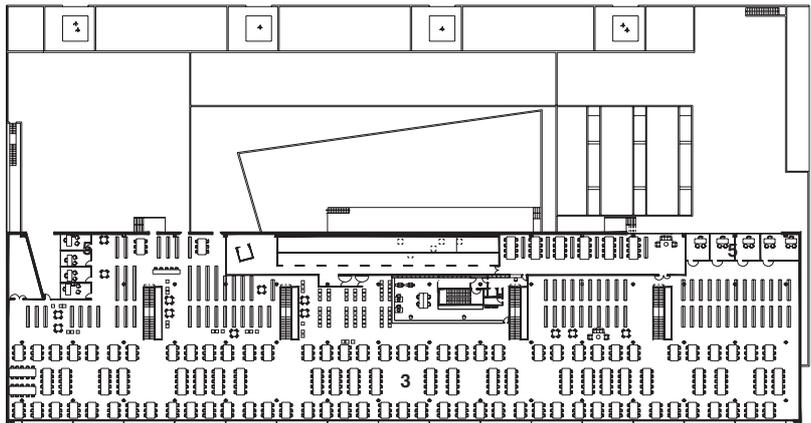
Dates:  
Project: 9-95  
Work begun: 6-95  
Work completed: 10-96  
Opening: 10-96

Useable Surface Area:	15,180 m <sup>2</sup> (including yards)
Built Surface Area:	15,021 m <sup>2</sup> (excluding yards)

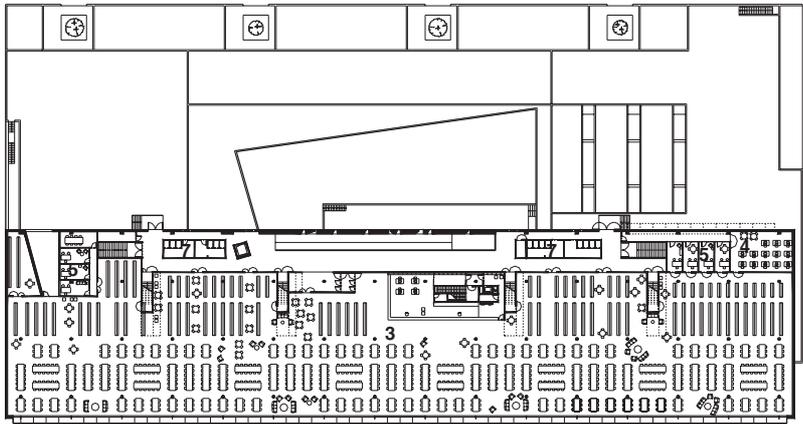
Total Cost of Construction (Execution by Contract Budget - ECB):	7,212,145.25 euros
Cost/m <sup>2</sup> built (ECB):	480.14 euros/m <sup>2</sup>
Cost of Furniture (ECB):	601,012.1 euros

Photography:  
JUAN MERINERO CAMARASA (1, 2, 3)  
EDUARDO SÁNCHEZ and A.L. BALTANÁS (4)



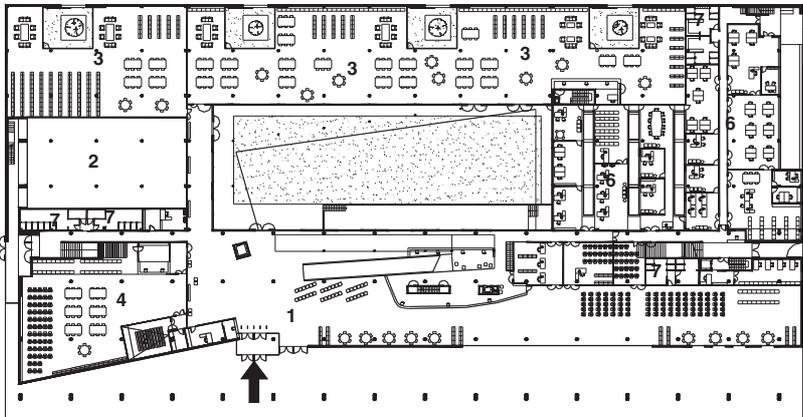


Second floor

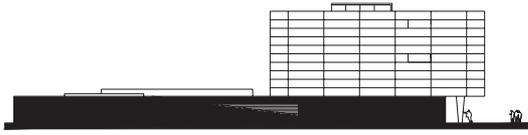


First floor

- 1. Foyer
- 2. Multipurpose room
- 3. General area
- 4. Study room
- 5. Office
- 6. Internal working area
- 7. Toilets



