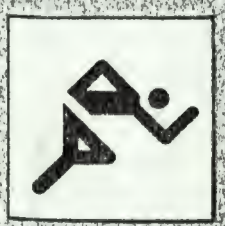
SPORTS CENTER at AUB



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AMERICAN UNIVERSITY OF BEIRUT
DEPARTMENT OF ARCHITECTURE
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Final Project Research

Sports Center at AUB

By

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INTRODUCTION

The only indoor facility in AUB where athletes can practice sports duriing winter is the Engineering Allumni Hall known as AUB "Indoor". Last year, the faculty of Engineering decided to take charge of the "Indoor" and transform it into a permanent exhibition hall for engineering materials and equipment. This represented a serious problem for the athletes; they could not practice in winter any more. This current problem was raised to the board of Trustiees in New York and a letter was sent from the President of AUB, in november 1991, stating that the only solution to this crisis is to build a new indoor athletic center on AUB campus.

SCOPE

The project will embody various sports facilities that will serve AUB faculty, students and staff; it will also include anciliary facilities for this purpose. Furthermore, the sports center will house various competitions on many levels as it will be unique in the country.

The project will include:

- Indoor dry sports halls
- Indoor pool hall
- Sports administration
- A lounge including recreational facilities
- A cafeteria
- Service facilities

I chose to have a sports complex as my final project because of my strong interest in sports. I have been practicing many kinds of sports for many years and I believe that sports are very important for the development of a community as well as for individuals.

I propose the Practice Field, on the western side of the Green Field, as a site for my project. In my opinion, this is the best location for such a project because it is near other outdoor sports facilities, flat and large enough to accomodate for the project.

OBJECTIVES

The main goal of this project is the promotion and improvement of sports at AUB. To achieve this, the project aims at providing two essential objectives:

- Adequate facilities for effective training
- Proper recreational areas to encourage interaction among athletes

HISTORICAL BACKGROUND

Sports at AUB had undergone many changes in the past fifteen years. Prior to the war, the university had a considerable percentage of foreign students who showed enthusiasm for sports which was considered to be important in their culture and it was given a greater and more professional value. In fact, they were examples for their lebanese colleagues to follow and hence, there was an increased contribution to sports activities.

At that time sports facilities at AUB were limited; nevertheless, there were better athletes who had set records on a national scale.

During the war, interest in sports among students and faculty dropped drastically. This attitude was faced by the athletic department by improving the existing facilities like the construction of four outdoor Tennis courts in 1983 and the addition of new facilities for new sports like the weight training room adjacent to the changing facilities in 1987. As a result, this improvement succeeded in raising the interest of students in sports.

Since then, the number of students using sports facilities has been improving constantly. Presently, there is a large number of students who are practicing sports; however, the quality of athletes that existed before the war has dropped sharply. Thus, there are no record makers any more.

Every year, many competitions and championships at different levels take place at AUB. For example, we have the "Lebanese Federation of Sports for Universities" championship which is on a national scale, where students from different universities in Lebanon compete in many kinds of sports. An other example would be the AUB intramurals which takes place every year among students from different faculties at AUB.

PURPOSE OF PROJECT

ARCHITECTURAL GOALS

The proposed site is in the lower part of AUB campus.This part is characterised by its new modern buildings in contrast with the upper part of the campus wich is old and traditional.

In my project, I aim to reach an architectural image that will stand in harmony with the adjacent buildings and will convey a true message of structure and fonction.

Spaces in this project are characterised by having large areas with the impossibility of having intermediate columns within these spaces; hence, we will have big spans. The design of structure in this case is very importent and structural elements play a prominent role in determining the architectural image of the building. Exposing the structural fram would give us a true idea about the relationship between structural elements and vertical planes, and what is happening behind them.

The proposed site is on the northern boundary of AUB campus, streching parallel to the sea road. Being so, it offers a high degree of exposuer to north orientation. The architecture should take advantage of this northern strech of the project to admit light into different sports facilities. North light is best for these facilities because it is glare-free. The introduction of light to spaces would be through architectural elements; glass panels would be an infill between columns and between beams. The combination between these elements will determine the external expression of the project.

As from the inside, it is a multifonctional project, joined together by aprocession of movement and experience through different perspectives.

Technologicaly speeking, steel structures are best for the construction of such projects due to their ability to resist high tensile forces; but, since the location of the project is near the sea, whith causes frequent corrosion to steel, and since this material is not abundant in our country, reinforced concrete becomes more apropriate as a technology for construction due to its availability and high resistence to corrosion. A combination of the two materials, steel and reinforced concrete, would be ideal

for the construction of this project; steel would be used in case of large spans, whereas reinforced concrete would be used for compression elements.

SOCIAL GOALS

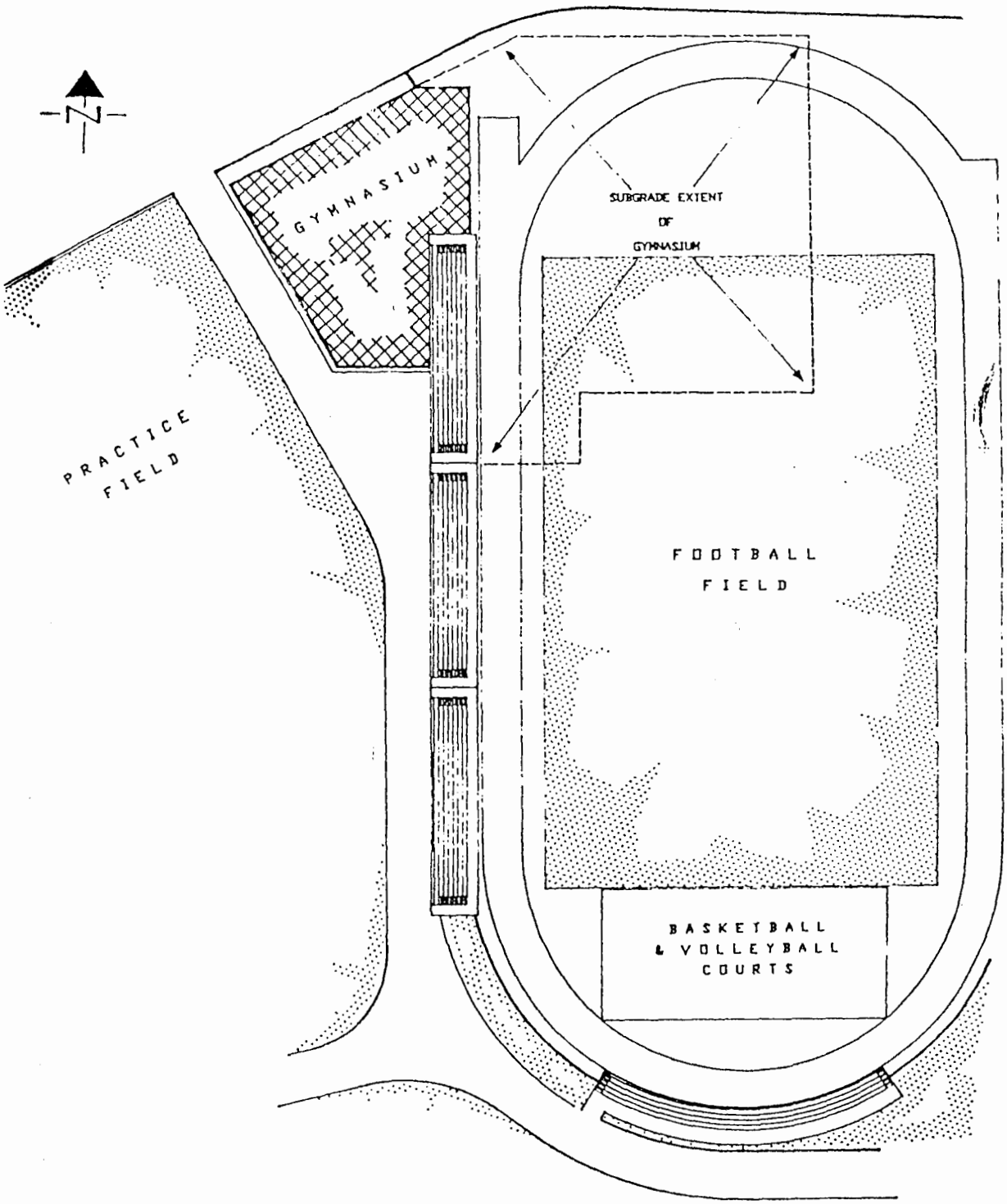
The presence of such a center will provide a place of identity for the athletic body and a place of interaction; gathering people who share a common interest. In addition to this, the existence of such a center will encourage AUB students to practice sports more frequently and henceforth have a chance to benefit from the numerous advantages that sports offer.

PROGRAM

EXISTING STUDY

As a result of the letter sent by the president of AUB in New Work, AUB officials started to conduct syudies concerning the location and the content of the indoor sports center.

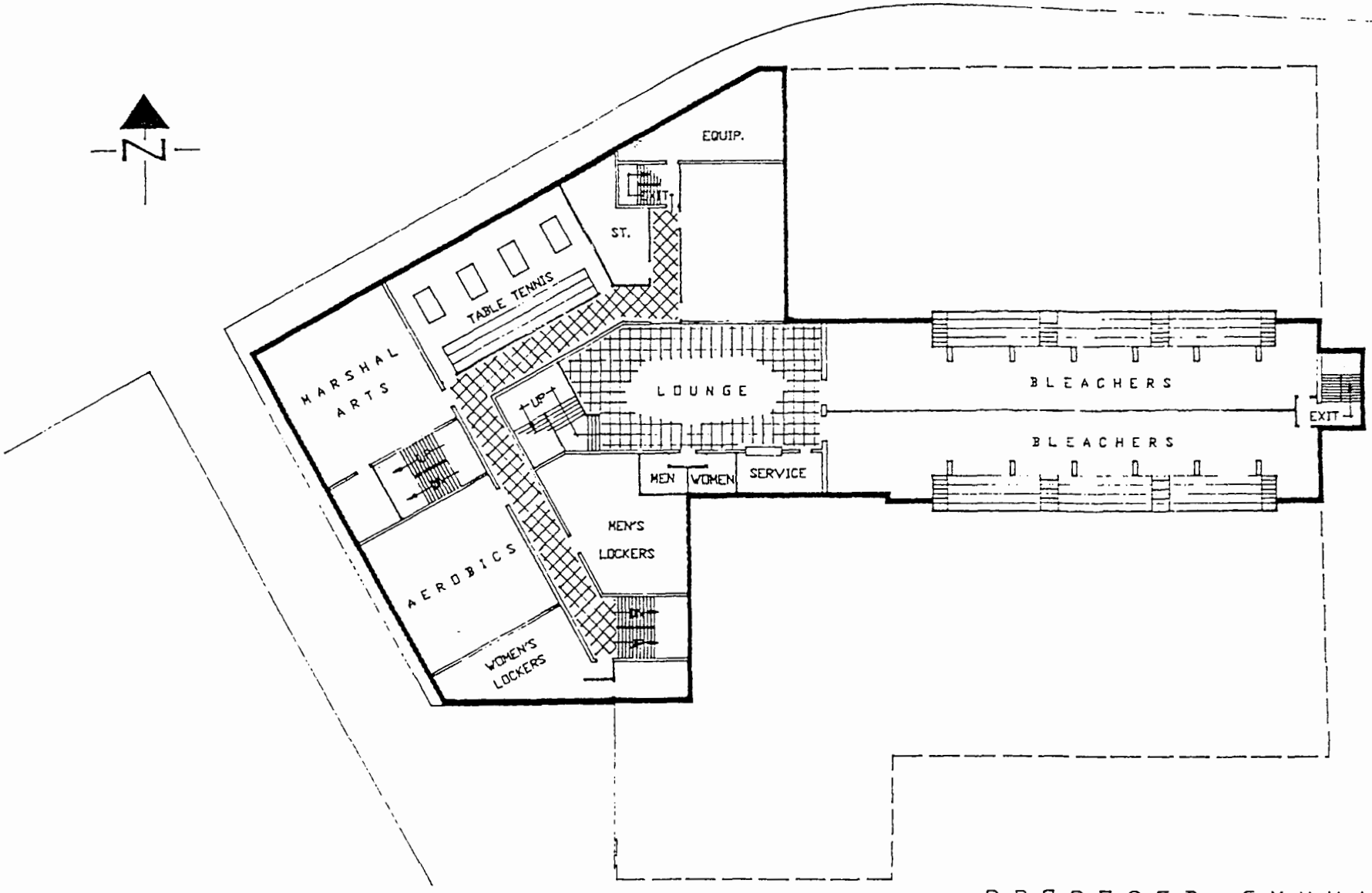
The following plans belong to a proposal by Mr. Richard Mashalani (Presidents office - civil engineer and architect by practice), in november 1991:



NEW
ATHLETICS CENTER
LOCATION PLAN

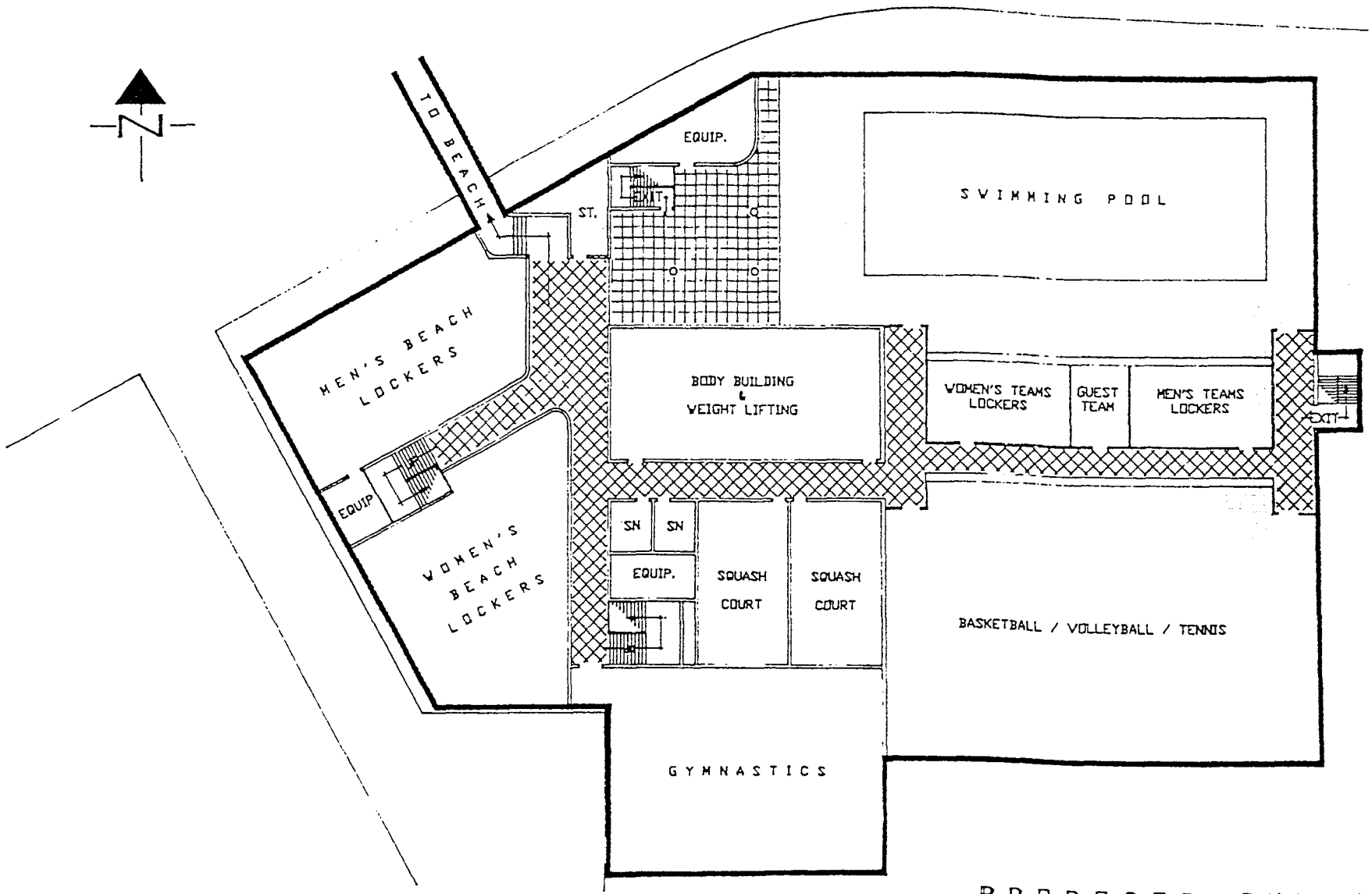
SCALE - 1/1000

PROPOSED GYMNASIUM



PROPOSED GYMNASIUM

BASEMENT FLOOR PLAN



PROPOSED GYMNASIUM

SUB-BASEMENT FLOOR PLAN

The project proposed by Mr. Mashalani of:

- Administration	235m²
- Lounge	275m²
- Cafeteria	117m²
- Marshal arts room	155m²
- Aerobics room	150m²
- Table Tennis room	170m²
- Squash courts	145m²
- Body building room	250m²
- Gymnastics area	390m²
- Pool hall	1035m²
- Multi-sports hall	830m²
- Bleachers	610m²
- Changing/Lockers	1050m²
- Styorage	150m²
- Circulation (17% of total area)	1160m²
Total built up area	6722m²

COMPARATIVE ANALYSIS OF SIMILAR PROJECTS

The following following similar projects were taken from an American magazine called Athletic Business dated on June 1990. Plans of these projects were not included.

Recreational Sports Complex
Loyola University - L.A

* Area: 7430 m^2
* Number of students: 3583
* Functions:
  - Natatorium
  - Sports Forum: 6 independent multipurpose courts
  - Indoors jogging track
  - Weights room
  - Exercise room
  - Combative room
  - Administration
  - Services

Physical Education, Recreation, Intramural Facility
University of HartFord

* Area: 8550 m^2
* Number of students: 5032
* Functions:
  - Gymnasium
    1 multipurpose court plus bleachers
  - Two RacquetBall/Squash courts
  - Aerobics room
  - Swimming Pool plus Diving Area
  - Weights room
  - Sports Medicine Area

The Berry Sports Center
DorthMouth College - N.H

* Area: 6412 m^2
* Number of students: 4400
* Functions:
  - Gymnasium: Three Basketball courts convertable to one court plus bleachers for 2200 spectators
  - Seven competition Squash courts
  - Six RacquetBall courts
  - Dance/Aerobics room
  - Services

Barbee Center
The WoodBerry Forest School - V.A

* Area: 7026 m^2
* Number of students: unknown
* Functions:
  - Fieldhouse: 200m indoor track plus one multipurpose court
  - Natatorium
  - Squash Complex
  - Services

Marion Burk Knott Complex
College of NoterDame of MaryLand

* Area: 3428 m^2
* Number of students: 690
* Functions:
  - Gymnasium: 1 multipurpose court plus bleachers
  - Games room
  - Offices
  - Two RacquetBall/Squash courts
  - Dance/Aerobics room
  - Fitness center
  - Weights room

Hunter Student Activity Center
WestMinster College - MO

* Area: 2788 m^2
* Number of students: 734
* Functions:
  - Gymnasium: 1 multipurpose court surrounded by an elevated track plus portable bleachers for 100 persons
  - Two RacquetBall courts
  - Weights room
  - Training Facility
  - Games room
  - Cafeteria
  - Reception Lounge
  - Music room
  - Administration

Land's End Activity Center
DodgeVille (For employees of clothing manufacturer)
* Area: 7435 m^2
* Number of users: 4650
* Functions:
  - Gymnasium: 1 BasketBall court plus an indoor track
  - Aerobics room
  - Physical testing and evaluation area
  - Two RacquetBall courts
  - Services

Student Recreational Center
University of Missouri - Colombia

* Area: 4553 m^2
* Number of students: 18196
* Functions:
  - Gymnasium: 2 multipurpose courts
  - 3 RacquetBall/Squash courts
  - Weights room
  - Exercise/Dance room
  - Lounge
  - Services

Hofstra Recreation Center

Hofstra University - New York

* Area: 3166 m^2
* Number of students: 8449
* Functions:
  - Gymnasium: 2 multipurpose courts
  - Weights room
  - Indoor running track
  - Exercise room
  - Reception Hall
  - Offices
  - Services

Rosary College Center

River Forest - IL

* Area: 3159 m^2
* Number of students: 1042
* Functions:
  - Gymnasium: 1 multipurpose court
  - Dance room
  - RacquetBall courts
  - Weight room
  - Elevated indoor jogging track
  - Meeting rooms
  - Bookstore
  - Services

As a summary, we come up with the following table:

Sports Centers	Area/m^2	# of students	Facilities: Gymnasium	Indoor jogging	pool Hall	Weights room	Aerobics/Dance	Combative room	Squash Courts	Games room	Cafet./Lounge	Medical Scrn.
Sports Center Layola Univ.	7430	3588	●	●	●	●	●	●				●
Physical Educ. Cent. Univ. of Hartford	9480	5450	●		●	●	●		●			●
Berry Sports Cent. Dorthmouth College	6412	4400	●				●		●			
Barbee Center Woodberry Forest schl.	7026		●	●	●				●			●
Knott Complex Notredame of Meryland	3428	690	●			●	●		●	●		●
Rosary College Cent. River Forest	3159	1042	●	●		●	●				●	●
Student Recreat. Cent. Univ. of Missouri	4553	18196	●			●	●		●		●	
Hunter Student Cent. Westminster College	2488	734	●			●		●		●	●	
Land's End Activ. Cent. Dodgeville	7435	4650	●		●		●				●	●
Hofstra Recr. Cent. Hofstra Univ.	3166	8449	●	●		●	●				●	
Project proposed by Mr. Mashalani	4727	5174	●		●	●	●	●	●	●	●	

Looking at the pased comparative table, we can conclude the following:

The total built up area of the project depends on the kind and number of sports facili ties to be included in the project.

The nomber of users is not a major determinent of the total area of the project; since most sports facllltles require standard areas regardless of the nomber of users.

Basic sports facilities like a gymnasium (including a multi-purpose court), a weight training room, an aerobics room and squash courts, in addition to a cafeteria, are present in similar projects irrespective of the variant nomber of users. This fact will be a major determinent of the total built up area.

The comparative table gives us a clear idea of facilities the are indispensable to a sports center and others that could be deleated in case we are restricted in area. For example, a gymnasium and a weight training room are a must, while a combative room and a game room are optional. This critirea is fonction of the kind of sports offered in each center, it is also dependent on the policy and orientation of each center (wether individual or team oriented).