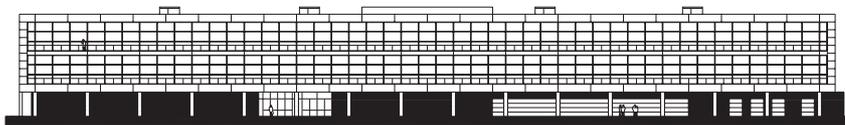
Ground floor



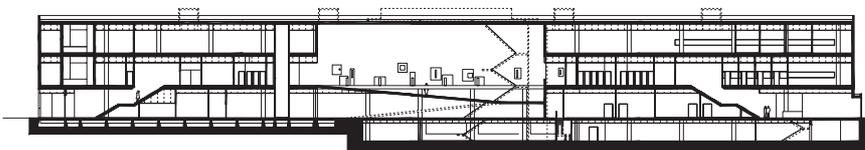
East elevation



2



North elevation



Longitudinal section



3

which is lifted up and modelled so as to hang suspended allowing for an entrance from below, channelled by light, which, from the patio, lights up the shadowed space below it.

We got rid of the idea of the student, of the researcher stuck inside surrounded by books and dust, with his horn-rimmed glasses, withdrawn, removed from everyday life and reality. We understand that “concentrating” does not have to mean “buried”.

The vision of thousands of students concentrating on their studies in the library is something that should not be ignored by the rest of the university. It is something that needs to be highlighted and needs to be the motivation and incentive for any person. We created a display window.

The reader is fully immersed in campus life, looking down from above onto the walking areas and the lush vegetation growing next to the old buildings of the current university.

Alicante library’s building philosophy is based on simplicity, modules, the use of few materials and fast completion.

Therefore, the structure envisaged is traditional, of reinforced concrete, lattice-like, with lighting adapted for large continuous surfaces such as the lower floor rooms and the reading rooms on the first and second floors.

Pedro PALMERO, architect  
Samuel TORRES DE CARVALHO, architect

4



# National University of Distance Education Central Library (Madrid)

## UNIVERSITY LIBRARY

Address:  
SENDA DEL REY S/N – CIUDAD UNIVERSITARIA  
MADRID

Developer:  
NATIONAL UNIVERSITY OF DISTANCE EDUCATION  
(U.N.E.D. - UNIVERSIDAD NACIONAL DE EDUCACIÓN  
A DISTANCIA)

Architect:  
**JOSÉ IGNACIO LINAZASORO RODRÍGUEZ**

Collaboration:  
LUIS SESÉ (project), JAVIER PULDÁIN (general  
management) – (architects)  
SANTIAGO HENÁN MARTÍN, JUAN CARLOS CORONA  
RUIZ (building surveyors)

Construction Company:  
FOMENTO DE CONSTRUCCIONES Y CONTRATAS, S.A.

Furniture:  
ESQUITINO MARTÍNEZ, S.A.  
Central continuous tables: INDAMA  
Other furniture: FRITZ HANSEN - SELLEX

This is a deliberately hermetically sealed building, the contents of which would be hard to guess from the outside, giving the impression of a warehouse: a kind of book 'silo'.

Due to its closeness to the motorway and the wide panoramic landscape that can be seen from it, the building is divided between the introversion expected of a reading area and the opening up to the beautiful views of the Cornisa de Madrid and the Casa de Campo. On the other hand, this is a library arranged according to the Anglo-Saxon model, meaning the readers have direct access to the books, where the storage of the books and the reading areas are interrelated.

The starting point or central idea of the project was consequently based on the superposition upwards of hermetically separate spaces: the entrance or lost steps hall; the reading and storage room, a unitary space of six floors with interior communications via stairs, and the administration and cafeteria floor.

Two core areas of shared communications placed diagonally provide access to the different levels and spaces.

The whole building is supported on a grid structure of 4.5 by 4.5 metres, independent of the outside walls.

There is also a semi-sunk floor for storage. The grid structure fits in well with the access hall, which has an immediate visual continuity from the square outside, and inasmuch as the thick exposed cement cylindrical support create a hypostyle hall.

On the other hand, the reading room which is accessed through the core communications area is a space based around a circular gap covered over by a wooden coffered ceiling which lets in the overhead light.

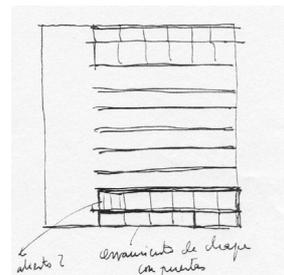
This space is the heart of the building, which one enters diagonally, as in the halls of

Dates:  
Project: 1989-1991  
Work begun: 1-92  
Work completed: 5-94  
Opening: 6-94

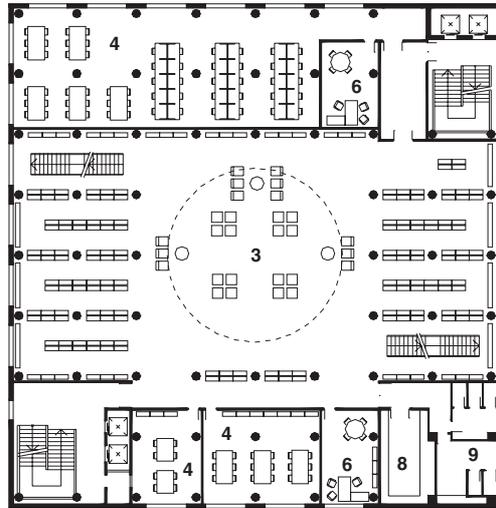
Library's Useable Surface Area:	8,232 m <sup>2</sup>
Built Surface Area:	
Library:	9,006 m <sup>2</sup>
Total:	11,392 m <sup>2</sup>

Cost total of Construction (library)  
(Execution by Contract Budget - ECB): 4,988,400.47 euros  
Cost/m<sup>2</sup> built (ECB): 553.9 euros/m<sup>2</sup>  
Cost of Furniture (ECB): 697,174.04 euros

Photography:  
JAVIER AZURMENDI



1. Foyer
2. Periodicals
3. Reference room
4. Group work room
5. Meeting room
6. Office
7. Internal working area
8. Storage
9. Toilets



Floor +1

oriental palaces or some spaces characteristic of Hispanic Muslim and Spanish renaissance architecture (the Alhambra or Vandelvira's sacristy in Jaén cathedral); for example, spaces that are always sealed – unsuspected until suddenly discovered by surprise.

The room is constructed spatially by the bookshelves themselves, in contrast with the void in the middle. In the centre, in a ring, surrounded by books and beneath the coffered ceiling, sit the readers. Light penetrates the room from the perimeter walls, through narrow horizontal windows above the bookshelves, and from the overhead coffered ceiling.

The light's source and intensity vary depending on the position of the sun at that time of day or season of the year.

It is a diffused, Byzantine light which creates an atmosphere of concentration and silence, removed from the noise and tumult outside.

The last floor, reserved for administration, cafeteria and meeting room, has a character and organization which are quite the opposite of the reading room, since the space here is inverted: it is open towards the outside, and hermetic towards the inside.

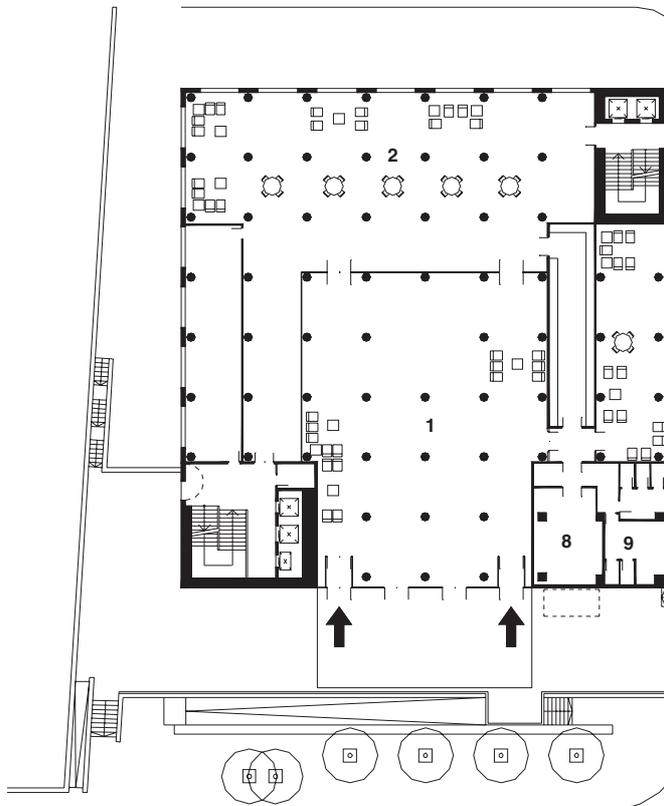
It is a space which is dominated by the exterior views: a splendid panorama spreading from San Francisco el Grande and the Cornisa de Madrid as far as the Casa de Campo and the Sierra.