SCHEDULE

This is a weekly schedule of sports offered at AUB:

Sport	Frequency/week	Duration	Place
- Football:	3 times	2h	Green Field
(men)	3 times		
- Basketball:	3 times	1h 30min	Indoor
(men&women)			
- Volleyball:	3 times	1h 30min	Indoor
(men/women)			
- Handball:	3 times	1h 30min	Indoor
(men)			
- Tennis:	3 times	2h	Tennis Courts
(men&women)			
- Track & Field:	daily	2h	Green Field
(men&women)			
- Table Tennis:	3 times	2h	West Hall
(men&women)			
- karate:	3 times	1h	West Hall
- Full_Contact:	3 times	1h	West Hall
- Judo:	3 times	1h	West Hall
- Taek Won Do:	3 times	1h	West Hall
- Aerobics:	3 times	1h	West Hall
- Body Building:	daily	9h/day	Weights Room
- Softball:	1 time	3h	Practice Field

Many sports listed in the comparative table of similar projects are not offered at AUB, as: Squash, Indoor Jogging, Swimming and Gymnastics.

These sports should be added to AUB schedule, and relative facilities should be provided for them accordingly.

Sporrts listed in AUB schedule are practiced in various places on AUB campus.They are combined as follows:

PLACE	SPORT
Green Field:	Football
	Track & Field

PLACE	SPORT
Indoor:	Basketball (men & women) Volleyball (men & women) Handball
W.Hall/Dance room:	Aerobics Dance
W.Hall/Combat room:	Table Tennis Karate Judo Taek Won Do Full Contact
Weights room:	Budy Building
Tennis courts:	Tennis
Practice field:	Softball

These combinations give us a clear idea of sports that can be practiced in the same space. This would help us to achieve maximum efficiency in the use of various spaces.

Looking at the pased schedule table, we notice that some of the sports facilities are underused, like the Green Fiejd and the Indoor; while the body building (weight trainning) room is overused. The following tables highlight the rate of occupation per week of sports facilities that should exist in AUB in order to satisfy existing and future needs, and to achieve maximum efficiency in the use of spaces.

* GYMNASIUM

It contains a multipurpose hall that will house the following sports:

Sports	Frequancy/week	Duration
Basketball (men)	3 times	1h 30min
Basketball (women)	3 times	1h 30min
Volleyball (men)	3 times	1h 30min
Volleyball (women)	3 times	1h 30min
Handball (men)	3 times	1h 30min
Tennis (men & women)	daily	1h
Gymnastics (men & women)	3 times	1h 30min

The gymnasium will be used 33h per week, according to the above table; i.e. it will be occupied for 5h 30min per day, six days per week.

* Weight trainning room

It will be used for 8 hours per day and will cater for an average of 15 persons simultaniously. An average trainning session per person is 60min.

* Aerobics/Dance room

It will house the following sports:

Aerobics	3 times	1h
Dancing	3 times	1h 30min
Physical Fitness	3 times	1h

Due to the popularity of this kind of sports, we will have two sections for each sport. The room will be occupied for 21 hours per week; hence, 3h 30min per day, six days per week.The room will cater for a maximum of 30 persons.

* Three Squash Courts

Squash courts will be open daily for 8 hours. A squash court is used by one or, in most cases, two persons at a time; for an average of per shift.

* Combative room

This room will include marshal art sports and wrestling.

Sports	Frequancy/week	Duration
Judo	3 times	1h 30min
Karate	3 times	1h 30min
Taek Wan Doe	3 times	1h 30min
Full Contact	3 times	1h 30min
Wrestling	3 times	1h 30min

This room will be occupied for a periode of 22h 30min per week; hence, 3h 45min per day, six days per week. The capacity of this room is a maximum of 30 persons.

Number of Employees

Full Timers: - Director
- Assistent Director
- Secretery
- 4 Staff members
- 2 Genitors
- A Doctor(present for 3 to 4 hours per day)
- A Nurs

Part Timers: - A coach for each of the following sports:

* Football	* Tennis
* Basketball	* Table Tennis
* Volleyball	* Gymnastics
* Handball	* Track & Field
* Swimming	* Weight Trainning
* Aerobics	* Dancing
* Karate	* Taek Won Do
* Judo	* Wrestling
* Squash	* Full Contact

As a conclusion, the sports center would need 29 staff members, 11 full timers and 18 part timers.

THE PROPOSED PROGRAM

The program that I propose is a result of the analysis of similar projects, the interview with Mr. Halimi and the review of books of architectural standards conserning sports facilities.

Similar projects were very helpfull in determining the different sports facilities that should exist in a sports center according to the scale of the center.

The interview with Mr. Halimi highlighted the existing and futur needs of AUB in terms of sports facilities. This fact determined sports facilities that should be added to the existing ones.

Books of standards delt with the technical part of the program; mainly areas of sports facilities and their relevent services, that summ up at the end to determine the total built up area of the project.

Number of students at AUB: 5174

Program:

* Entrence Hall and Controle area ---------- 50m²

* Administration ---------- 70m²
  - Director's office 15m²
  - Assistant director's office 12m²
  - Waiting and secretery space 10m²
  - Lounge 15m²
  - Changing room for a minimum of 6 staff members 12m²
  - Two toilet units 4m²
  - Small kitchenette 4m²

* Cafeteria ---------- 140m²

  The area of the cafeteria includes a storage place and a service counter.

  It will cater for an average nomber of 70 persons.

* Game room ---------- 220m²

  Table Tennis, Biliards, ets.

* Gymnasium ---------- 2225m²

Including the following:

- Multipurpose hall 950m²
- Indoor jogging track 600m²
- Seating capacity for 1500 spectators 675m²

* Pool Hall ---------- 1400m²

It includes a 50×21m² swimming pool in addition to a diving area.

* Weight Trainning Room ---------- 150m²

This room will cater for an averege of 15 persons trainning simultaniously.

* Aerobics/Dance Room ---------- 120m²

It will house the following sports: aerobics, dance and physical fitness.

The capacity of this room is 30 persons.

* Combative Room ---------- 144m²

This room will house the following sports: Judo, Taek wan Do, Karate, Full Contact, Wrestling and any marshal art sport newly introduced.

The room will cater for 30 persons.

* Three Squach Coutrs ---------- 190m²

* Conference/Audio Visual Room ---------- 45m²

This room will be used for team gatherings and meetings. Its area was determined to accomodate for the biggest team (the football team, 16 players) amd staff members, where they can meet, exchange oppinions and watch ralevent visual material.

* Medical Screening ---------- 72m²

It includes:

- Waiting 10m²
- Examination room 10m²
- Physical testing room 40m²
- Office 10m²
- Toilet unit 2m²

The medical screening requires a full-time nurse and an attending doctor present for three hours per day.

* Changing rooms ---------- 465m²
  - Dry changing area: Area: 200m²
    Maximum number of users: 105
  - Wet changing area: Area: 140m²
    Maximum number of users: 150
  - Clothes storage: Area: 60m²
  - Showers: Number of showers: 25
    Area: 40m²
  - Toilets: Number of toilets: 6 (men) - 9 (women)
    Area: 25m²

Note: These areas would be equally between men and women except for the toilet units.

* Mechanical room ---------- 800m²
  For water treatment, heating, ventilation, electrical substation, etc.

* Storage spaces ---------- 120m²
  Distributed on all floors.

Total area of spaces: 6305m²
Circulation is 15-20% of total space area.

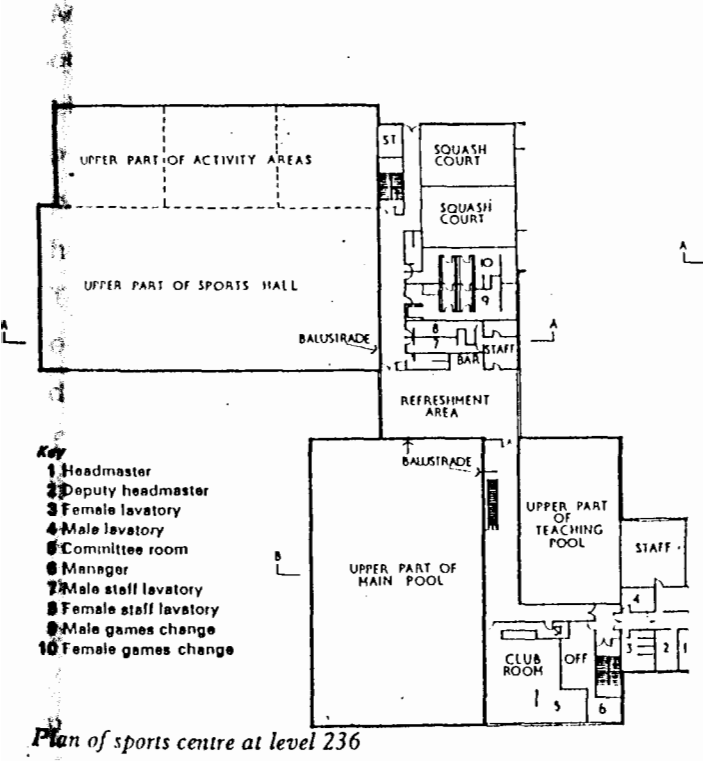
Total built-up area: ---------- 7250-7550 m²

* Parking:
  Parking facilities are not needed since the number of cars accessing the AUB campus is limited and parking is already provided for them. However, service parking will be provided on the road near the service facility.

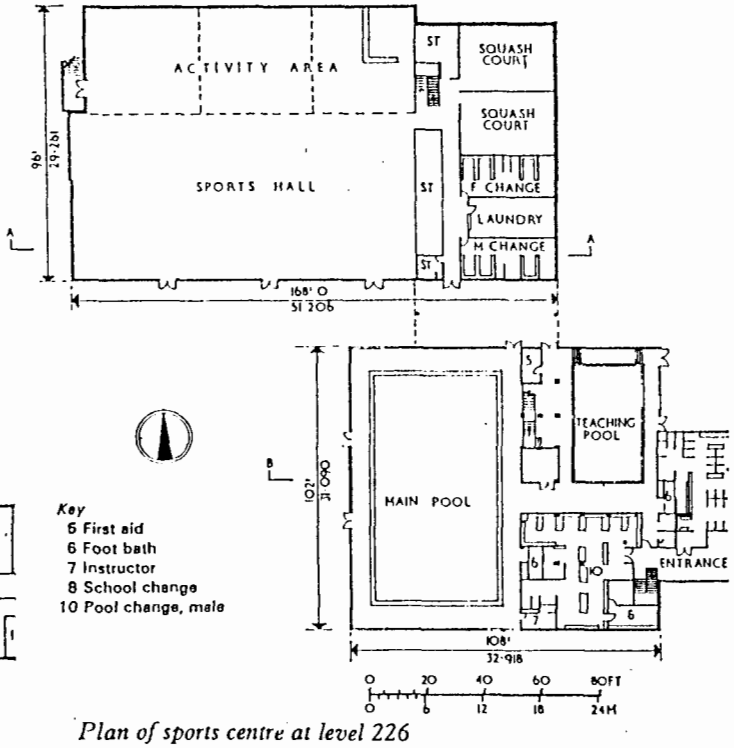
SIMILAR PROJECTS

School and Sports Centre,
Carlton, Nottingham (Project architect Gilbert Mellers)

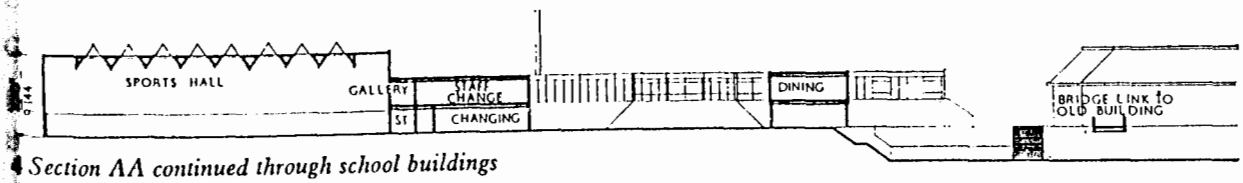
The project was for the adaptation and extension of Carlton Cavendish secondary modern school to form an eight form entry 1200 pupil comprehensive school. In addition a sports centre was to be provided, to include a swimming pool and sports hall which would be used by school children during the daytime and by general public in the evenings, weekends and during school holidays.



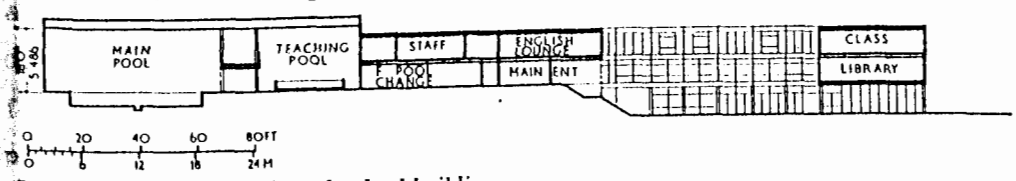
Plan of sports centre at level 236



Plan of sports centre at level 226



4 Section AA continued through school buildings



5 Section BB continued through school buildings

Schedule of accomodation

The joint facilities required by the brief were a swimming pool(25m × 12.8m); a teaching pool 7.3m wide with a depth of 0.91m throughout; a viewing area for spectators located between the two pools; a sports hall 36.6m long by 18.3m wide; three activity area for judo, fencing and weight training; changing and cloakroom facilities for the sports centre and associated playing fields; a refreshment area and clubroom and a boiler house and plant room.
Additional facilities to be provided were two squash courts, a licensed bar in the clubroom, floodlighting for the all-weather pitch, parking for 150 cars, two grass pitches, an artificial ski slope and a target golf range of pavilion. The site is among medium to high density urban housing about three niles from the centre of Nottlngham.
The sports centre is open from 9.00 to 23.00 hours hours every day, being used by schools until 17.00 each day during term time. It is therefore available to the public for the rest of the day, at weekends and in school holidays.
The area of Carlton in which the school is situated is part of Nottingham conurbation and is typically suburban in character.

Principal planning and disign decisions

To integrate the scheme, seperate entrances for the sports centre and school, lead into a combined entrance foyer. Glass doors allow the school premised to be locked from the public at weekends and holiday times. The sports centre block is to the west to be nearer to the public car park and playing fields. The main swimming pool is of the level deck type and electronic swim time equipment regulate the flow of bathers. Natural light to the sports hall is by pitched rooflights designed to reduce glare to a minimum. The sports hall has red-brown faced brickwork panels at ground floor with grey-green plastic coated steel sheet cladding over. Retaining walls are reinforced concrete with red-brown facing bricks to match the sports hall.

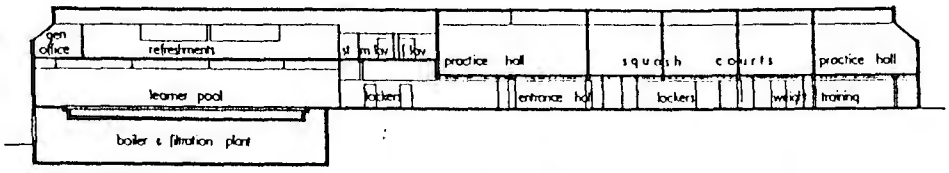
Bury St Edmunds Sports and Leisure Centre,
Suffolk (Project architect Henk Pieksma)

Site

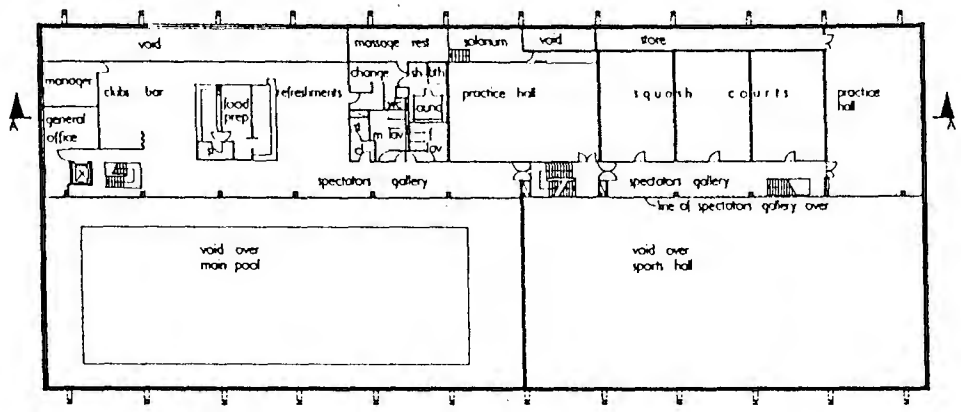
The site of approximately 7.5 hectares, known as the Gibralter Barracks site, was originally the headquarters of the Suffolk Regiment.
The site is enclosed on three sides by a heavy red brick wall(part of the old barracks complex) which is subject to a planning preservation order. The three buildings on the site__regimental museum, youth centre and sports centre, are all strong simple forms. It was intended to emphasise this character by restraint and simplicity in the landscape treatment. The site is approximately half a mile from the town centre.
On the north and east sides there are educational establishments, with playing fields, including a 400m all weather running track, hard on the site boundaries.

Design

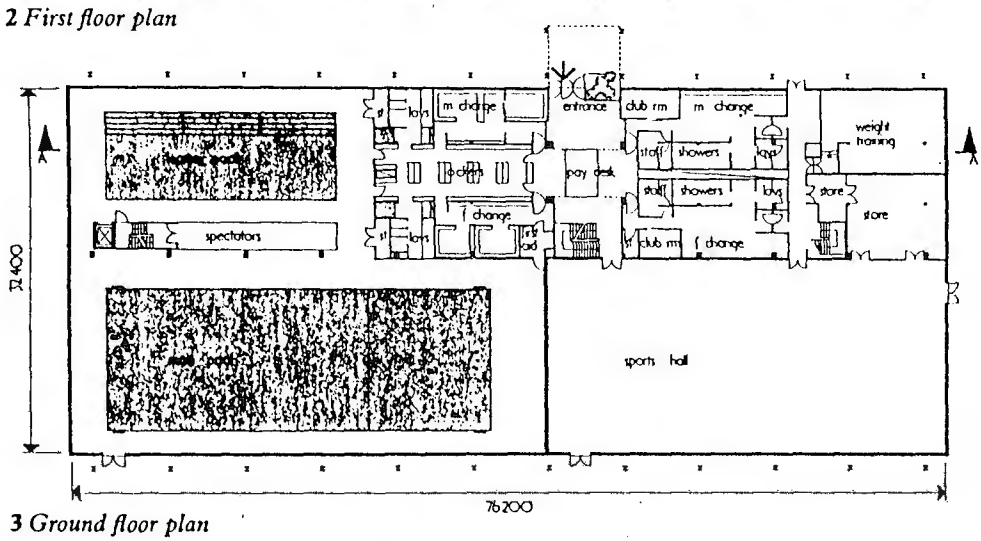
As a result of site requirements the building was designed as a simple rectangular box, sited on top of the bank and in front of the wooded area. The structural steel frame supporting the roof is exposed to give a feeling of rhythm and scale to the building. Brick was used inside and out up to a height of 2.1m and above this the secondary steel frame is clad externally with horizontal metal boarding and internally with timber boarding.
Extensive use is made of different levels leading off landings and half-landings of the staircases within the simple box conception. The architects have tried to express the relationship of spaces within the building by way of through views. Simplicity of construction and materials expressing the structure inside as well as out was always borne in mind.



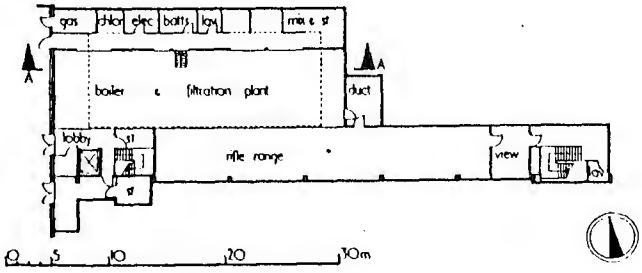
1 *Section AA*



2 *First floor plan*



3 *Ground floor plan*



4 *Basement plan*

Construction and materials

With a view to reducing maintenance to a minimum, materials are restricted to steel, brick, timber and glass__all of good quality. The quality of brickwork, metal cladding and timber boarding, coupled with the fact that all pipework has been hidden in ducts, will keep down vandalism.

Circulation and planning

The simple rectangular envelope is 76.2 × 32.4 × 7.5m high (floor to ceiling). The southern half of this volume is taken up by two roughly equal areas: main 33.33 × 12.60m pool(water area) and a 34.80 × 17.18m main sports hall. The northern half has three levels containing learner pool, changing areas, and weight training room, on the ground floor; bar, refreshments, three squash courts and two practice halls on the first floor. The second floor accomodates the upper levels of these spaces and another viewing gallery. Between these two main divisions, along the major axis at each level, run the long public viewing areas which, at one end, form the refreshment room and bar.
Having entered at ground floor level through the centrally positioned foyer and ticket office, the public are split four ways: to dry changing, wet changing, up to spectator areas, and down to the rifle range.

Structure

The simple box idea, with only high level fenestration, has three advantages. It allows a very plain elevational statement which seems right in this setting, it ensures a very tight economical plan and it overcomes the distraction, glare. The Stanchions also express the 6.6m grid(into which squash courts fit perfectly) and provide rhythm and interestexternally.
The 2.1m high continuous brick perimeter floats the building above its banked podium. The basement boiler house and rifle range are in reinforced concrete, as are both pools and their surroundings.

Form and Space

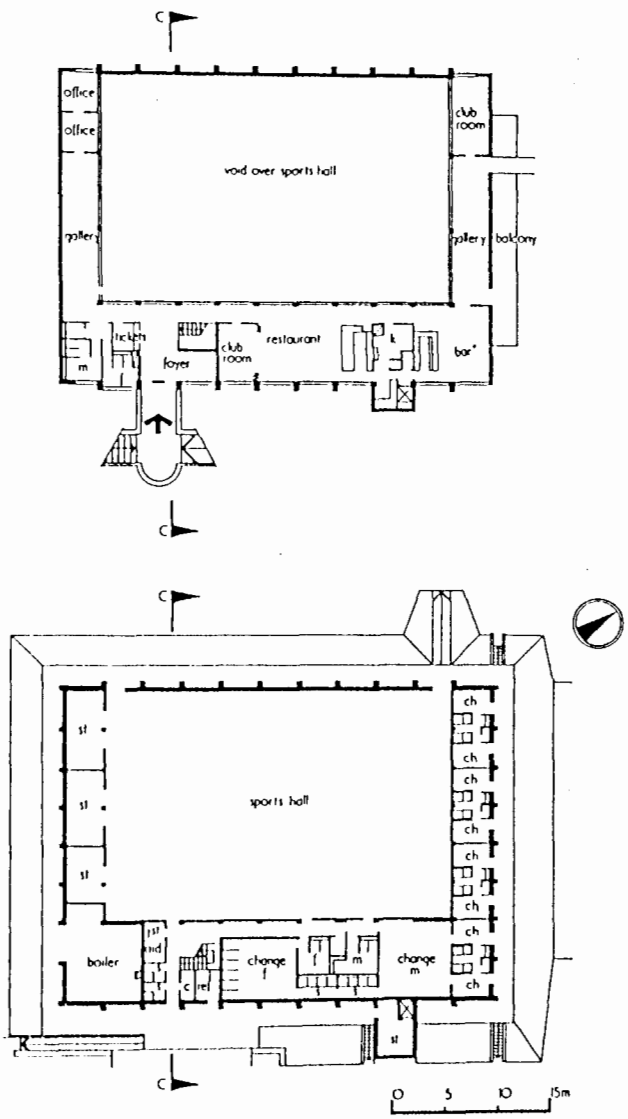
One remarkable effect on the inward-looking design, the variation of interior levels and simple elevations, is that the building appears twice as large inside as it does

externally. The diagonal views achieved internally by the extensive use of glass screens give a remarkable feeling of spaciousness and interest, and while the decision to adopt the 45° high-level glazing was to solve problems of glare, vandalism and maintenance, the architects were also aware of the internal views of leaf and tree patterns outside.