The central nucleus is filled by the lattice decor of the coffered ceiling, and light floods in through large or continuous windows on the south and east, facing the best views.

There is also a technical terrace roof with the building's electrics. On the outside, the building – all in exposed orange brickwork – rises up powerfully without overdoing it, in harmony with the surroundings like a watchtower advancing from the University City towards Los Franceses bridge.

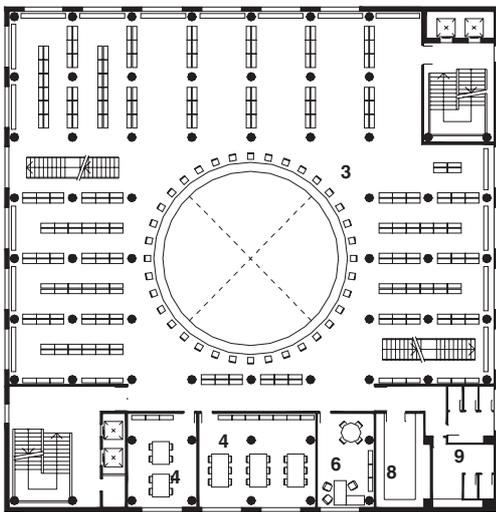
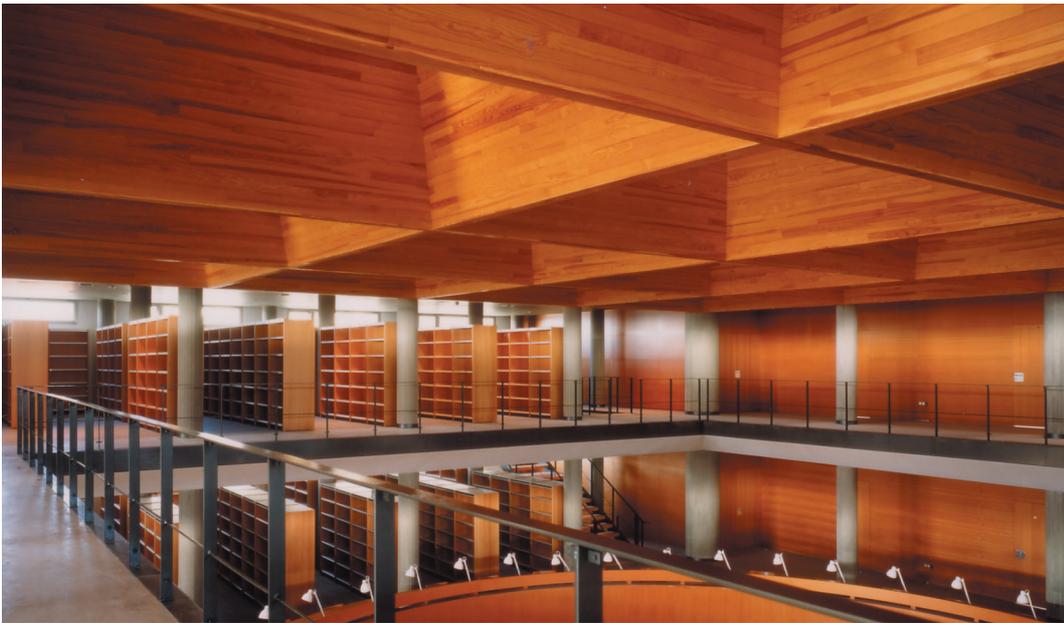
The use of bricks, a material used in the original University City buildings, is a homage to those structures as well as being – because of its atemporality – a symbol of stability and permanence, which is entirely fitting for an institutional building that we want to last.

José Ignacio LINAZASORO, architect

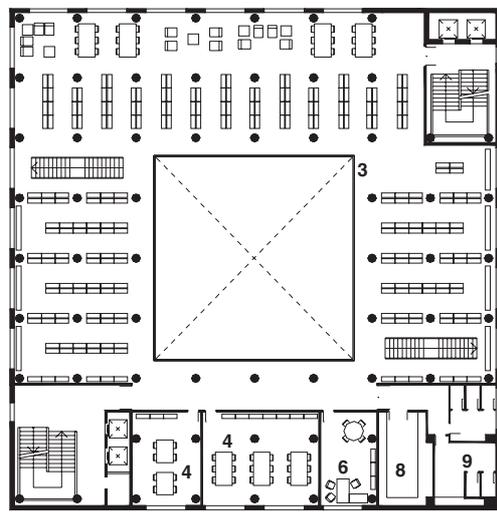


0 5 10

Ground floor

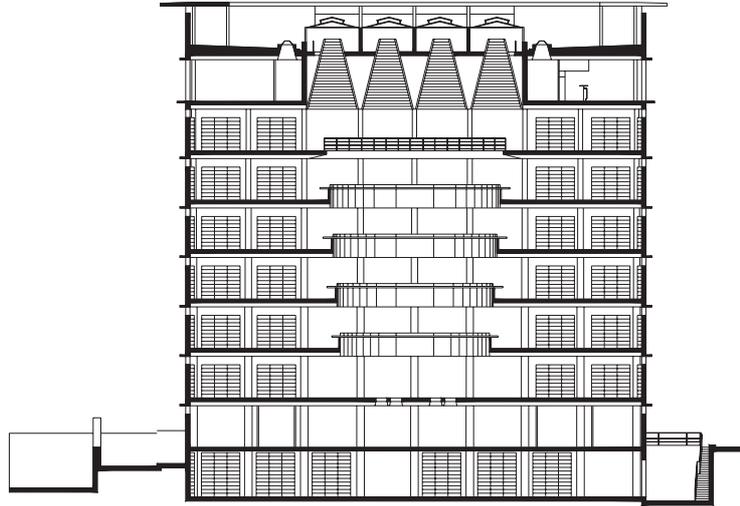


Floors +2, +3, +4 and +5



Floor +6





North – South section



# Rector Gabriel Ferraté Library (Barcelona)

The building houses the various university school libraries of the Universitat Politècnica de Catalunya. It is in the Campus Norte, in the upper part of the city of Barcelona at one of the extremes of the university complex.

The particular placement of the building, right on the border between the city and the university campus was one of the aspects in which the project showed most sensitivity. The almost continuous façade formed by all the lecture room blocks is like a backdrop for the outline of the shape and mass of our building. The feeling created by its specific location as a virtual door to the university complex on the one hand, and on the other as an urban element which people relate to and react to, was a basic premise for the development of the project.

From the urban point of view, one new street will connect the city to the campus' new civic square, right through our building, thereby establishing a specialization of spaces which will later, in a conceptual way determine the formation and development of the whole project.

This street, which by passing through the inside will become both a real foyer and a creator of new foot traffic in the library, will be the element which determines a major differentiation of internal spaces, in both customer and customer service areas.

The constant appearance of new technologies, the more than justified question as to whether a library in the future should actually contain books, the incompatibility of natural light with computer screens, the increasing changeability of everyday customs and methods of study and reference are some of the factors which contribute to the concept of these buildings as huge containers which can change with the times, incorporating the changing and constant modifications which our society is currently undergoing.

This is why, from the very beginning, the

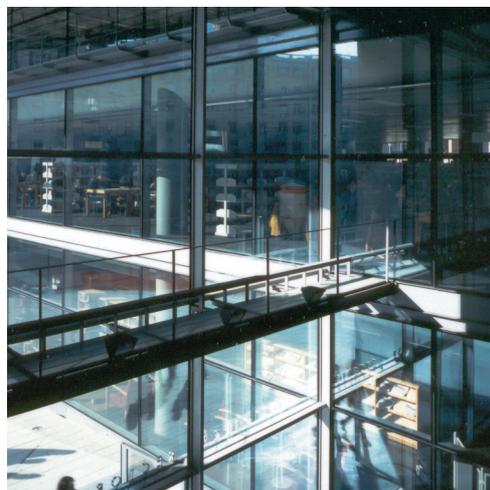
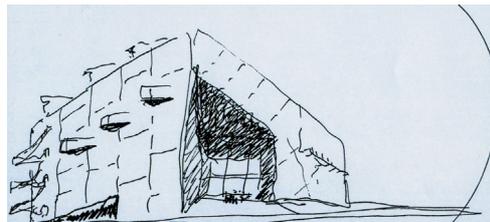
UNIVERSITY LIBRARY  
Address:  
JORDI GIRONA. URBANITZACIÓ CAMPUS NORD  
08034 - BARCELONA  
Developer:  
POLYTECHNIC UNIVERSITY OF CATALONIA  
Architects:  
**ARTIGUES & SANABRIA ARQUITECTES**  
Collaboration:  
LLUÍS X. COMERON, JOAN SOLÉ (architects)  
ANTONIO MASSAGUÉ (installations engineer)  
VIDAL GARCÍA, VIRGINIA OTAL (building surveyors)  
Construction Company:  
CONSTRUCCIONES DECO - AGROMAN  
Furniture:  
FRI-TEL, S.L.