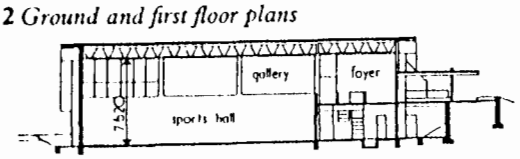
Area: Ground floor area: 2472m^2.
Total floor area: 4129m^2.

Park Recreation Centre
Horsham, West Sussex
(Project architects D.F. Tandy, A. Bisztyga)

This project was for a recreation centre with accommodation for indoor and outdoor sporting activities.



2 *Ground and first floor plans*



3 *Section CC*

The accommodation

The accommodation comprises at ground level a 32m × 21m multi-purpose sports hall with three eqpuipment stores, male and female changing rooms with showers and toilets, disabled persons' toilet, first aid room, two instructors' changing rooms, referee's room, boiler house, beer store and cleaner's store, with eight external team changing rooms complete with toilets and showers serving the playing fields in Horsham Park.
In the first floor, approached by stairs and ramps, there is an entrance foyer and ticket office, male, female and disabled persons' toilets, two club rooms,restaurant and bar with services and kitchen, viewing galleries on three sides, one leading to an external gallery for viewing to the sports fields and two management offices overlooking the sports hall and most of the public area including the entrance.

The site

The building is located on the south side of Hrsham Park. It has been built as low into the ground as the relatively high water table will allow. The nature of the site is such that the sports centre appears to be a single-story building when viewed from most of the Park.

Factors influencing design

A number of factors, influenced the design; the building had to blend with its park surroundings, stay within financial limits, have low maintenance costs, and cater for maximum use.

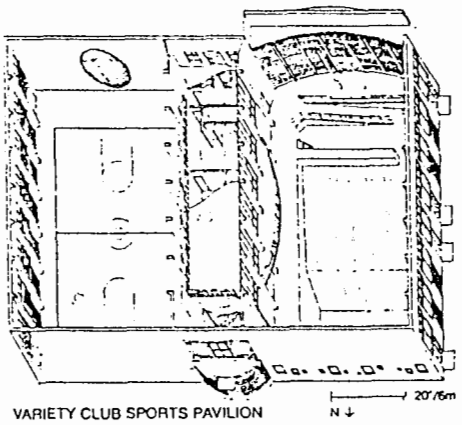
Construction

The building is steel framed with a clear roof span and clad with bricks externally and internally. The building is mainly artificially ventilated with gas fired entrained heating but it is not air conditioned.

Area: Ground floor area: 1130m² - Total floor area: 1690 m²

The plans on the following pages have been selected because they illustrate the difference between:

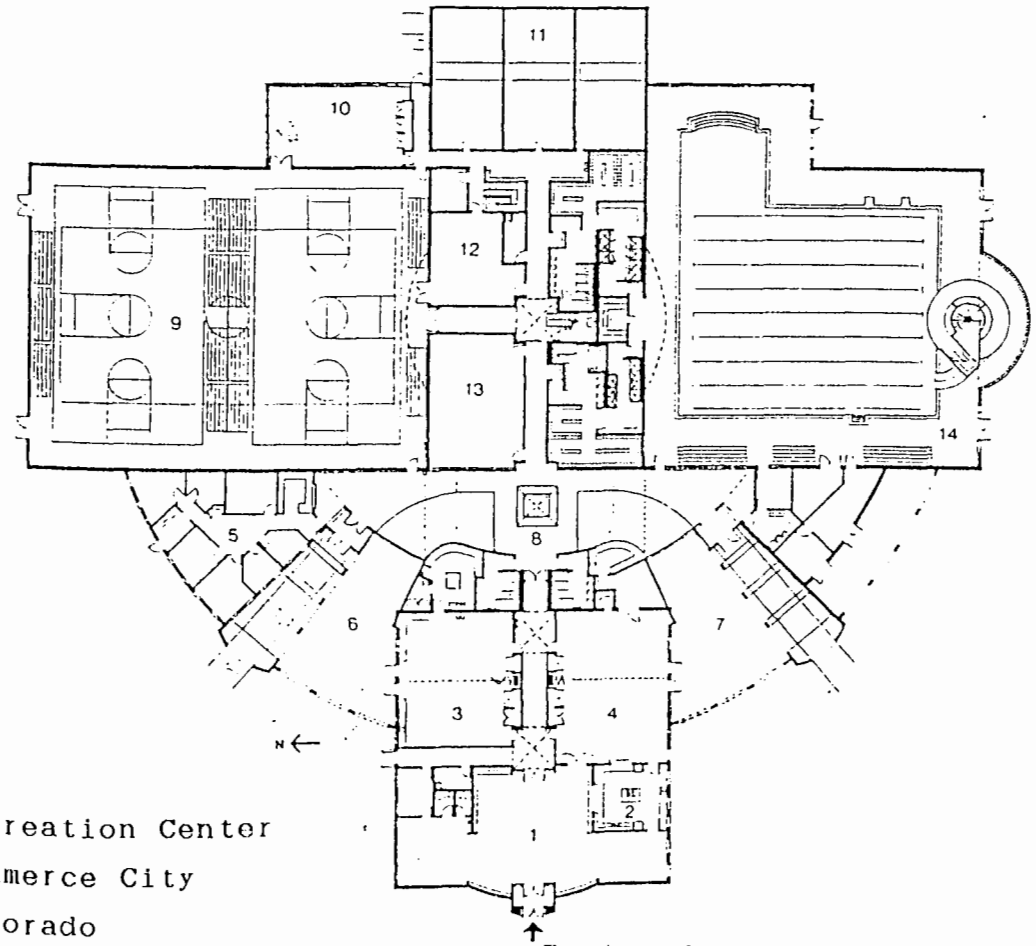
- Treating the indoor facilities as one bulk or breaking them into smaller friendlier volumes.
- Combining the wet and dry changing facilities as opposed to sepereting them.
- Providing one access point for the athletes from the chainging facility into the main hall versus providing more than one access.



VARIETY CLUB SPORTS PAVILION

Variety Club Sports Pavilion
Philadelphia
Arch: BJC / Knowles

The central spine, composed of lobby, locker rooms, support facilities and mezzanine above, is marked on the exterior by the curved glass-block entrance.



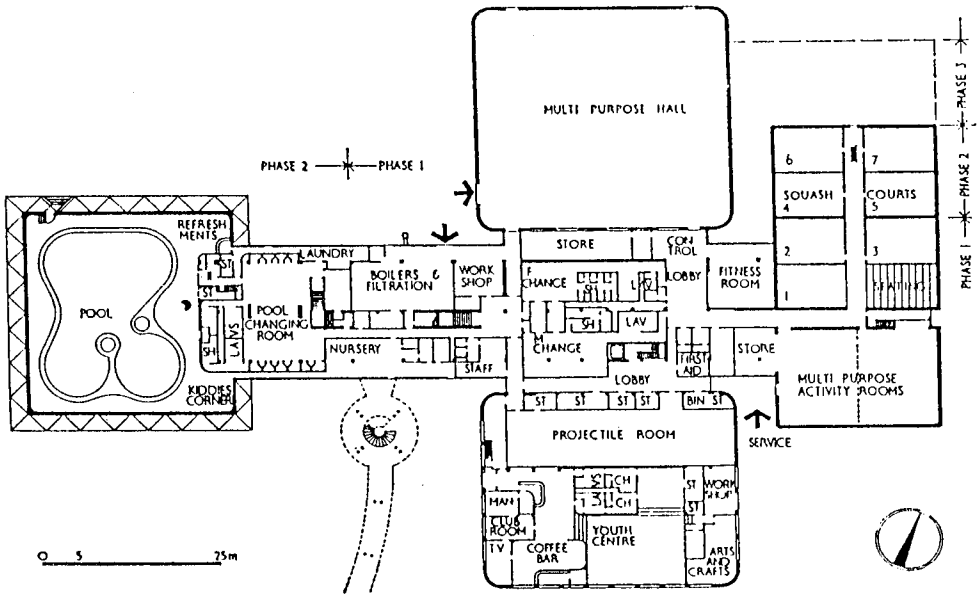
1. *Senior activities*
2. *Kitchen*
3. *Arts and crafts*
4. *Multipurpose*
5. *Administration*
6. *Art court*
7. *Play court*
8. *Lobby/atrium*
9. *Gymnasium*
10. *Aerobics/dance*
11. *Racquetball*
12. *Storage*
13. *Weight room*
14. *Pool*

Recreation Center
Commerce City
Colorado
Arch: Barker Rinker Seacat and Partners

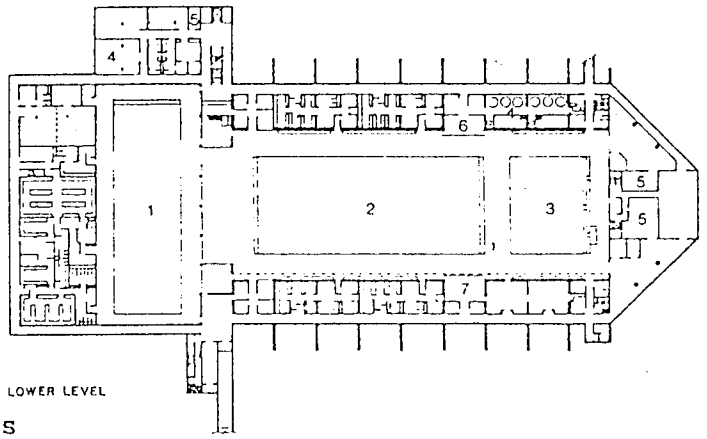
Recreayion Center

Riengwood

- Clear subdivision between served and servant space.
- Seperate dry/wet changing facilities.



Ground floor plan

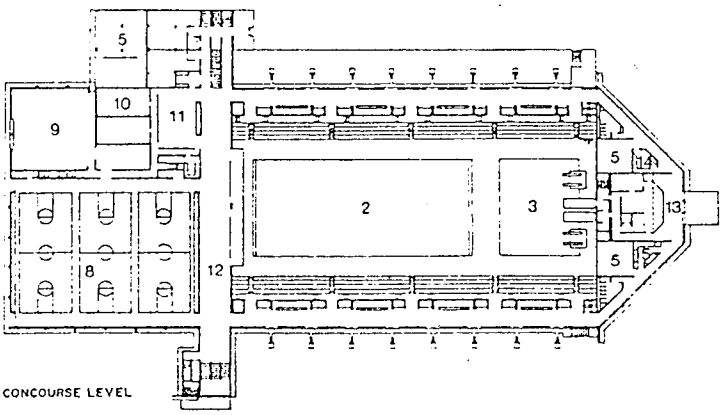


Indiana University

Indianapolis

Arch: Edward Larrabee Barnes

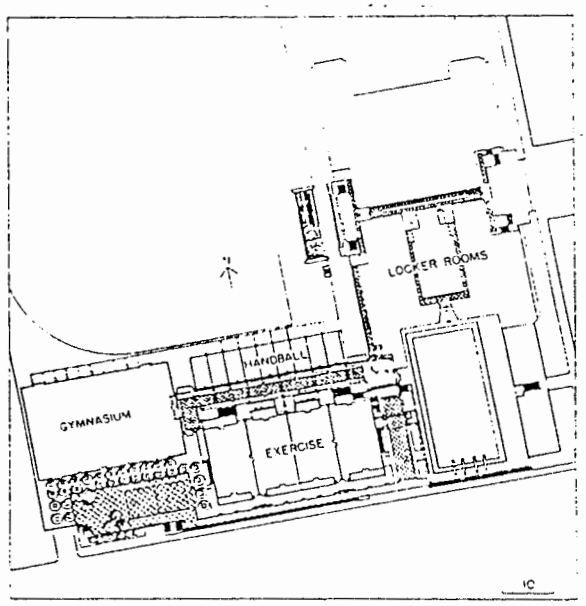
1. Instructional pool
2. Competition pool
3. Diving pool
4. Filter room
5. M/E
6. Control room
7. Scores office
8. Main gym
9. Auxiliary gym
10. Handball
11. Lounge
12. Concourse
13. Lobby
14. Kitchenette
15. Vending



Notice the massiveness and the bulk of this volume compared to the volume of the previous project which is broken into smaller volumes.

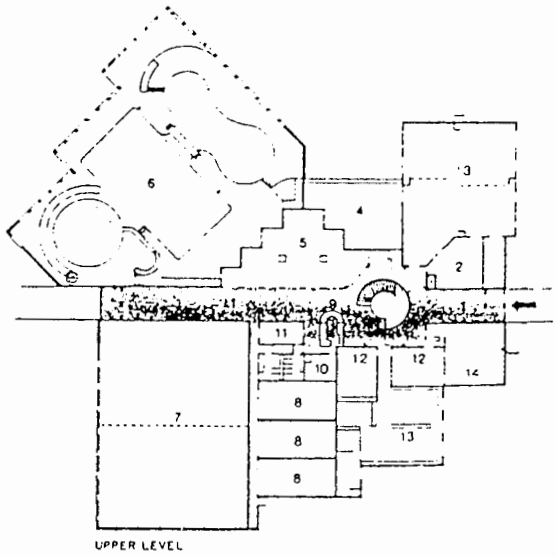
The design took advantage of the building's bulk to establish a strong edge for the campus, but they nevertheless attempted to humanise the architectural scale by using ventilation louvers on the fasade (windows are denied because of glare).

The circulation corridor was given grand dimantions to act also as an exebition space and to evoke somthing of the grandeur Greeks associated with physical exercise.



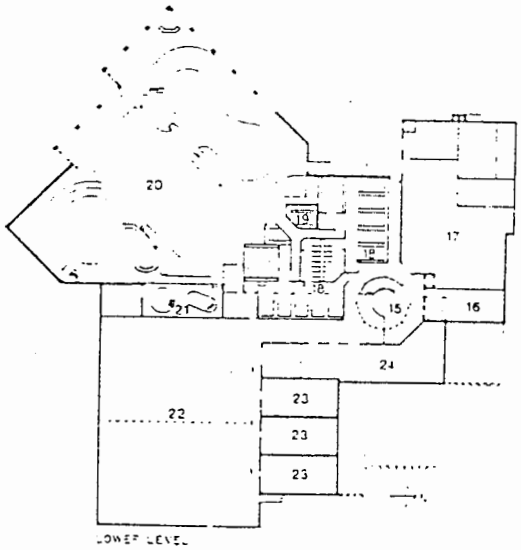
University of California
Berkley
Arch: Elbasani and Logan

Recreation Center
Westminster
Colorado
Arch: Barket Seacat
and Partners



The center is on two levels, and access is from the upper level, where one overlooks the pool and the gymnasium.

1. *Galleria*
2. *Kitchen*
3. *Community room*
4. *Deck*
5. *Lounge*
6. *Pool below*
7. *Gymnasium below*
8. *Racquetball below*
9. *Vending*
10. *Office*
11. *Reception*
12. *Classroom*
13. *Crafts*
14. *Daycare*
15. *Lower lobby*
16. *Staff*
17. *Storage/expansion*
18. *Lockers*
19. *Steam/sauna*
20. *Pool*
21. *Spa*
22. *Gymnasium*
23. *Racquetball*
24. *Weight room*

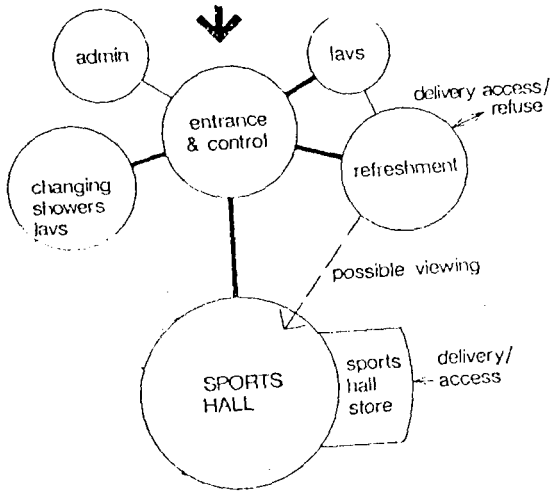


SPACE ANALYSIS

Administrative, refreshment, social and ancillary areas

Entrance hall/control area

Space must be large enough to accommodate normal flow of public - participants and spectators - with area for waiting (including some seats). Considiration must be given to crowds leaving main activity areas after spectator event or special functions. Minimum area to be approximately 20 sq.m. Reception/Control space is usually glass enclosed for security and large enough to accomodate two people; minimum area around 10 sq.m. There must be access from entrance hall to toilets, refreshment areas and changing rooms. Consider segregation of players and spectators where required (as in pool hall). Reception/Control office staff should have good view over major circulation spaces, and space must be positioned so that all users must pass it to enter activity areas. It must, therefore, be in a prominent position. Consider directional signs and possible planting.

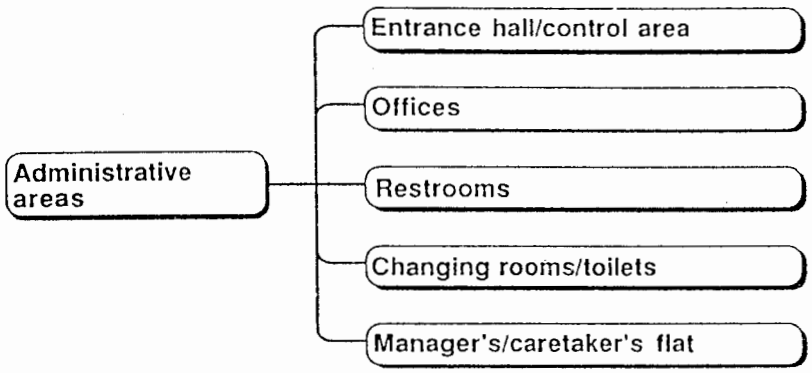


Offices

The type, size and numver of offices depend upon the size of center, number of staff, managerial policy and organisation. A rough guide of likely minimum areas is: manager's office 14-20 sq.m; general offices (supervisor, engineer, instructors/coaches, etc.) 9-11 sq.m; secretary/typist 8-9 sq.m. Offices should ideally be close to reception control space but away from main public circulation areas. Group offices should be together as far as possible. Some (instructors/coaches) may need to be adjacent to activity areas or changing rooms.

Staff restroom, changing-room and toilets

Size will depend on the number of staff. Area of 10-15 sq.m will probably be required for restroom. Changing and toilet facilities may be seperate for males and females or shared. One WC and one wash-basin will be adequate for up to 15 persons.



Refreshment and social facilities

Bar: to determine overall (customer and servery) space required allow approximately 0.6 sq.m per person if only drink is served; where food is also served, 0.9 sq.m per person. The average bar (Cafeteria) area is around 140-150 sq.m. Storage space (excluding empties) of between 30-45 sq.m will be required. For seating at tables for four-six persons (self-service) allow 0.9-1.4 sq.m per person.

The refreshment areas should, ideally, be sited at the heart of the center, possibly overlooking the major activity areas and , if possible, should be visible from the entrance hall.

Public toilets should be situated adjacent to the refreshment areas.

Toilets: statutory requirements vary from place to place. A general guide is

Men WCs:minimum two (up to 200 persons), then one for each 100 up to 500, then one for each additional 200.
Urinals:minimum two (up to 1,000) then one for each 50.
Wash-basins:one for each sixty persons.

Women WCs:mlnimum two (up to 75), then one for each 50.
Wash-basins:one for each sixty persons.

Changing-rooms

The number of changing-spaces should relate to the maximum utilisation of the facilities with allowance for overlap. For dry sports calculate maximum number of persons using each activity space during a one-hour period and double total to allow for overlap. For Swimming-pools changing-space is normally related to pool area: one place for each 8.4 sq.m of water area. Add two places for the a diving pool. Area required is generally based on 0.7-0.85 sq.m per person which include 400-500 mm of bench space per person.

Provision should be made for a drying/towelling area between the showers and changing-spaces.

Changing-rooms must be centrally placed in the complex particularly if they are shared by swimming-pool(s) and dry sports. Changing can be all cubicles, open plan or (most commonly) a combination of the two. In this case space mainly for open changing with some cubicles provided for the shy (minimum size 800 mm x 900 mm : 1m x 1m preferred). The proportion of cubicles to open changing areas may need to be increased for females.

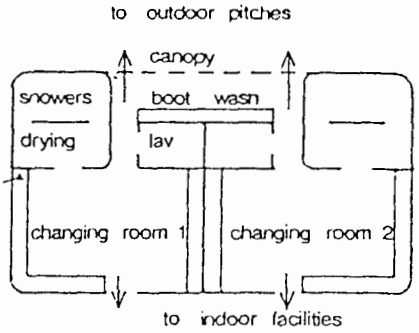
Clothes storage: either in individual lockers - which can be grouped together or dispersed - or in central store (for hanger/baskets). Both systems require approximately the same area. For dry sports, storage space (usually lockers) should be provided for the estimated number of players using the facilities per hour x 2.5, while for swimmers, storage units for 4-6 times the number of changing places are normally provided.

Showers and toilets: provision is based on the number of changing places provided.

WCs(2 minimum)	1 per 15-20 (males), 1 per 7-10 (females)
Urinals	1 per 15-20
Showers	1 per 7-8 both males and females
Wash-basins	1 per 15 both males and females

Showers and toilets must be placed so that bathers pass them on their way to the pool. Stais and steps must be avoided. Access to pool from this area to be at shallow ends.

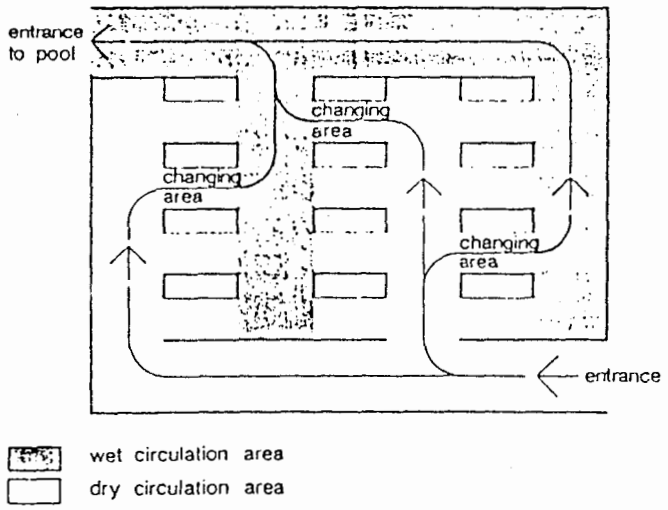
The facility will contain both open changing ares and self-contained team changing area.