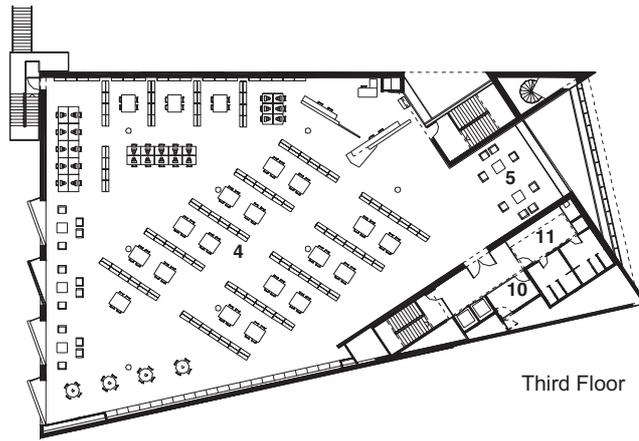
Dates:  
Project: 1992  
Work begun: 7-93  
Work completed: 12-96  
Opening: 19-12-96

Useable Surface Area: 5,575 m<sup>2</sup>  
Built Surface Area: 6,343 m<sup>2</sup>

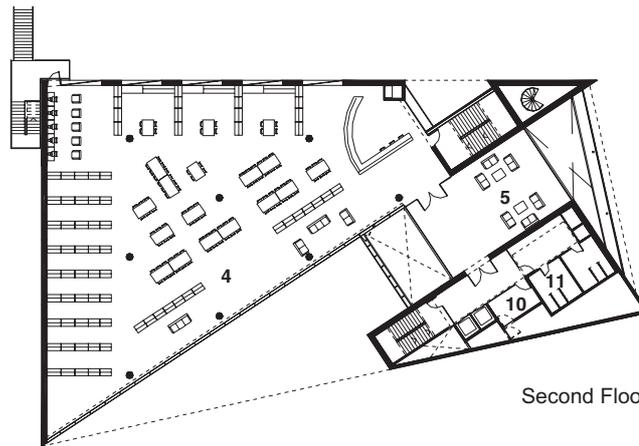
Total Cost of Construction  
(Execution by Contract Budget - ECB): 5,136,135.14 euros  
Cost/m<sup>2</sup> built (ECB): 809.73 euros/m<sup>2</sup>  
Cost of Furniture (ECB): 414,698.35 euros

Photography:  
FERRAN FREIXA

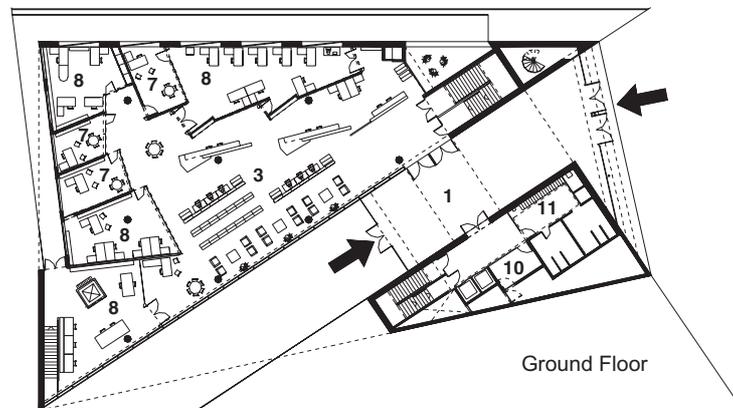




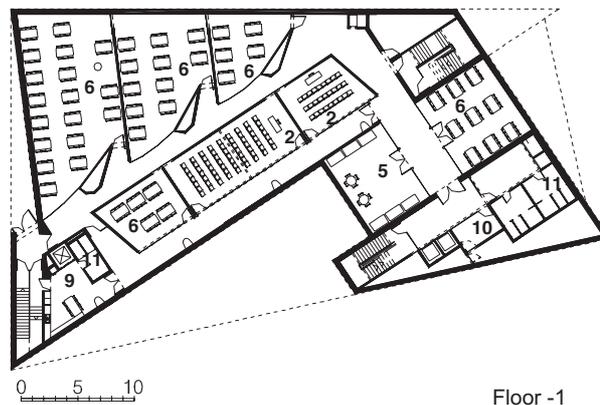
Third Floor



Second Floor

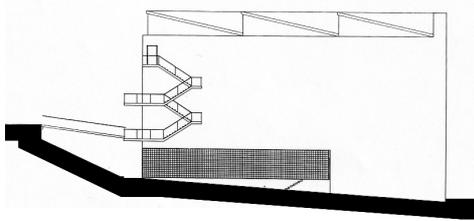


Ground Floor

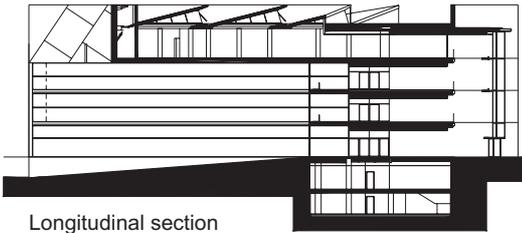


Floor -1

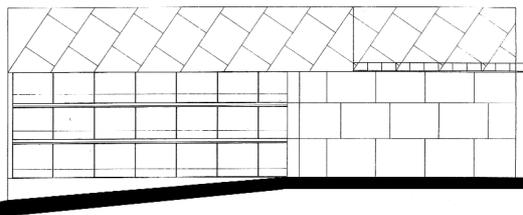
1. Foyer
2. Multipurpose room
3. Periodicals
4. General area
5. Rest area
6. Study room
7. Office
8. Internal working area
9. Staff rest area
10. Storage
11. Toilets



Southwest Elevation

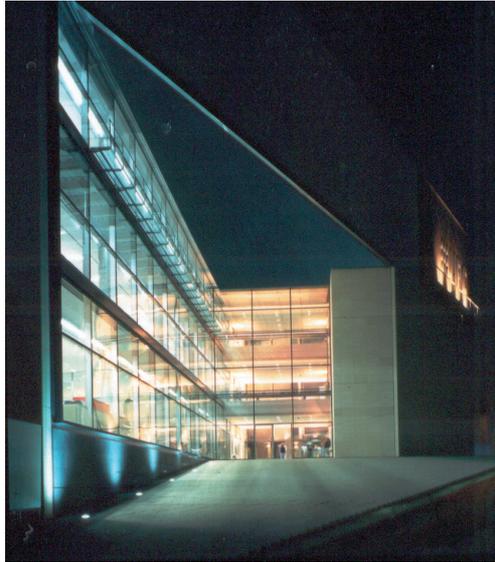


Longitudinal section



Southeast elevation





project divides the spaces into customer service areas (toilets, electrical installations, lifts, stairs, and so on), which are normally noisy and with constant foot traffic, and customer use areas (reading, reference, study and so on) which are given the largest space possible for the location of the functional programme called for at any moment. Between these spaces, the project establishes neutral areas which act like bridges over the public street on the ground floor, where there will be the rest and relaxation zones, as areas which clearly differentiate the two basic areas.

The building's last floor, which will possibly be used for overhead lighting, will have some north-facing linear skylights, creating a whole new geometry which, through the favourable use of the light, will give new resources and meanings to the interior.

This attempt to make the customer areas as flexible as possible with an eye on future changes has already proved useful before the work is finalized, since the lower floor has

already incorporated various university services which had not been envisaged at the start of the project.

As for the exterior mass, the building remains an approximately rectangular prism which, because of its situation and what it represents, has to respond in an appropriate manner to the environments where it is seen. So the main façade will, right from the abstract inception be based on a large scale, with a side curtain wall, which will take us into the building continuing the trajectory of the outside street. The façade which gives onto the Campus' civic square, will be made of a huge glass screen, which will mark the end of the public area, and which will act as a huge torch for the outside space, and through its transparency will allow the various "bridges" to be seen, between the customer service and customer use areas of the library. This manifest attempt by our building to participate and collaborate through its presence and structure in the various urban and university environments will be another added attribute in its functional logic.

The various materials have been chosen to ensure that building aged gracefully. The façades use aerated limestone cladding, which will produce a composition of joins in keeping with the scale and symbolism of the building. On the inside, the public bits have stone flooring, whereas the rest of the flooring in the study and reference areas will be carpeted to maintain a certain level of comfort in keeping with the nature of the building.

Ramon ARTIGUES, architect  
Ramon SANABRIA, architect



## SANTI ROMERO - CURRÍCULUM VITAE

---

He was born in Pont de Suert (Lérida) in 1955. He did an advanced architecture degree at Barcelona's *Escuela Técnica Superior de Arquitectura*.

He began his professional life combining independent architectural practice with collaborations in various architectural studios.