Self-contained team changing areas for outdoor and indoor use

* SEPERATE CHANGING FACILITIES WILL OFCOURCE BE PROVIDED FOR THE TRAINERS.

The open changing area could be concentrated on one floor adjacent to the gymnasium and the pool hall, or, if needed, it could be divided on diferent floors, depending on the zoning of various sports facilities.



Wet and dry circulation for changing area

Two self-contained team changing areas would be provided: one near the Gym. and an other external one to serve the football team.

Storage areas

General storage areas may be necessary in addition to the specialised storage areas that are located within the various sports facilities. It is difficult to generalise, and only arough guide to areas can be given. For example, poolside storage (can also be adjacent to pool hall) may be required for lines, starting-blocks, water-polo nets, floats and other swimming/training aids, tables, chairs, bleacher seating,cleaning equipment, etc: minimum of 30 sq.m up to 75 sq.m or more. Also, storage for various equipment and seating for the main sports hall: from 50 sq.m (small hall) to 115 sq.m or more (large hall).

Storage for cleaning equipment (floor cleaning machines, buckets, mops, cleaning materials, etc.) and general equipment (spare light bulbs, access ladders, etc.) must be provided.

Stores should be kept fairly shallow (about 5.5 m deep maximum) and may require direct access from aoutside for deliveries. All doors and access routes will need to be a minimum of 2.25 m high and preferably 2.7m. Where movable bleacher seating is used the minimum hight must be 2.85m.

Plant rooms

These are necessary for water treatment and filtration, heating, ventilation, electrical substations, etc. Space requirements will depend on size of complex, size of pool - plant room for pool can be based on 50-60% of water area - and systems used. Approximate area required for medium to large complex (total area ± 4,000 sq.m) would be in the region of 250-300 sq.m. Seperate store (about 10 sq.m) will be required for chemical storage. Cold water storage - usually at high level will be required.

Spaces should be grouped together and sited so as to minimize the length of service rounds. Certain spaces (electrical substation and chemical store) will require direct access from the outside. A service yard is desirable.

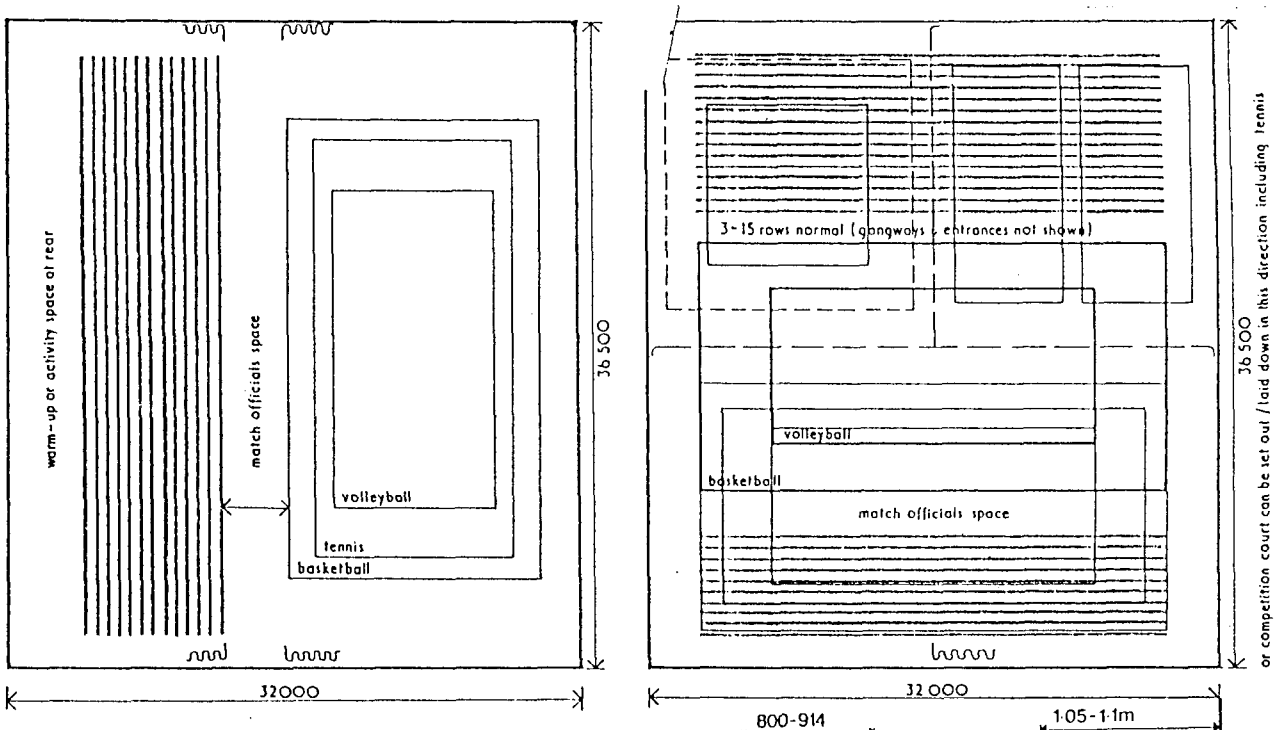
SPORTS FACILITIES

Gymnasium

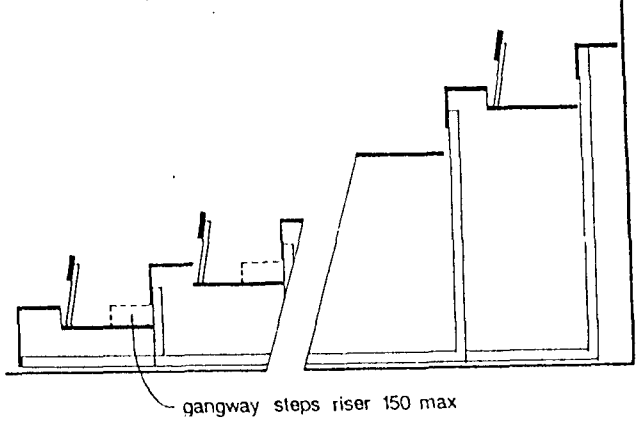
In order to provide a healthy and enjoyable environment for practice, a gymnasium requires the following:

- Natural light is best from above and it should be glare free.
- In case of artificial light, light sources should not be suspended from the ceiling because they risk hitting the ball that might frequently reach the ceiling level.
- walls and ceiling should be designed to reduce reverberation (sound insulation).
- Storage required for: goal-posts, nets, ets.
- hight : 7-9m
- Seating arramgement should give reasonable comfort and sight line, along with safety and space standards.

The following diagrams are seating and court arramgement alternatives:



This is a space diagram of a bench-back type



Pool Hall

The Pool Hall is more sensitive in terms of envelope than the gym. because of the constant water evaporation; therefore, the following is required:

- Large glass areas should be avoided.
- The problem of glare should be solved be either orienting openings north, or using tinted glass.
- Storage is needed for: pool cleaning equipment, floating lane markers, ets.
- Hight: 6-7m. In case of the presence of an olympic diving area the hight of the ceiling should reach 12.5 m

Squash Courts

Squash courts are self contained boxes which do not need any breathing to the outside. Thy require artificial lighting, mechanical ventilation to avoid condensation and a minimum ceiling hight of 5.7m

Combative Room

This room requires the following:

- Mechanical ventilation
- Storage is needed for equipment (mats,training euipment)
- Ceiling hight of 4m is preferable

This room could be either naturally or artificially lit.

Aerobics/Dance Room

This room requires the following:

- Artificial light
- Mechanical ventilation is required to avoid condensation on the mirrors surrounding the space.
- Storage is needed for training equipment
- Ceiling hight: 3-4m

Weights Room

The weight training activity can be noisy; this may be a problem particularly if the room is located over other spaces; however, the requirements of the space are:

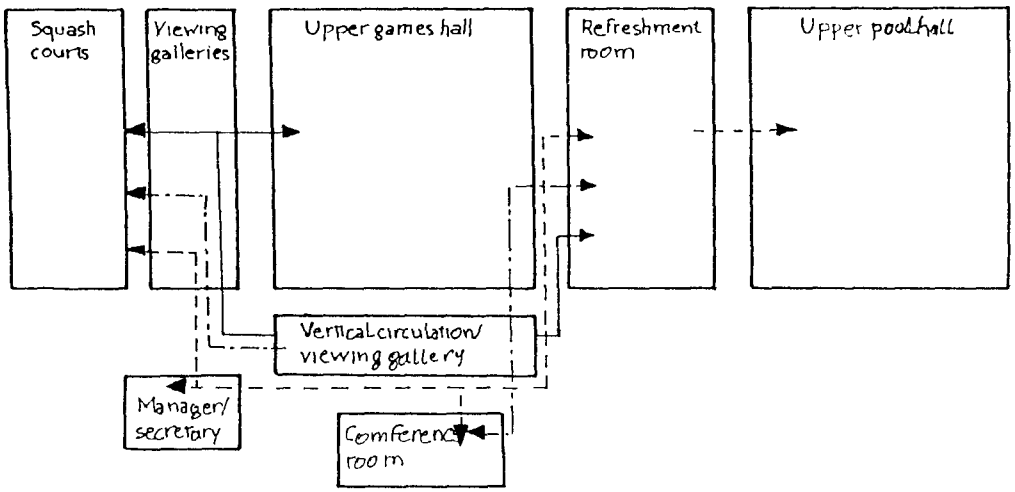
- Natural or artificial lighting is possible
- Mechanical ventilation is needed to keep a healthy environment.
- Structure of floor and walls should be strong enough to support heavy training equipment.
- small storage area is needed for spare parts
- Ceiling hight: 3m and above

Medical Screening Facility

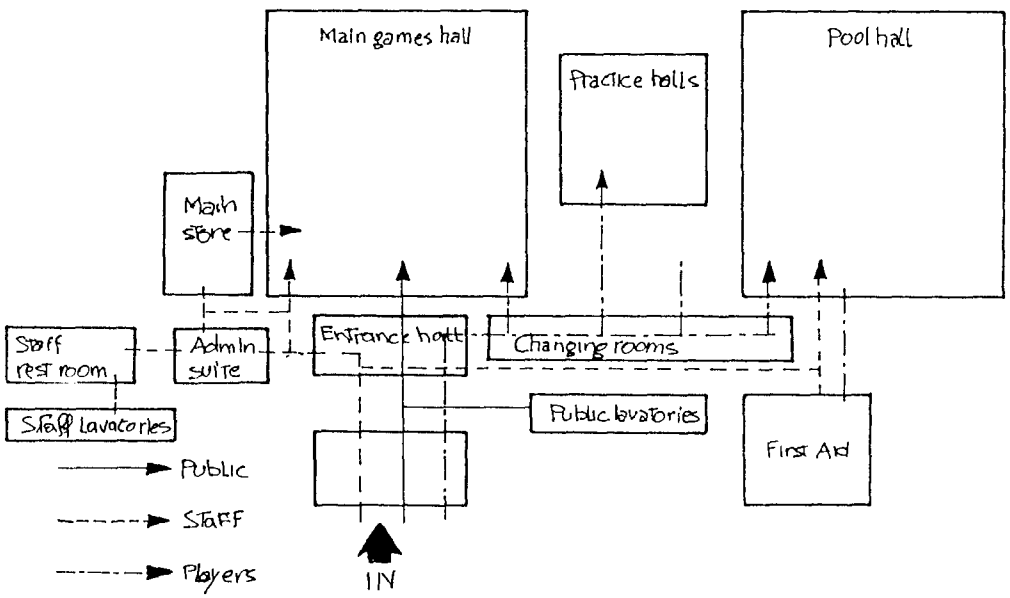
This facility is also called: medical testing and evaluation. It is preferable to have a direct exit to the outside for immergency cases. It includes the following spaces:

- waiting space
- doctors office
- Examination room
- Physical testing space

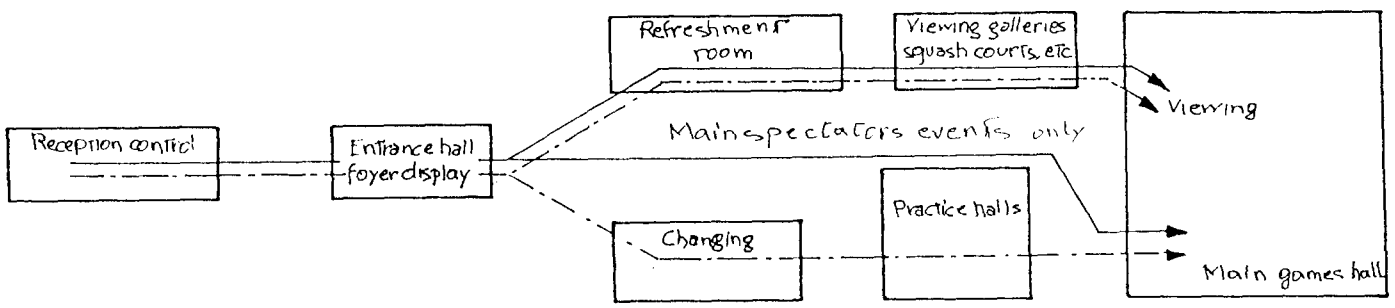
ORGANISATION DIAGRAMS



Diagrammatic plan of upper level showing circulation routes

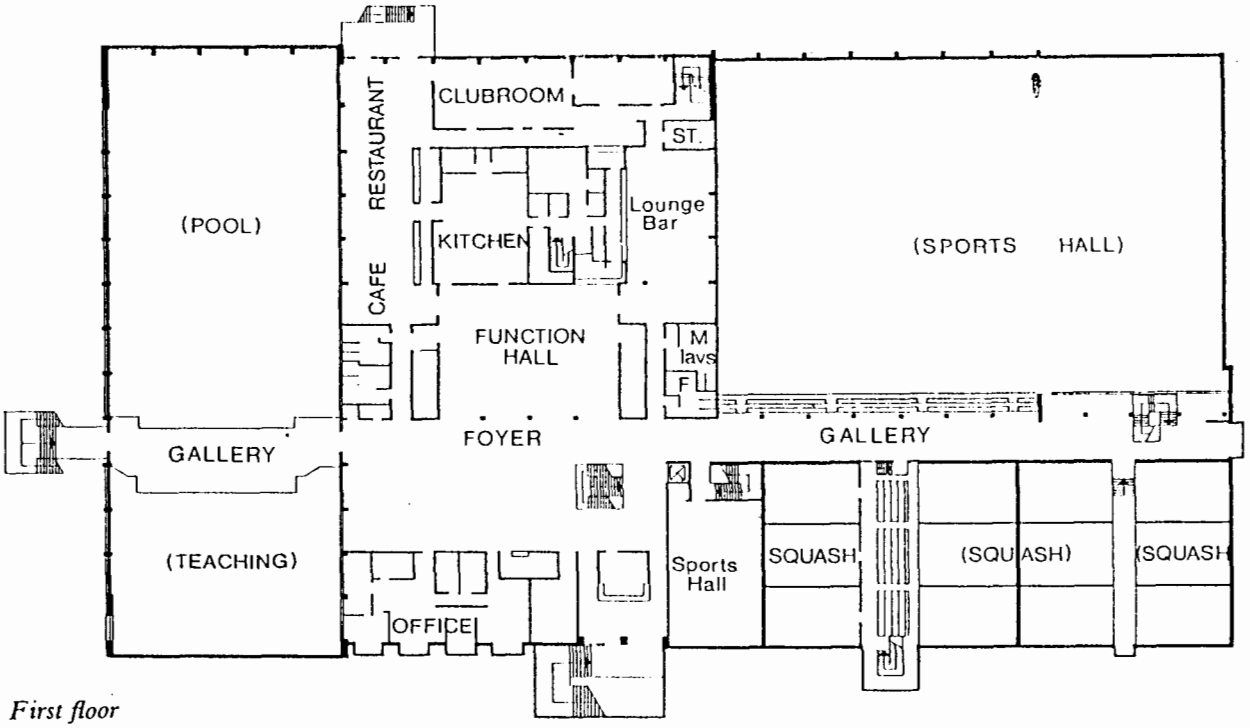


Diagrammatic plan of lower level



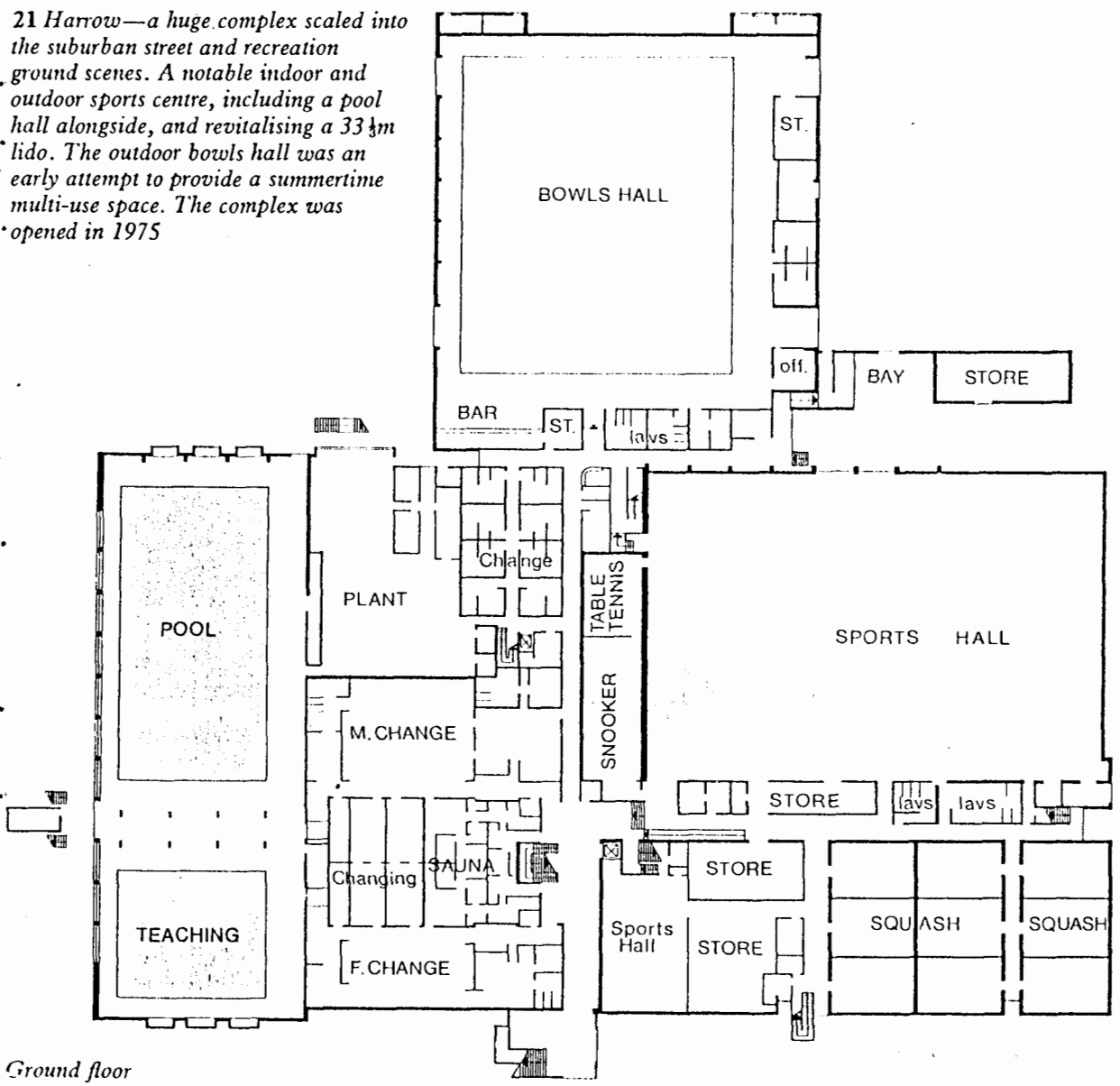
Diagrammatic section

An example on the passed diagramatic plan is:

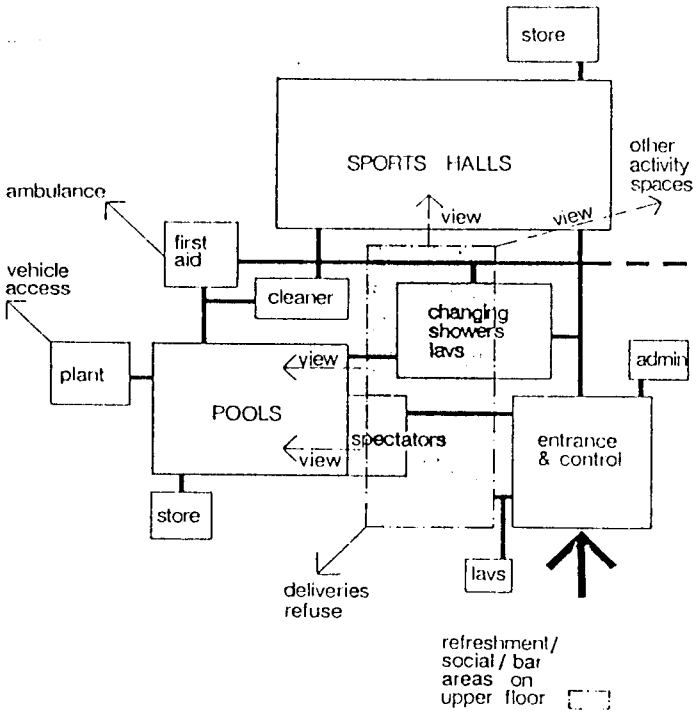


First floor

21 *Harrow—a huge complex scaled into the suburban street and recreation ground scenes. A notable indoor and outdoor sports centre, including a pool hall alongside, and revitalising a 33⅓m lido. The outdoor bowls hall was an early attempt to provide a summertime multi-use space. The complex was opened in 1975*

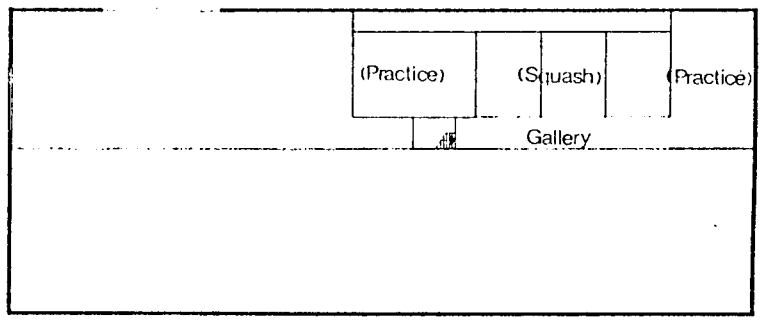


Ground floor

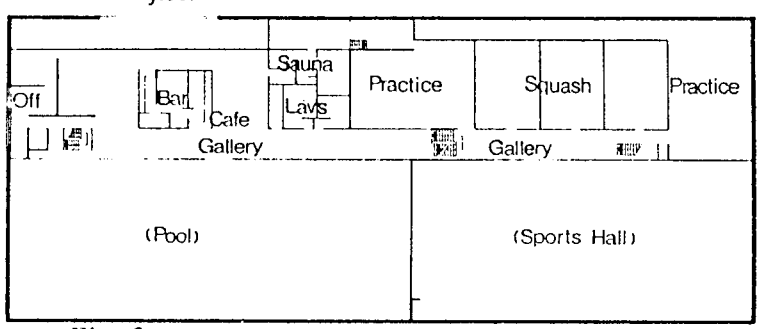


1 *Spatial patterns and circulation in a wet and dry centre*

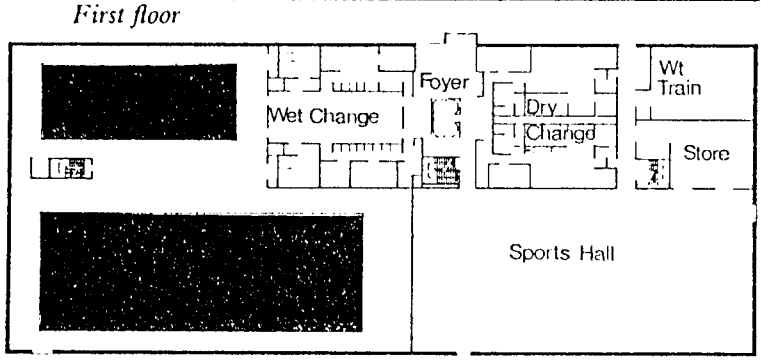
This is a simplified organisation diagram. It deals with the Sports Hall, the Pool Hall, The Main Entrence and services. High lighting the spacial and circulation relationship among them.
An example of this organisation is the Bury St Edmunds sports center which plans are shown on this page:



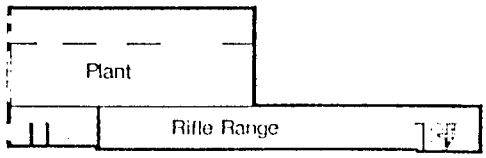
Second floor



First floor



Ground floor



Basement

SITE ANALYSIS

I chose the Practice field as an alternative site for my project. the site is located on the northern edge of AUB, where outdoor sports facilities (Green field, Tennis courts, access to beach) are concentrated. It is adjacent to some incompatible land uses, two academic buildings and a residence. Thise land uses are separated from the site by a concentration of high trees that act as a buffer zone inbetween. the northern edge of the site is defined by the sea high way (Avenue De Paris).

The site has a direct vehicular access from its eastern side (near the AUB "sea gate"). On other hands it could be accessed on foot from its eastern side, facing the Green field entrance, and from its western side, between the Physics and the Agriculture building.

The site has an irregular shape, its longuest side streaches parallel to the sea high way. Its area is approximately 7500m^2.

TOPOGRAPHY

Beirut is built on an undulating site which falls sharply to the nortwest, west and east and rather gently to the north.

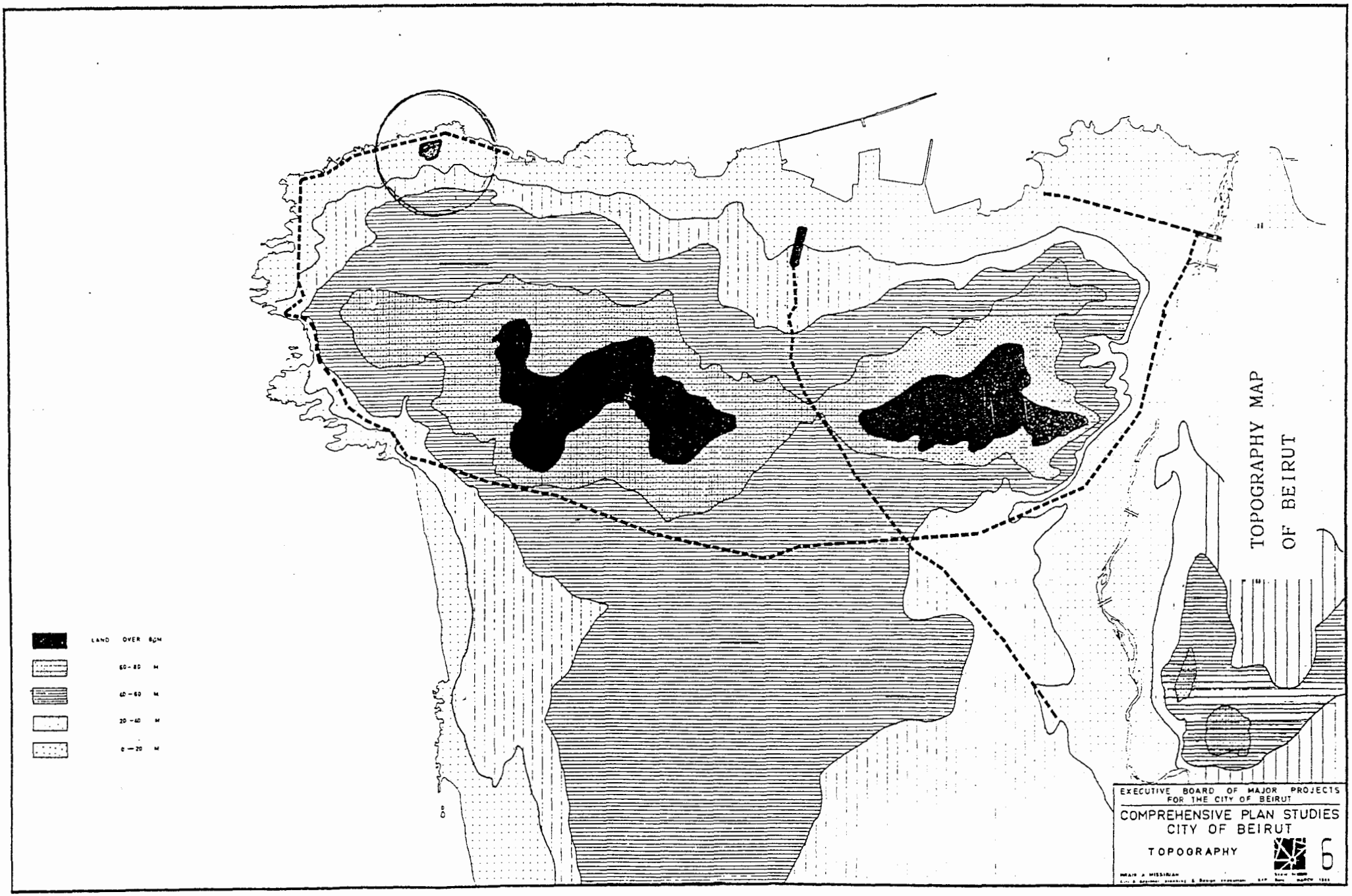
The site is located on the northern area of Beirut. It is flat and rises 8m above sea level. In case of excavation we should not go below this level because we would hit the water table.

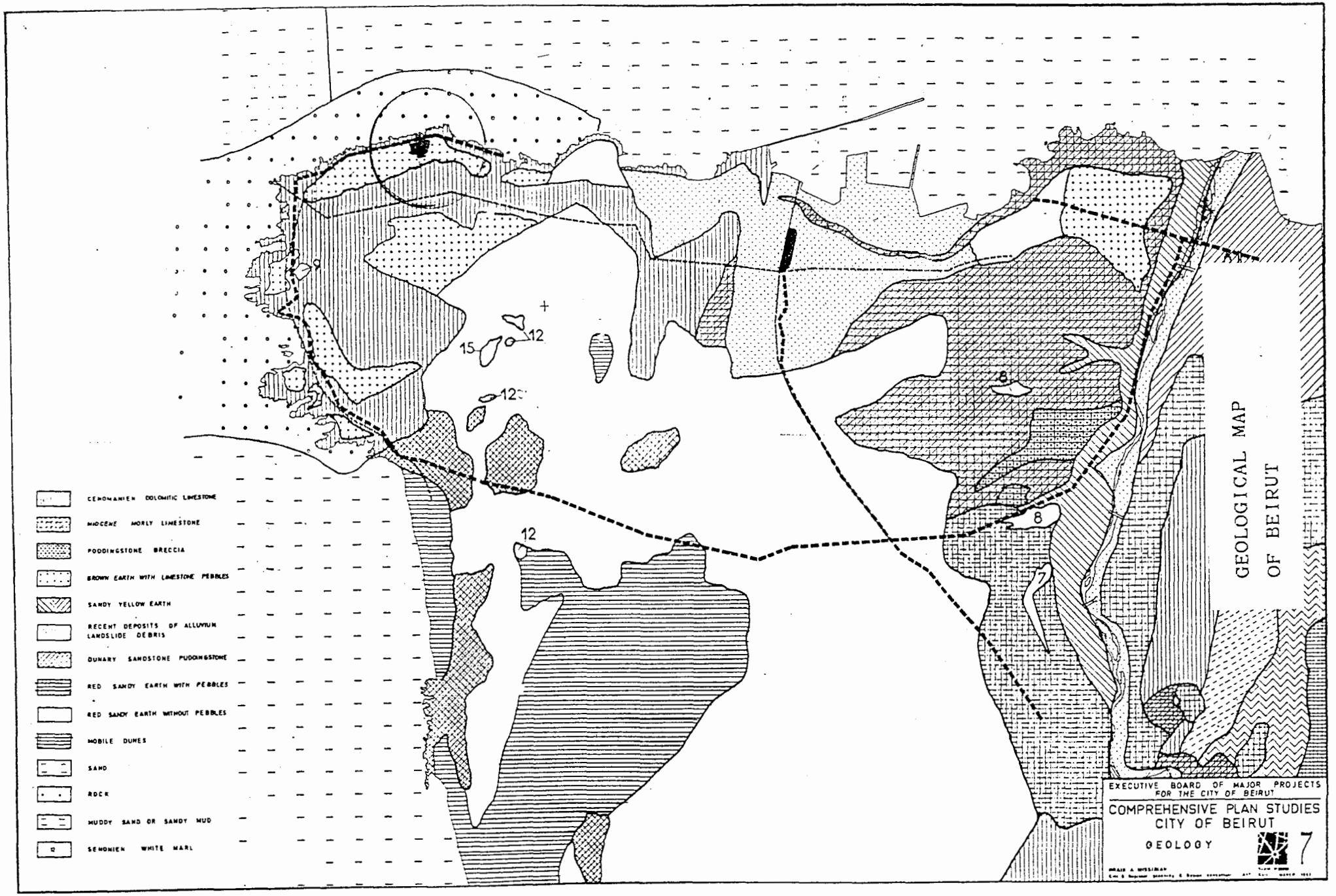
GEOLOGY

The Beirut region has a very varied soil structure with several geological faults.

the area of Ras Beirut, in which the site is located, is characterised by its Cretaceous, Cenomanian limestone soil formation. this soil is relatively hard. Therefore, excavation is not advisable unless it is a must, and the rock bed could be used as a support for the foundations.

KEY
SCHOOL INSTITUTIONS OF HIGHER EDUCATION
L. UNIV. LIB.
• ST. JOSEPH
L. A.U.B.
L. UNIV. MAAB
L. ACAD. LIB. DES B.A.
L. ECOLE SUP. DES LETTRES
L. CENTRE D'ETUDE MATH.
L. B.C.W.
SOURCE
MAP OF BEIRUT
1/2500 — 1964
EXECUTIVE BOARD OF MAJOR PROJECTS
FOR THE CITY OF BEIRUT
COMPREHENSIVE PLAN STUDIES
CITY OF BEIRUT
SCHOOLS
18
LOCATION MAP
RELATIVE TO THE AREA OF BEURUT


LAND OVER 80M
60 - 80 M
40 - 60 M
20 - 40 M
0 - 20 M
TOPOGRAPHY MAP
OF BEIRUT
EXECUTIVE BOARD OF MAJOR PROJECTS
FOR THE CITY OF BEIRUT
COMPREHENSIVE PLAN STUDIES
CITY OF BEIRUT
TOPOGRAPHY
6


CENOMANIEN DOLOMITIC LIMESTONE
MIOCENE MARLY LIMESTONE
PODDINGSTONE BRECCIA
BROWN EARTH WITH LIMESTONE PEBBLES
SANDY YELLOW EARTH
RECENT DEPOSITS OF ALLUVIUM LANDSLIDE DEBRIS
DUNARY SANDSTONE PUDDINGSTONE
RED SANDY EARTH WITH PEBBLES
RED SANDY EARTH WITHOUT PEBBLES
MOBILE DUNES
SAND
ROCK
MUDDY SAND OR SANDY MUD
12 SENONIEN WHITE MARL
15
12
12
8
8
7
GEOLOGICAL MAP OF BEIRUT
EXECUTIVE BOARD OF MAJOR PROJECTS FOR THE CITY OF BEIRUT
COMPREHENSIVE PLAN STUDIES CITY OF BEIRUT
GEOLOGY
7

CLIMATE

Beirut enjoys an equable Mediterranean climate with mild winters and hot humid summers. The spring and autumn seasons are very agreable. Rainfall is seasonal and falls mainly in winter in heavy downpours. Thunderstorms are common and wind of gale force are not unknown especially in January. The prevalling breezes are southwesterly which is typical of thi coastal area.

The following table No.1 and the constructed windrose, show that a dominent feature of the Beirut region climate is the prevaling south-west breeze, more noticeable in the afternoon.

Table 2, figure 2, gives the Beirut wether at a glance. It will be seen that most of the rain falls during the mounths December to February. The temperature of the sea is warmest from mid-July to mid-September.

(Comprehensive Plan for the City of Beirut. The Executive Board of Major Projects for the City of Beirut March 1968)

Beirut Lat. 33 54' Long. 35 28' Ht. 33.8m above MSL

Table No. 1

Wind direction

(30 years)

Observations 1875 to 1948

08:30 Percentage of observations from									14:30 Percentage of observations from								
N	NW	E	SE	S	SW	W	NW	Calm	N	NE	E	SE	S	SW	W	NW	Calm
2	4	8	9	14	19	5	3	36	9	6	3	1	13	32	12	5	19
2	3	7	8	13	24	7	2	34	8	6	4	2	11	36	12	7	14
5	6	4	6	10	26	8	3	32	13	8	2	2	9	33	11	7	15
5	5	4	2	11	32	12	5	24	10	8	3	2	9	34	14	8	12
5	4	2	1	9	41	12	6	20	11	8	2	0	7	39	13	7	13
4	2	0	2	11	51	12	4	14	6	3	0	0	8	52	16	8	7
1	1	0	0	10	63	12	3	10	2	1	0	0	6	60	20	6	5
1	1	0	1	7	59	9	5	17	3	1	0	0	4	53	22	11	6
4	6	2	2	8	30	12	7	29	10	9	1	1	4	29	20	19	7
8	8	4	4	8	22	7	3	36	17	11	3	1	3	23	14	15	13
2	6	3	8	11	16	4	3	47	13	13	3	2	7	25	9	10	18
3	4	4	12	15	19	3	2	38	8	9	3	3	12	28	8	7	22
3	4	3	5	11	33	9	4	28	9	7	2	1	8	37	14	9	13

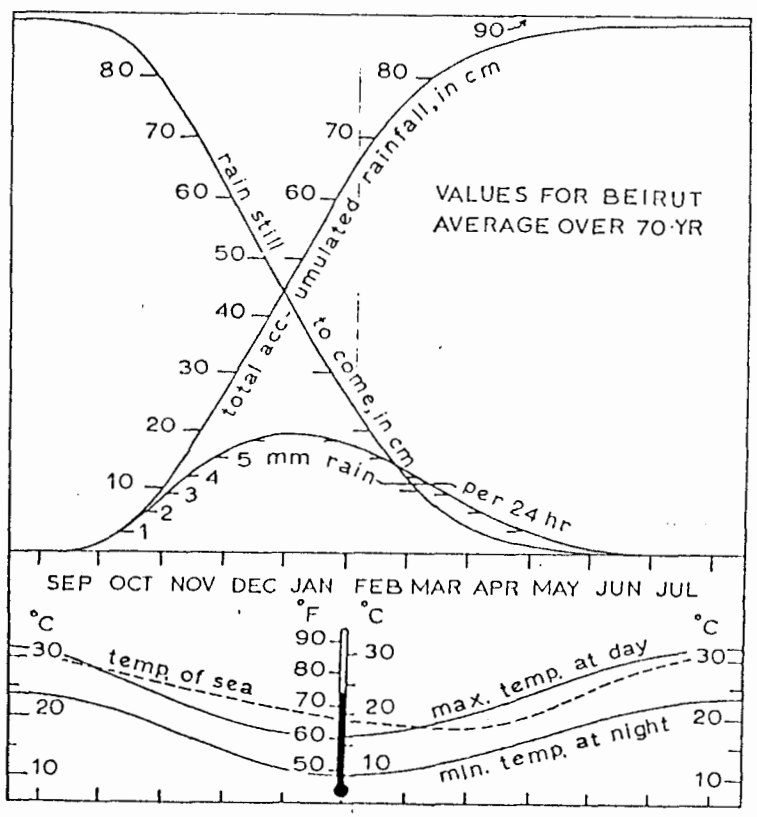


FIGURE No. 2

BEIRUT WEATHER THE YEAR ROUND AT A GLANCE

SITE SURVEY AND ANALYTICAL MAPS

The site is surrounded by three adjacent buildings. The Agriculture/Biology building to the west, the Physics building to the south-west and a small residence to the south. It contains some pine trees on the north edge and a combination of several kinds of trees on the western side. These trees should be preserved because they play a doubled role. First, they act as boundaries for space enclosure. Second, they define buffer zones that separate areas of incompatible land uses; in other words, trees act as buffers between sports facilities and academic buildings and between sports facilities and the residence. Therefore, we can conclude from this observation that whatever the shape and bulk of the project will be (assuming that we will not go more than three floors above ground level), it will not create any visual disturbance to the neighbouring buildings.

To the eastern side of the site, we have the main concentration of sports activities, the Green field and the entrance to the beach. The harmony created by the proximity of the sports facilities (including the practice field) is interrupted by a street linking the sea gate to the vehicular circulation network in AUB. This street creates an edge of tension between the eastern side of the site and the Green field.

As AUB owns a very large area of land in which the practice field is located, there is no legal restrictions on the site exept for the 4m setback from the street on the northern boundary.

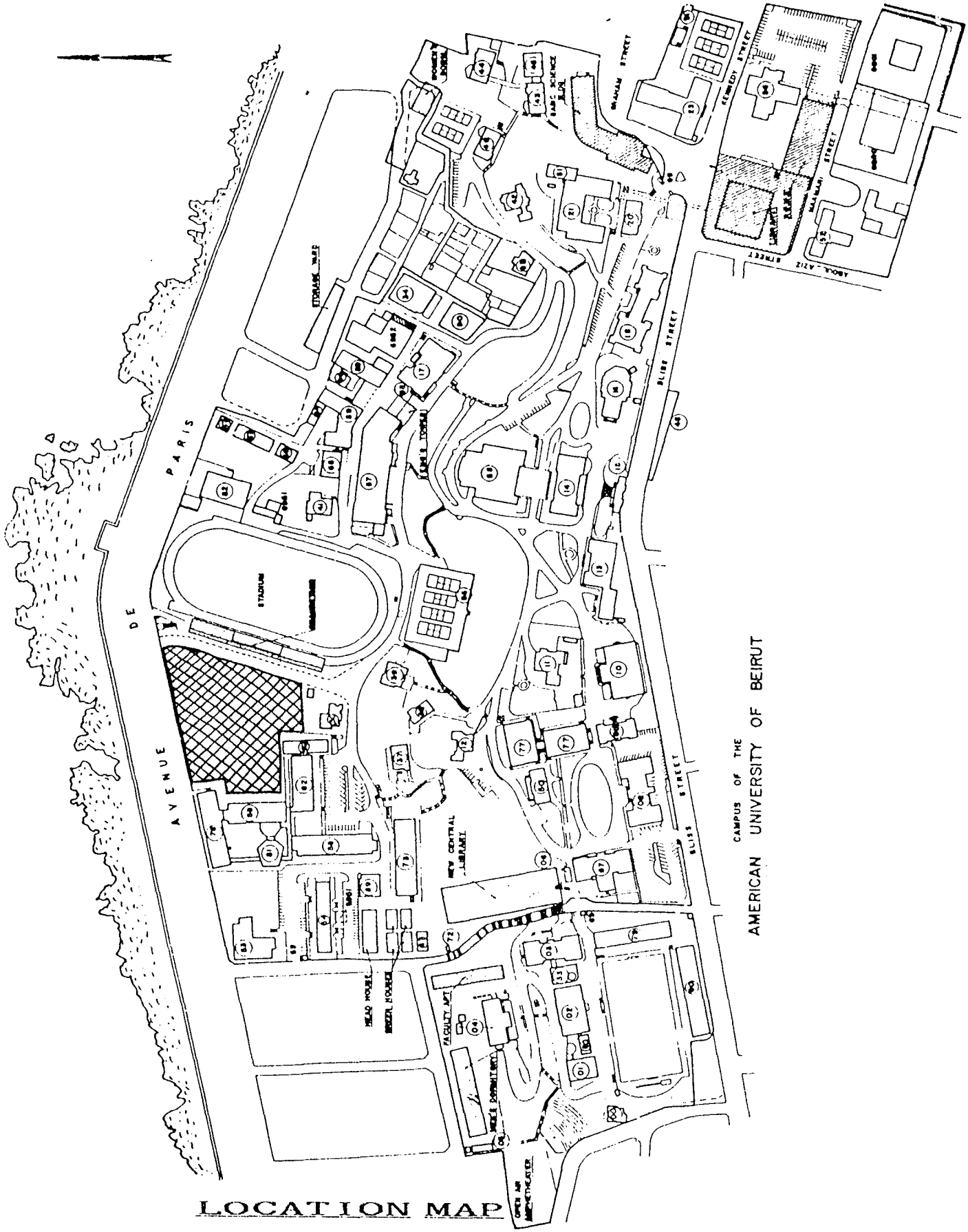
The maps that will follow are:

- Location map: relative to AUB campus
- Immediate context map
- Survey map
- Circulation map

The immediate context map gives us a clear idea how sports facilities: Green field, Practice field, Tennis courts and beach access are concentrated in an area characterised by its mild topography relative to AUB campus.