In 1993 he was taken on as architect for the *Servicio de Bibliotecas de la Diputación de Barcelona* (Public Library Service of the Diputación (Provincial Council) of Barcelona). His work – which mainly centered around advising and overseeing the province's public library projects and works, has meant his involvement in more than 150 libraries, in most of these cases also dealing with the furniture projects. He is currently head of the Library Architecture Department at the *Servicio*.

He has also overseen library projects in other parts of Spain. He has attended, taken part in and actually delivered talks at various conferences. Furthermore, he has given courses on library architecture, run by both public and private organizations right across Spain.

He is a member of the "Library Buildings and Equipment" Section of the IFLA (International Federation of Library Associations and Institutions).

The writing of this book, by request of the *Escola Sert* of the *Colegio de Arquitectos de Cataluña* (Catalonia Architects Association), is based on the author's experience of a discipline which is currently producing a large number of very varied examples of what this kind of facility is supposed to be.

The book was published in November 2001, in both Spanish and Catalan editions. In December 2004 a second updated edition was published.



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(p.311: 2, 6)

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07.12, 10.32

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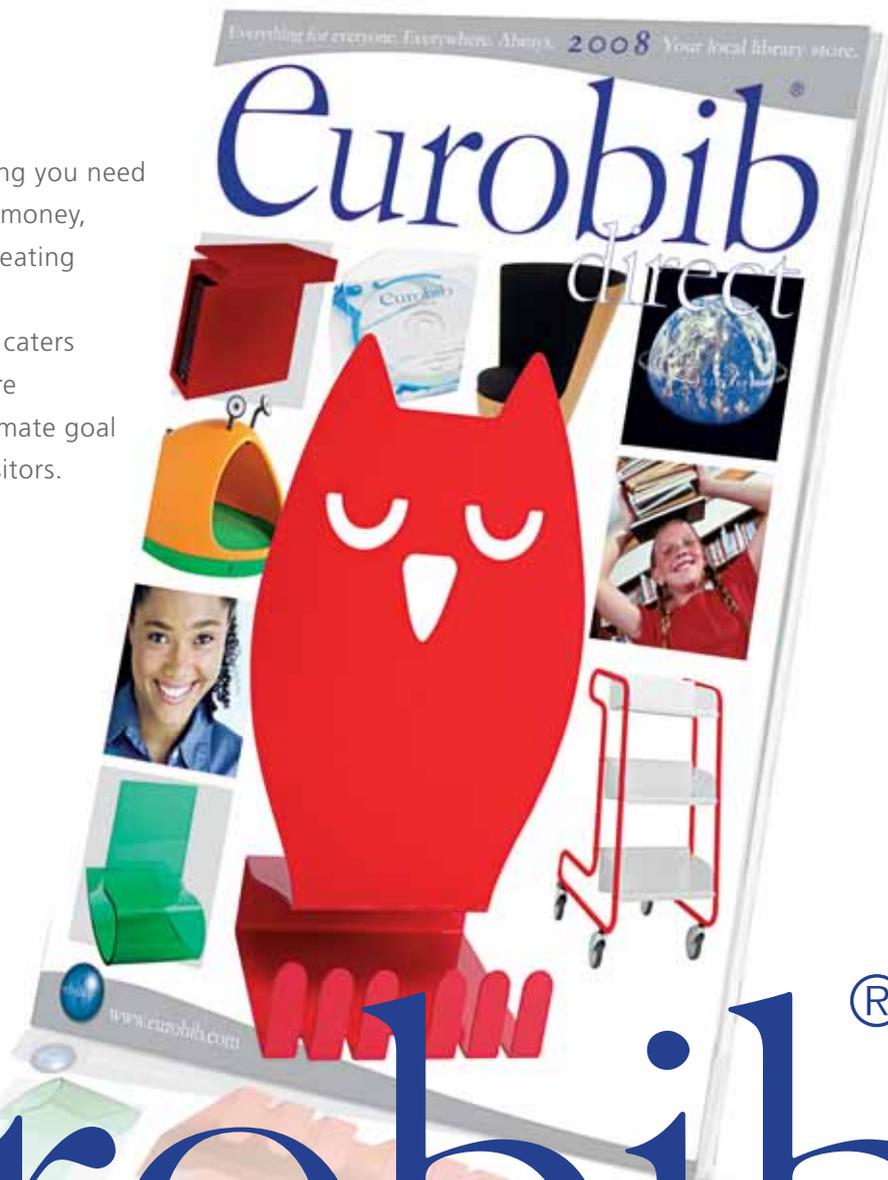


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