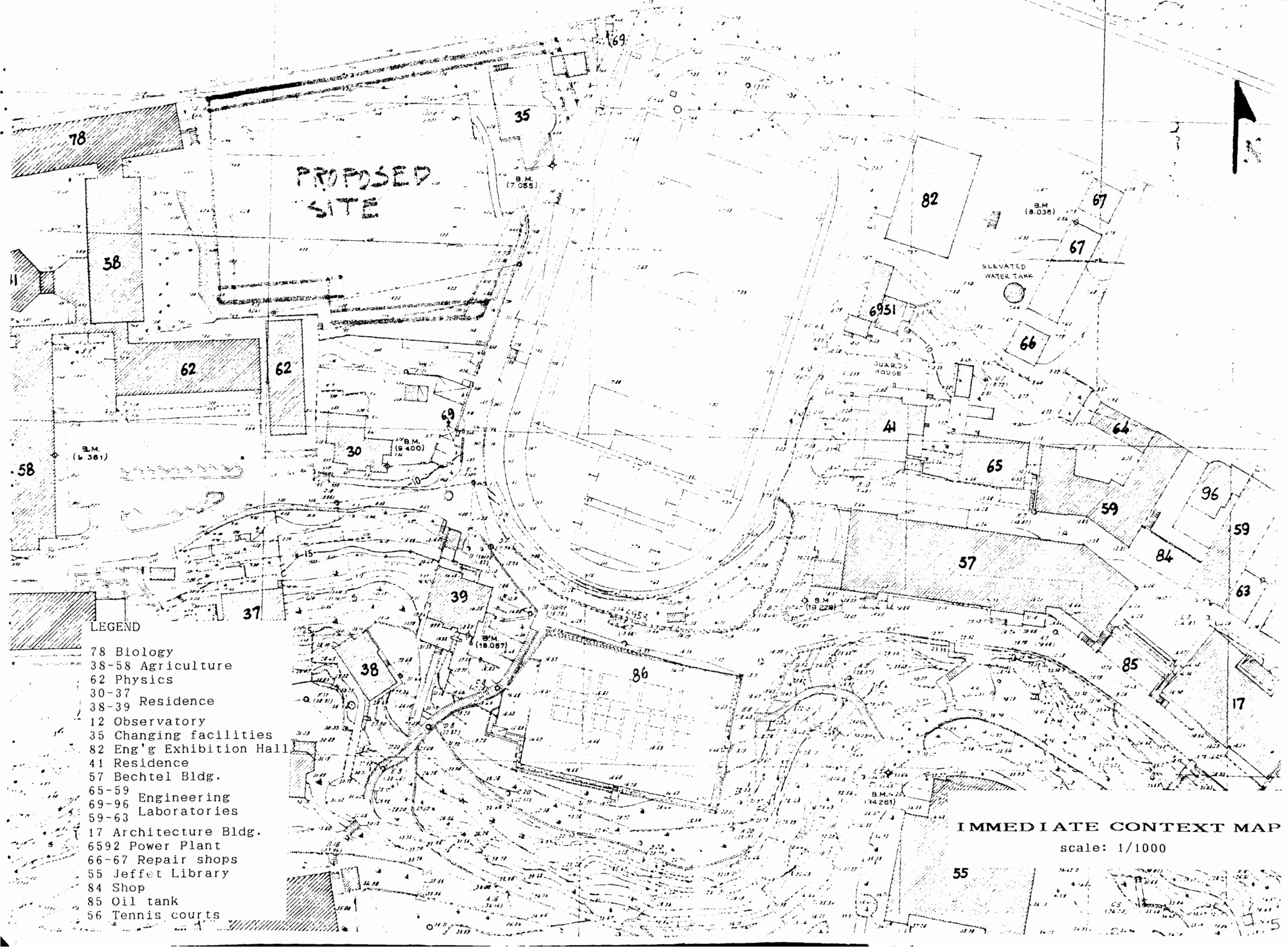
The survey map informs us about the surrounding land uses, buildings and green areas. It also gives us an idea about natural features like orientation and wind direction.

The circulation map shows us how various sports facilities are connected to other uses by a vehicular network (streets) and a pedestrian network (stairs and streets). It also pinpoints the different access points to the proposed site and locations of photographic shots.



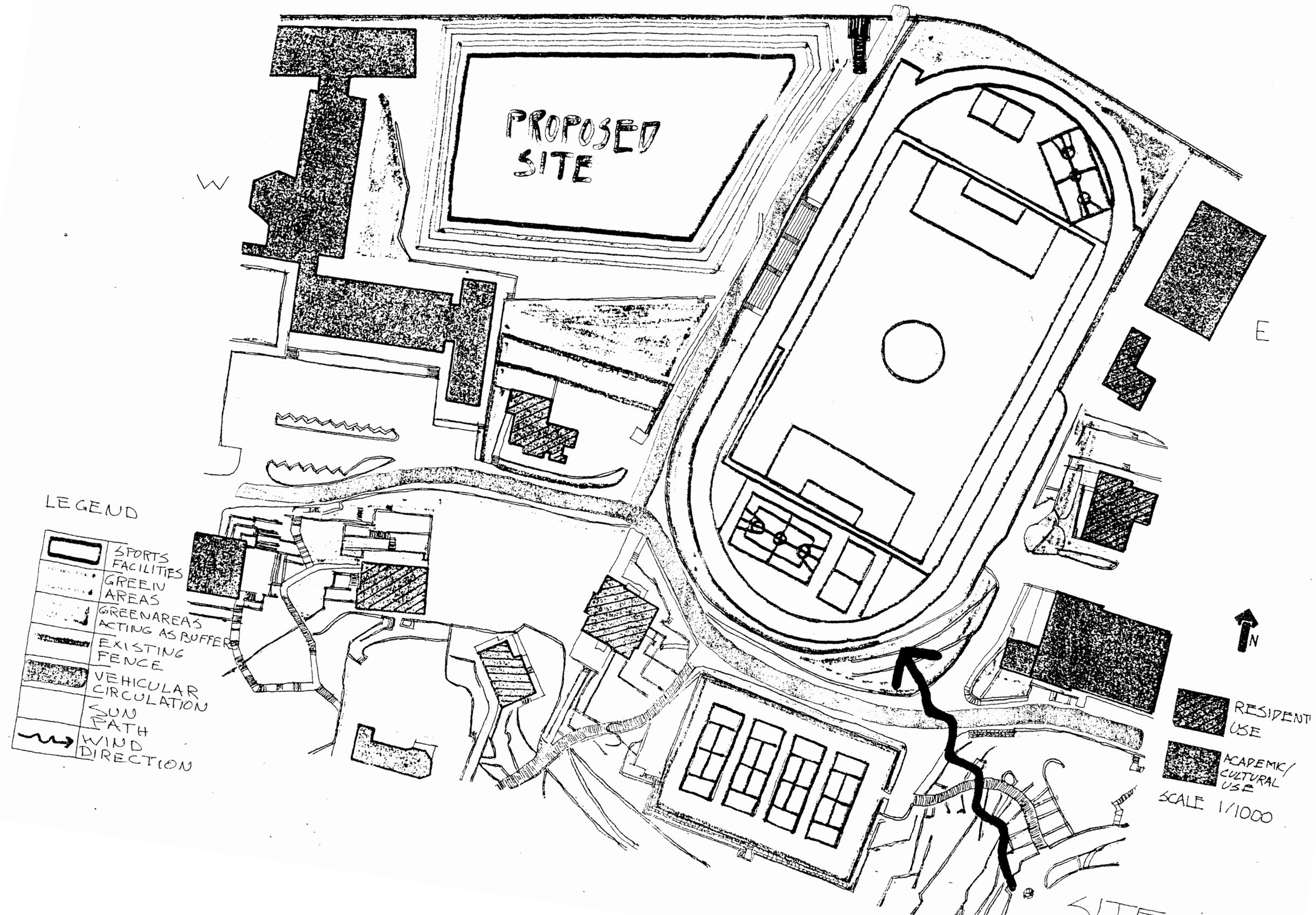
LOCATION MAP

Relative to AUB



IMMEDIATE CONTEXT MAP

scale: 1/1000


PROPOSED SITE
W
E
LEGEND
SPORTS FACILITIES
GREEN AREAS
GREENAREAS ACTING AS BUFFER
EXISTING FENCE
VEHICULAR CIRCULATION
SUN PATH
WIND DIRECTION
N
RESIDENT USE
ACADEMIC/ CULTURAL USE
SCALE 1/1000

AVENUE DE SEA HIGH WAY PARIS

PROPOSED SITE

PRACTICE

OBSERVATION

TENNIS COURTS

MECHANICAL SHOP

POWER PLANT

UPPER CAMPUS

UPPER CAMPUS

UPPER CAMPUS

FACULTY RESID. BLDGS.

CIRCULATION AND ACCESSIBILITY MAP

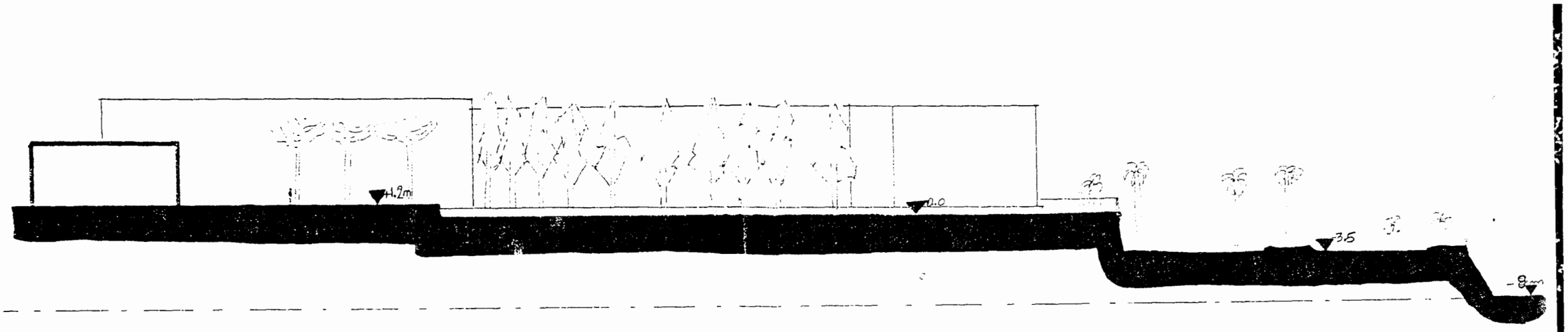
- VEHICULAR NETWORK
- PEDESTRIAN NETWORK
- EXISTING FENCE
- DESTINATION POINT
- CAR ACCESS TO PROPPOSED SITE
- PEDESTRIAN ACCESS TO SITE
- SHOT

RESIDENT USE

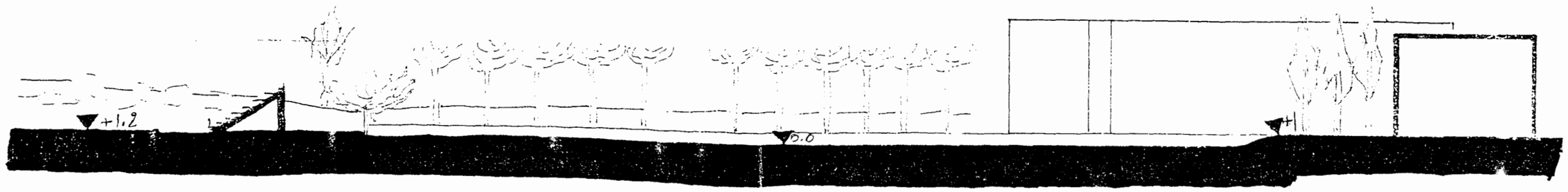
ACADEMIC/ CULTURAL USE

SCALE 1/1000

SITE PLAN

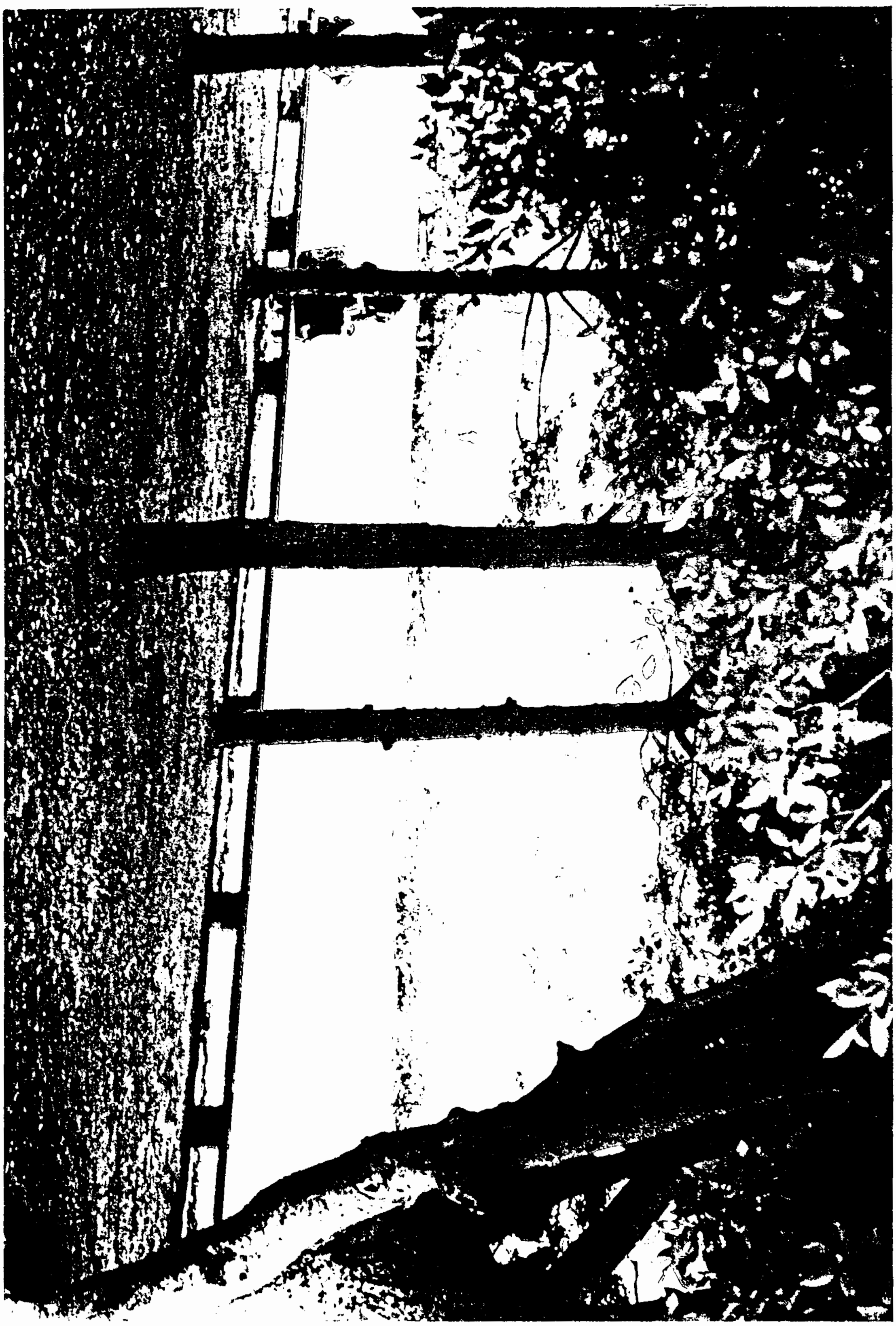


CROSS SECTION

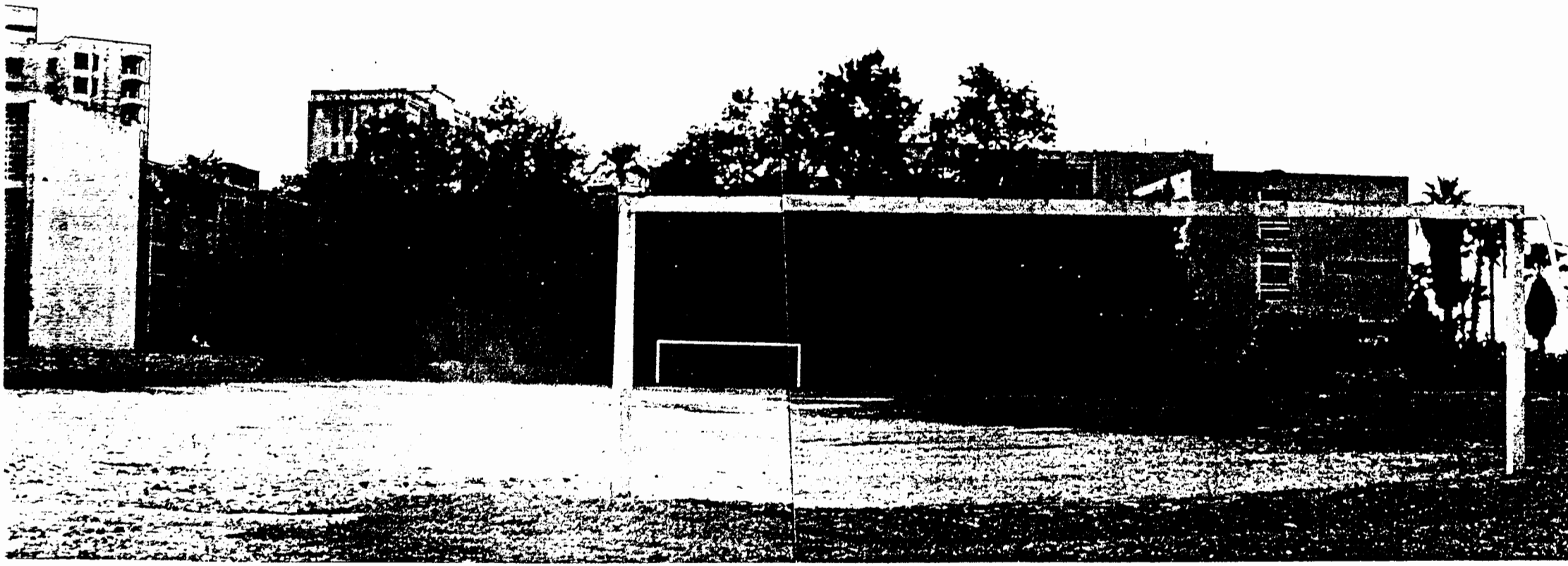


LONGITUDINAL SECTION

Scale 1/50



10N



9

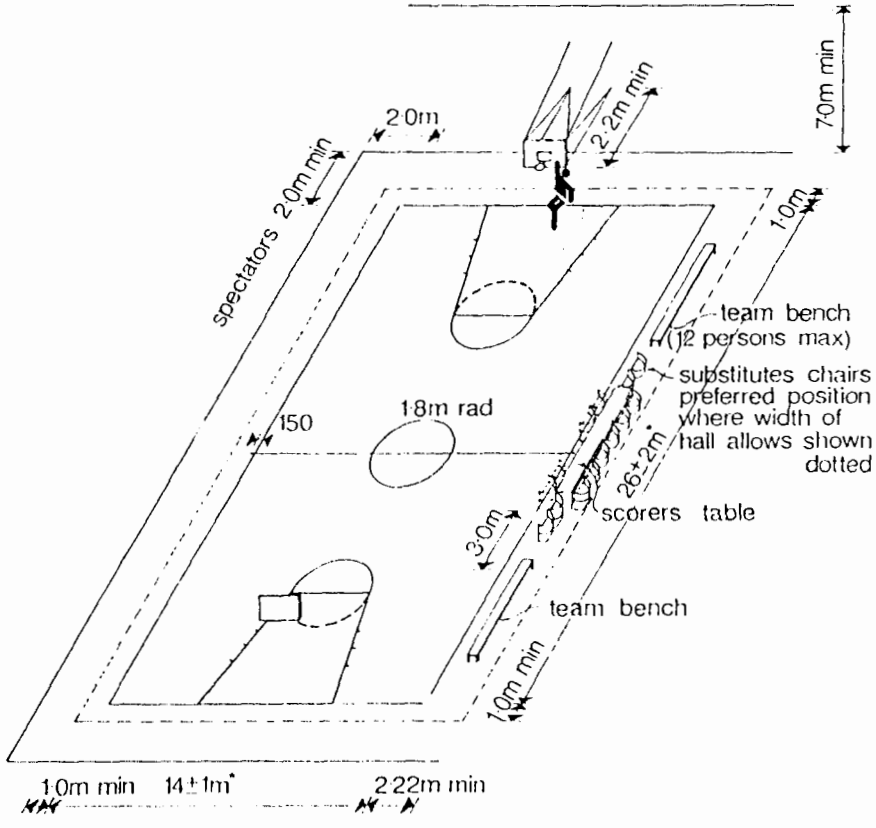
APPENDIX

BASKETBALL

Indoors natural lighting is best from above and artificial light sources should not be suspended below the ceiling, and should be protected against impact.

Court size 26m × 14m

- During trainin, ideally, the court should have 1.5m of extra space at each side and 3m at each end.
- During competitions an area of 30m × 26m is required.
- The floor to ceiling height should be at least 7m.
- Best view for spectators is from the sides, and must be a minimum of 2m away from court.
- The arrangement of team benches and officials table shown in the picture is obligatory for all matches.
- Minimum temperature is 12.8°C.
- Mechanical ventillation is best,providing a maximum of 4 air changes an hour.
- Walls and ceilings should be designed to reduce reverberation because Basketball is a very noisy game.
- Storage is required for goal units if they are not suspended.



VOLLEYBALL

- Volleyball is another very popular game played both inddors and outdoors.

- The indoor court should be in a glare-free space as the players continually look upwards during play.

- Hanging lights should also be avoided as the ball is constantly in the air.

- Minimum height of space for national play is 9m.

- Court size is 18m × 9m.

- Overall area required for training and competition is 24m × 17m.

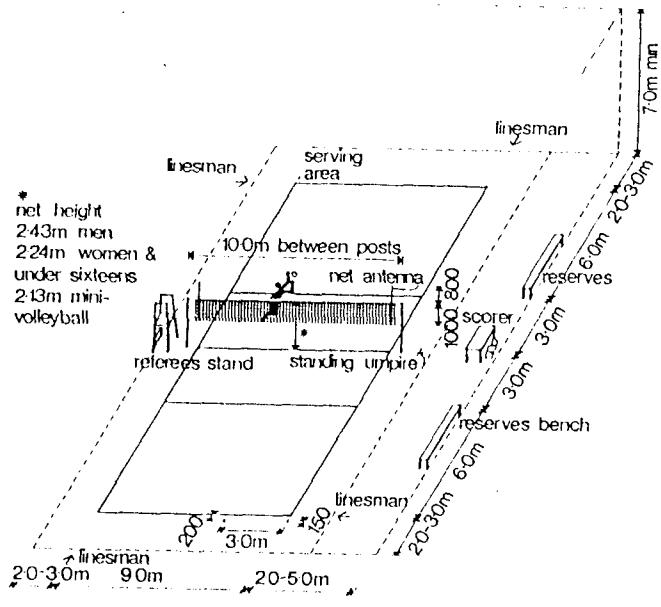
- Spectator seating is best along the sides.

- Storage is necessary for the net (which is 1m long × 300mm diam. when rolled) and posts.

- Temperature needed is 10°C minimum for training but when spectators are present 15°C is necessary.

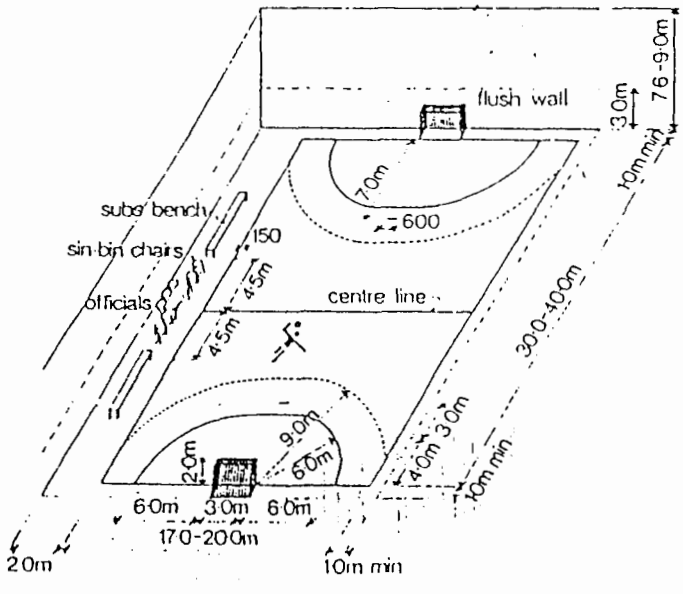
- Either natural or mechanical ventillation can do.

- Volleyball is rather a noisy sport; accordingly walls and ceiling should be designed to reduce reverberation time.



HANDBALL

- Court must be 40m × 20m and 9m high.
- On ends and on one side 1m clear space should be provided and 2m on the other side to allow for substitutes, coaches, etc.
- Best viewing is from gallerries but bleacher seating along sides - at least 2m away from side lines - is suitable.
- Storage is necessary for portable goal-posts.
- Walls should be projection-free and non-abrasive.
- Minimum temperature is 12.8°C.
- Lighting should be even and glare free.



TENNIS

- Tennis is a game played both indoors and outdoors.
- In case the court is inside, walls should be without windows up to 3 - 4m above floor level, and the total height should not be less than 9.1m.
- Court size is 23.77m × 10.97m; a clear space of 4m on each side and 6.4m on each end is required.
- Spectator seating may be all around court with careful positioning at ends to avoid obscuring player's vision of ball.
- Storage is necessary for net, posts and umpire's chair.
- Good even lighting is essential over the whole playing area.

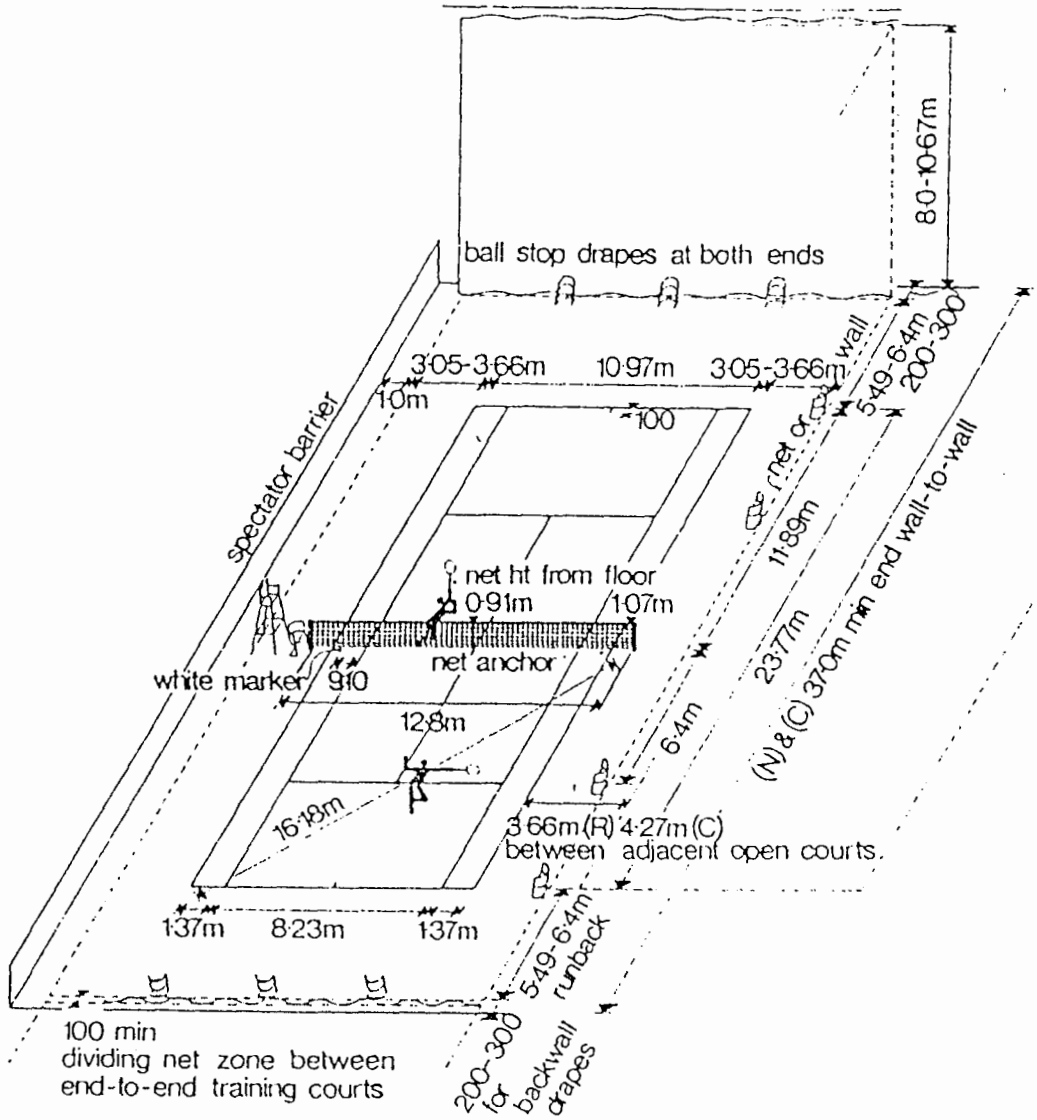


TABLE TENNIS

- This sport requires good artificial lighting (fluorescent tubes should be avoided) and a draught-free atmosphere.
Furthermore, the walls should provide a uniformly dark non-glossy background.

- Table-tennis competitions, however, do take place in the main hall to accomodate for the spectators and the space needed for the simultaneous competitions.

- The table is 2.74m × 1.52m

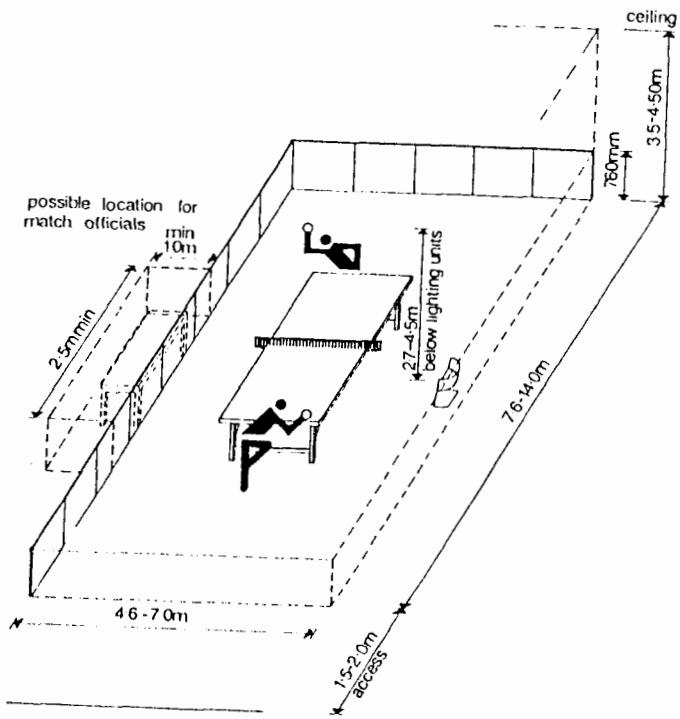
- The overall space required per table for a national match is 14m × 7m.

- For practice: 2 tables can be accomodated in a 10m × 10m, 3 tables in a 10m × 15m, 4 tables in a 10m × 20m.

- Seating can be provided all around but best viewing is from the sides.

- Storage is required for the tables and barrier panels.

- Temperature desired is 13°C.



SQUASH

A squash court for tournament play should provide for spectator viewing, and as such should incorporate a rear glass wall termed as "championship" wall. This wall is a self-supporting 12mm toughened glass sheet, 2134 mm high with a central glass door.

Directly above this glass, the rear wall should also incorporate a sounding board which may extend to any height but should not be less than 200mm deep.

The front wall should incorporate the playboard (known as the tin) to a height of 483mm.

To be used for chanpionship play, the court must have a minimum clear light of 5.7m.

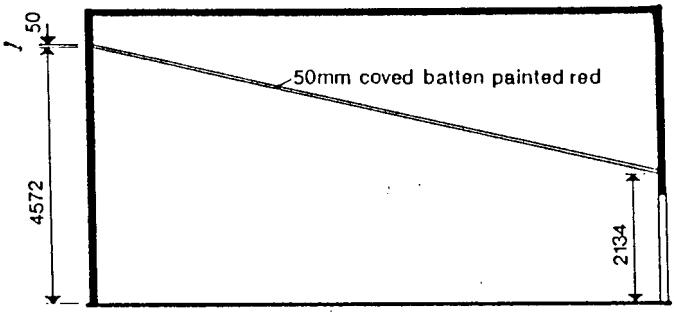
Walls should be preferably white, able to withstand impact and to absorb a certain amount of condensation.

For the completions, it should be remembered also, that there will be need for a referee's position: If there is a gallery, then there will be no problem. This gallery could also be used for casual viewing and as a coaching aid.

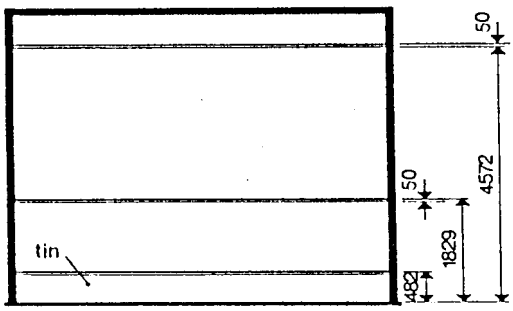
_ A good mechanical ventilation system is necessary to keep the courts free from condensation.

- Temperature needed is around 18°C.
- Natural lighting should be excluded and light is to be supplied by artificial means.
- The floorfinish adjacent to the wall on the spectator side should be of the same material as the squash courtfloor for a distance of 90mm. In addition, during competitions a white painted upstand 700-900mm high should be positioned 900mm behind the glass wall and the side walls should be extended by 900mm beyond the glass wall and finished in the same colour as the squash court wall finish.

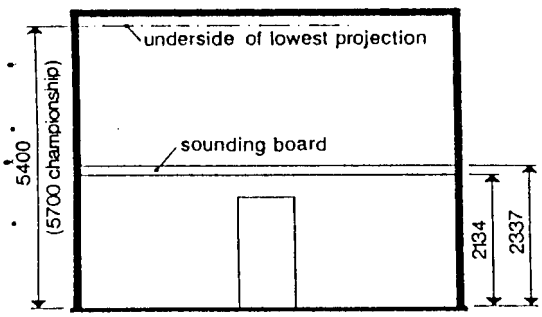
Graphic representations of squash courts are shown on the next page.



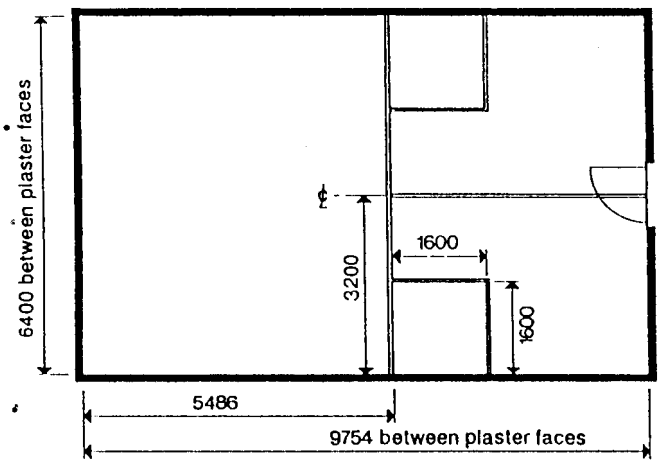
Side wall



Front wall

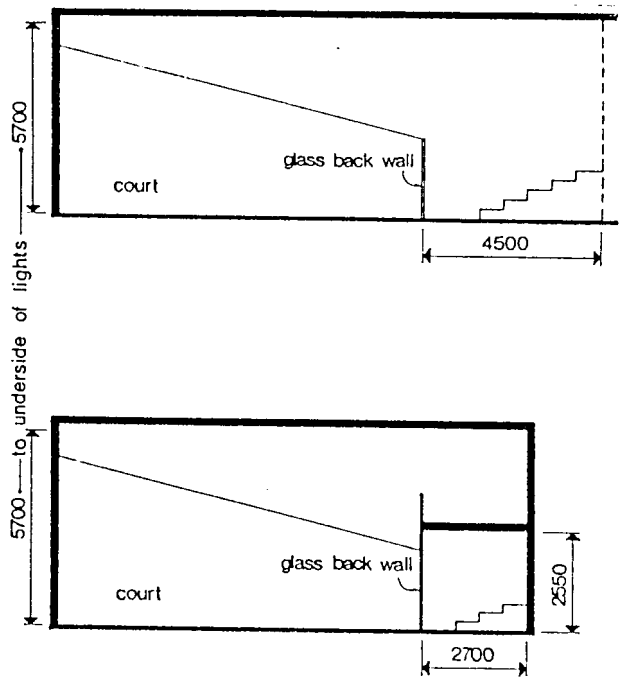


Rear wall



Plan

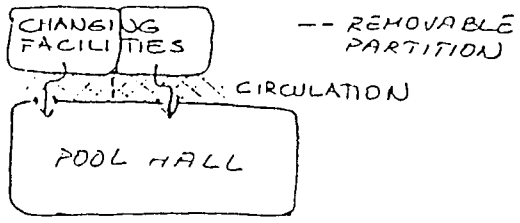
Squash court dimensions



Spectator accommodation for squash clubs

POOL HALL

The pool hall should be linked to the changing facilities by means of 2 access points which could be totally seperated in case of competitions.



The temperature requirements are the following:

- Water temperature for swimming is 24°C minimum, and for diving 26°C minimum.
- Air temperature should be kept at 27 - 28°C.

An indoor pool building presents the following problems which should be overcome:

- Humidity and chlorine vapour: These have a damaging effect on materials; accordingly the latter should be chosen to be impervious and non corrosive.
- Condensation is another problem; the relative humidity should be maintained at an average of 60%, and this is achieved by: Good ventilation, and proper insulation of walls, ceiling and windows.
- LArge glass areas should be avoided as these can result in unpleasant specular glare, unwanted heat gain or loss, and cleaning problems.
  Glare can be reduced in various ways including facing windows north, tinted glass, external screening or planting close to glazed areas, and underwater lighting.

Storage is needed for the following:

- Pool cleaning brushes and materials
- floating lane markers
- Polo nets
- Judge's tables and chairs as well as spectators' seats

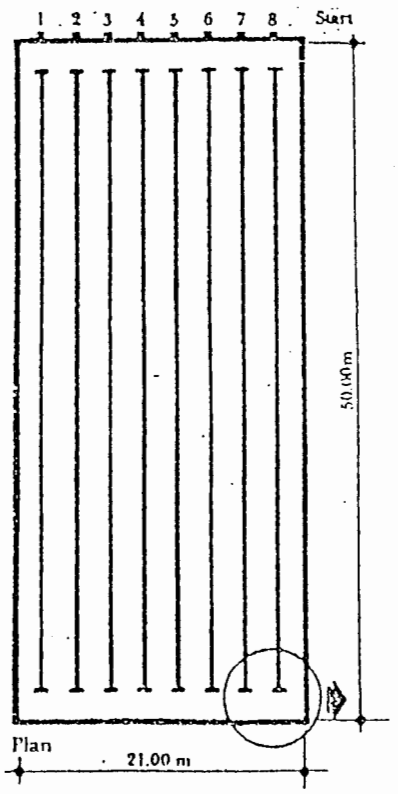
The pool tank can be sunken in ground,or either partially or completely above ground.

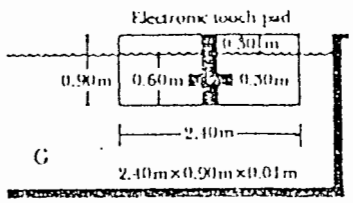
SWIMMING

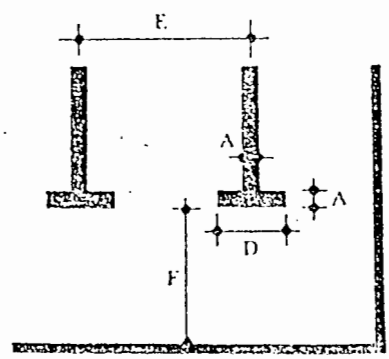
The length of the olympic pool is 50m; the width varies depending on the number of lanes where each lane is 2.5m wide.

International pools are 8 to 10 lanes wide plus 50cm extra on the edge side of the 2 outer lanes; thus giving a pool dimension of 50m × 21m or 50m × 25m.

- Depth of pool is 1.8m minimum throughout.
- Storage is needed for the floating roaps that indicate lane markings. (This assuming that the starting boxes will not be dismantled because they do not hinder other activities taking place in the pool).
- Pool surrounds should have a minimum width of 2m on the sides and 5m on the ends.







DIVING

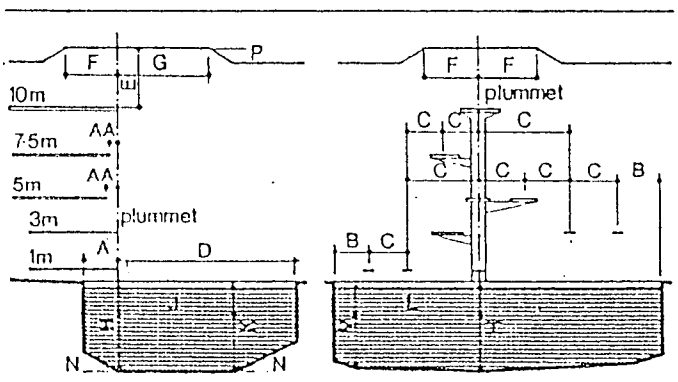
Spring boards are from 1m to 10m high. All diving boards above 1m might need a seperate diving pit.

For a seperate diving pit the diving pool required is 12.5m × 15m × 4.5m deep; otherwise, if the diving area is part of the swimming pool a 4.5m deep spot should be provided.

Boards should face a blank wall and not towards any activity where movement will cause distraction.

This is a sport requiring absolute concentration and thus, under no circumstances should the diver face public seating, a cafe or a window.

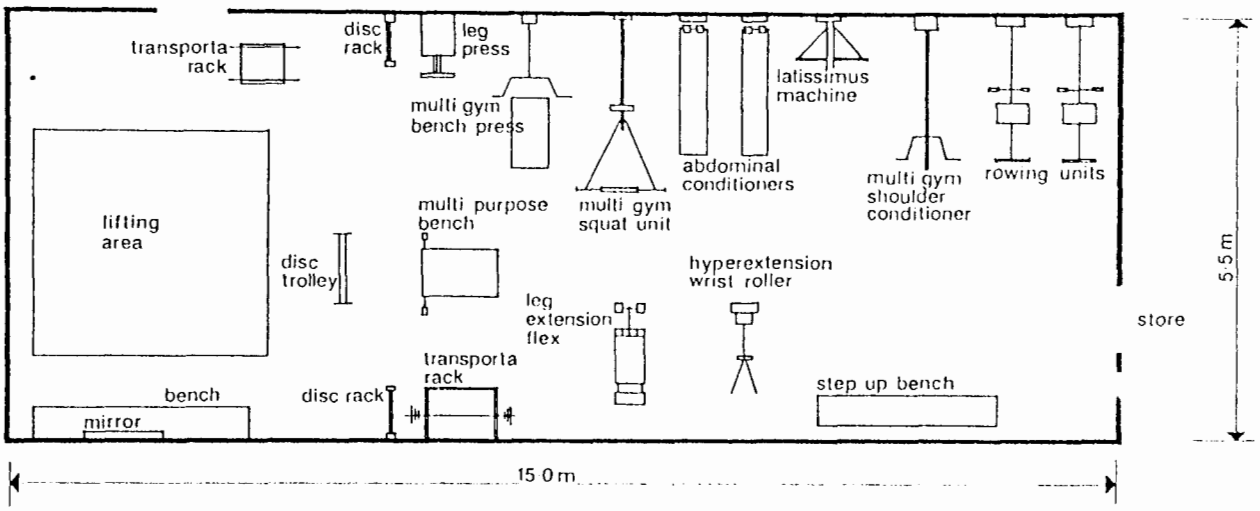
- Ideally the seperate diving pool should be 5 to 6m away from the main pool.
- Height of ceiling should be 3.4m minimum above the highest platform. Thus giving an approximate 14m height for the space. (For more details refer to table below).



Sections of diving pool to be read in association with Table III showing FINA requirements

WEIGHTLIFTING

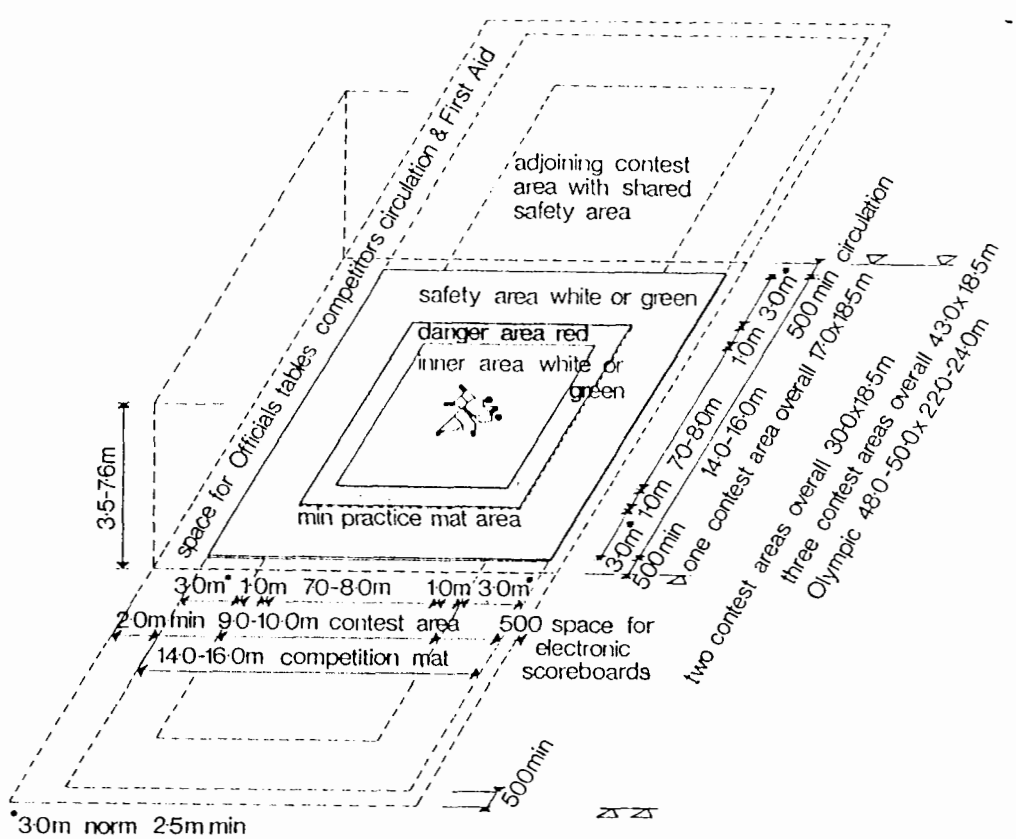
- Weightlifting competitions take place in the main hall. Weightlifting training, however, requires a self-contained space in which equipment is permanently installed as it is inpractical to move it from place to place.
- The activities can be noisy; this may be a problem particularly if the room is located over other spaces.
- Ceiling, walls,and floors must be structurally strong enough to support heavy equipment, some of which may be strenuously used.
- A temperature of 10 - 13°C is recommended
- Good ventilation is essential
- Storage is needed for weights which should be stored clear of the floor area.
- This space must be accessible to changing rooms and, if possible, to the sauna.



Fitness room layout, Cramlington Leisure Centre

JUDO

- Contest area is $9m^2$ around which there is a 1m danger area. Then this is surrounded by a safety area giving a total space of 16m × 16m.
- Practice can take place in an ancillary hall, but competition needs to be held in the main hall.
- For national championships three mats are usual and competitions can take place simultaneously.
- Temperature required is between 10 - 15°C
- Adequate ventilation is important because a damp mat surface is dangerous.
- Storage: Every 16m × 16m competition area requires 128 mats (each 2m × 1m). Each additional contest area adds 104 mats. Theseare best stored on trollies.
- Minimum clear headroom for national standard competitions is 7.6m, while for training a 4m height is acceptable.



WRESTLING

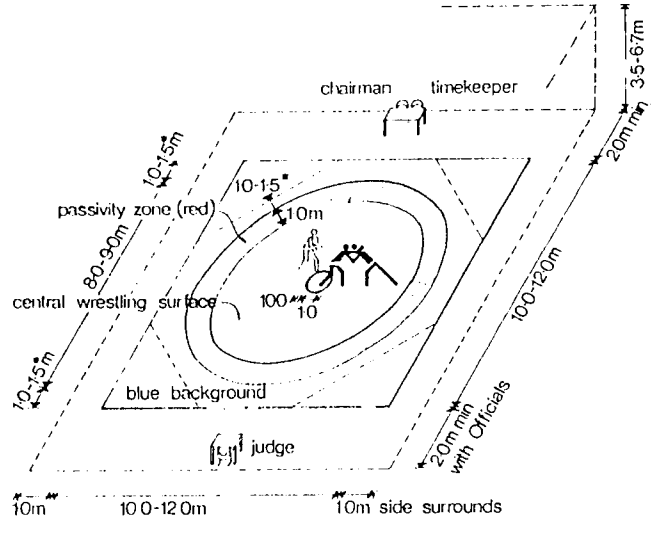
- Mat size is 12m × 12m × 2m minimum surrounding space is required.
- Height of space needed is 6.7m during competitions and 4m during training.
- Storage is necessary for mats.

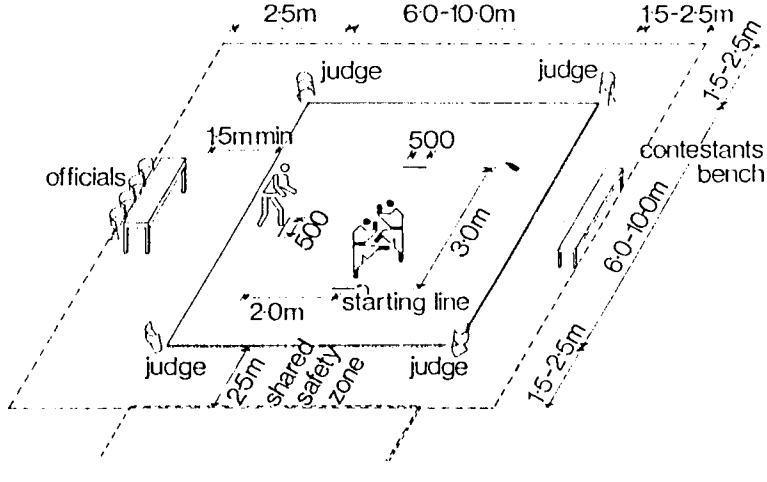
KARATE

_ For national standard competitions, the combat mat needs to be 10m × 10m and the overall area 15m × 15m.
- Other requirements are same as Judo.

TAEKWONDO

- Requirements are same as Judo.





Gymnastics

This activity is held, whether for training or competition, in the main sports hall and hence general design considerations of the main hall apply. However, it needs additional special requirements such as:

- Floor and equipment: For all floor work the official measurements of the competition mat area are 12m × 12m × 54mm within a 14m × 14m area if on a raised podium. Additional pieces of apparatus require areas of approximately 36m² each and a minimum of 25m is required for vault run-up.

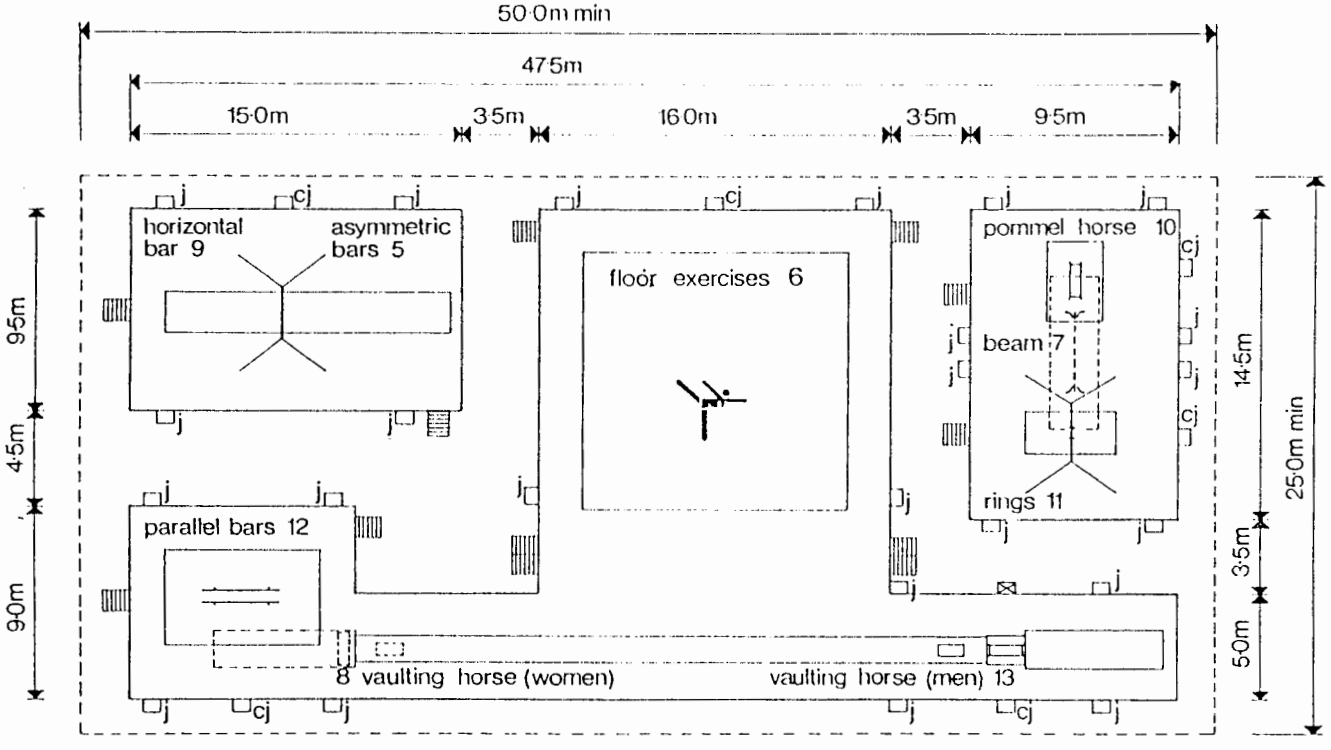
- Storage: is required for all or most of the pieces of apparatus such as the vaulting horse, horizontal bars, parallel bars, rings, beam, asymmetrical bars, and floor. Storage will also be needed for:

¤ Safety control weights and test equipment

¤ Modern rhythmic gymnastic apparatus

¤ Trampolines used for gymnastic training

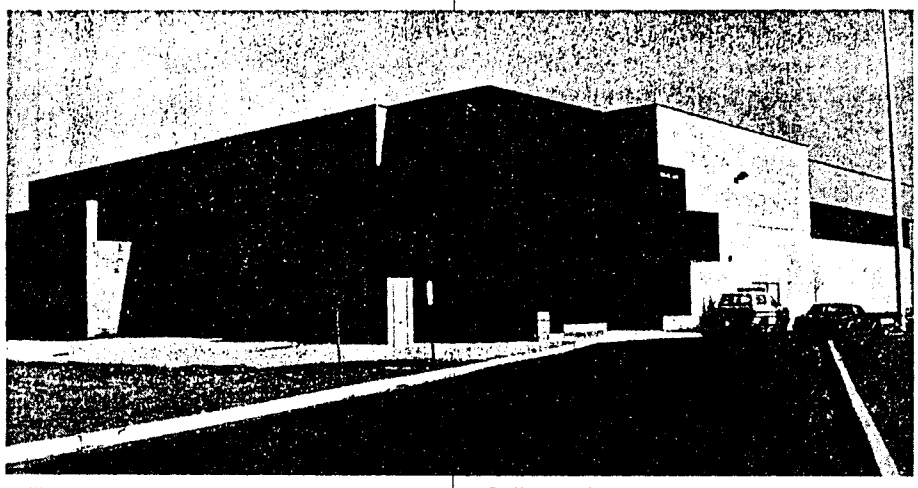
- Other considerations are roof loadings and headrooms for training apparatus and trampolines.



Architectural Showcase

Hofstra Recreation Center Hofstra University Hempstead, NY

Angelo Francis Corva & Associates, Architects
Uniondale, NY
Cost: $3.3 million
Square Feet: 34,070
Occupancy: August 1989



Built on a fast-track schedule, Hofstra's new recreation center is a two-story prefabricated metal and brick structure.

Located in the northeast corner of Hofstra's campus, the recreation building is a two-story prefabricated metal and brick structure built on a fast-track schedule.

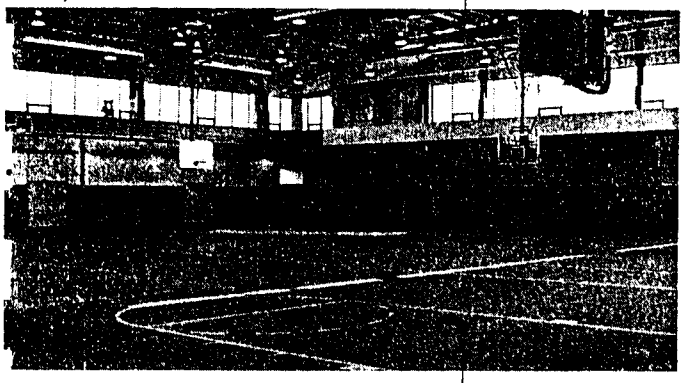
The major space in the facility is a two-story, 14,160-square-foot gymnasium located on the first floor. The remainder of the first floor contains the lobby, reception area, locker rooms, offices and a 2,120-square-foot weight and exercise room.

A 590-foot running track is located on the second floor and travels the perimeter of the building. The fixed and awning windows along the track are constructed of insulating glass.

The building's mechanical system is primarily mechanical ventilation and radiant heat with air-conditioning in the offices and weight and exercise room. Also located on the second floor are offices, a classroom, an aerobics studio and a 1,564-square-foot student lounge.

The facility, totally accessible to the handicapped, is used 16 hours per day by various members of the student body and faculty, as well as the National Football League's New York Jets.

Photos by William R. Mitchell



The gym has one full or two half-court basketball courts.

The first-floor, 2,120-square-foot weight room is air-conditioned for user comfort.

Architectural Showcase

Student Recreation Center University of Missouri Columbia, MO

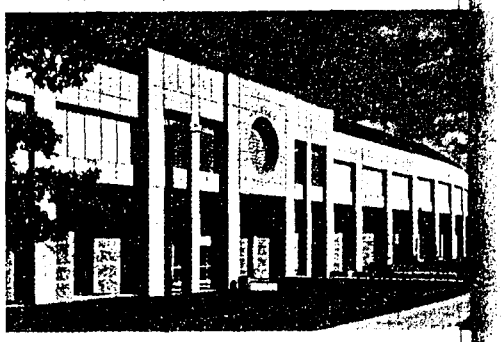
RDG Bussard Dikis
Des Moines, IA
Associated Firm: Gastinger Rees Walker Architects
Kansas City, MO
Cost: $4.9 million
Square Feet: 49,000 New
17,000 Remodeled
Occupancy: February 1989

A comprehensive master plan was developed for recreation facilities at the University of Missouri campus at Columbia. A "charette" process by the architects and planners addressed a need to involve the university administration, recreational staff and students in identifying issues in terms of facility needs, phasing of the construction process and long-term potential growth. The first phase of the master plan involved designing an addition to, and renovation of, Brewer Field House and Rothwell Gymnasium.

The addition provides six multipurpose basketball/volleyball courts, three racquetball/handball courts and an elevated ⅙-mile jogging track. The multipurpose area was designed to utilize natural lighting, as skylights and translucent wall panels provide 40 footcandles of light throughout the area.

Circulation patterns tie to existing levels in Brewer Field House and a newly installed elevator provides handicapped access to all facilities. Portions of Brewer Field House are included within the scope of remodeling and include an additional three handball/racquetball courts, one of which can be converted to squash; a weight room; an exercise/dance room; and an upgraded mechanical system.

Photos ©Mike Sinclair, Sinclair-Reinsch



Building materials include limestone, precast concrete panels, buff and red brick, and standing seam metal panels.

The addition is carefully located and oriented to continue the border of an existing pedestrian mall that extends through the campus. The architecture of the addition recalls the historic character of both Brewer Field House and the original Rothwell Gymnasium. Major building materials include limestone, precast concrete panels, buff and red brick and standing seam metal panels, all materials characteristic of the Columbia central campus.

Six new multipurpose basketball/volleyball courts are a highlight of the Brewer Field House/Rothwell Gymnasium addition.

A gallery overlooking the control booth extends from the new addition through Brewer Field House.

Architectural Showcase

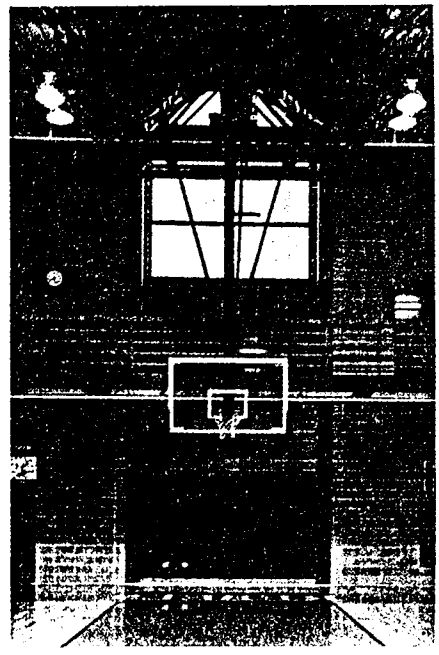
Rosary College Center
River Forest, IL

Hastings & Chivetta Architects Inc.
Itasca, IL
Cost: $3.5 million
Square Feet: 34,000
Occupancy: February 1989

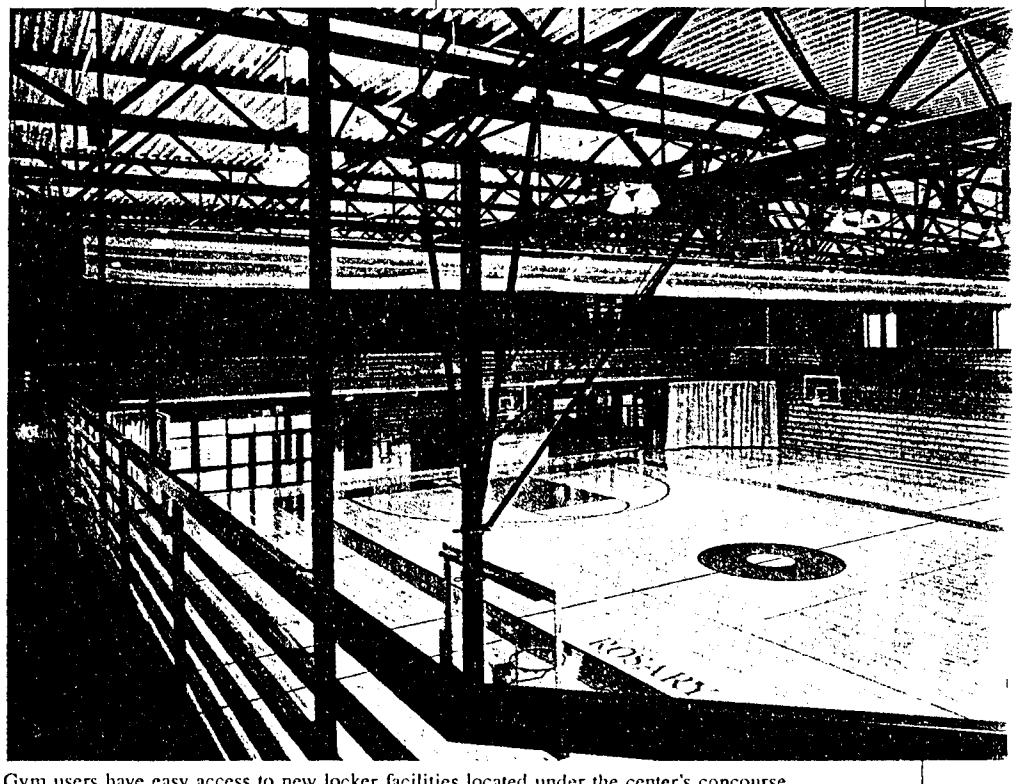
The Rosary College Center brings the school together in one central activity space through the adaptive reuse of existing buildings, as well as new construction.

In deciding to build the facility, Rosary College administrators saw the need for a central gathering place or focal point for the predominantly commuter campus. And, with the interest in recreation and fitness soaring, students needed a new place to play and socialize. Existing recreation facilities on the landlocked campus were antiquated and overutilized.

Major spaces include a multipurpose gymnasium, dance studio, racquetball courts, a weight room, an elevated jogging track, bookstore, meeting rooms, snack grill, locker area and a concourse that connects existing structures with the new facility, creating a public environment for cross-connecting the entire campus.



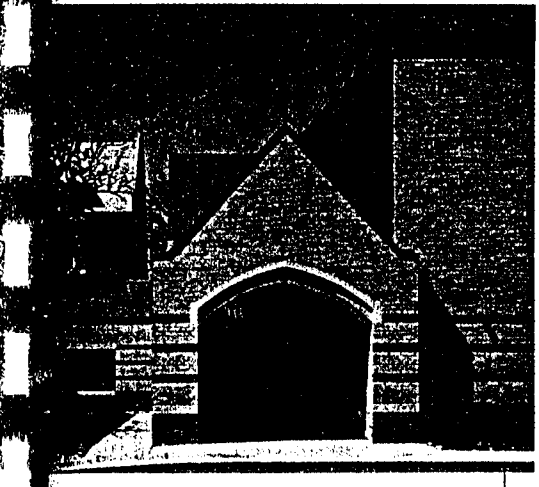
The center serves as a focal point of student activity. It's a place to both play and socialize.



Gym users have easy access to new locker facilities located under the center's concourse.

The turn-of-the-century "campus eclectic" style of the surrounding campus is reflected in the rhythm and geometry of the new facility.

Photos by Don Dubroff



Architectural Showcase

Hunter Student Activity Center Westminster College Fulton, MO

Cannon
St. Louis, MO
Cost: $2.5 million
Square Feet: 30,000
Occupancy: May 1989

Purposely built on the campus' main circulation spine, Westminster College's new activity center physically and visually links both the academic and student housing areas of the campus.

The prominence of the site required special care with the architectural design. The building is compatible in both appearance and mass with the traditional look of surrounding structures on the 136-year-old campus.

Key components of the facility are a single-level gymnasium and a two-story section that accommodates passive recreation, major social events and organizational activities.

The gymnasium features a basketball court, an elevated two-lane running track and portable bleachers for up to 100 spectators. Accessible from the gym are two racquetball courts, a weight room and training facility, an equipment checkout area, and men's and women's locker rooms.

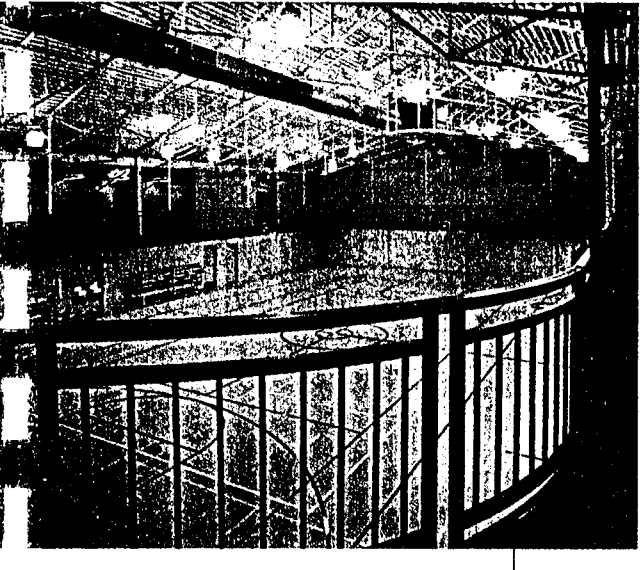
The lower level of the two-story section houses television and game rooms, mail facilities, a publications office and darkroom, and a student cafe called the College Inn. The upper level includes a reception hall and lounge with adjacent serving kitchen, music room, two conference rooms and a director's office.

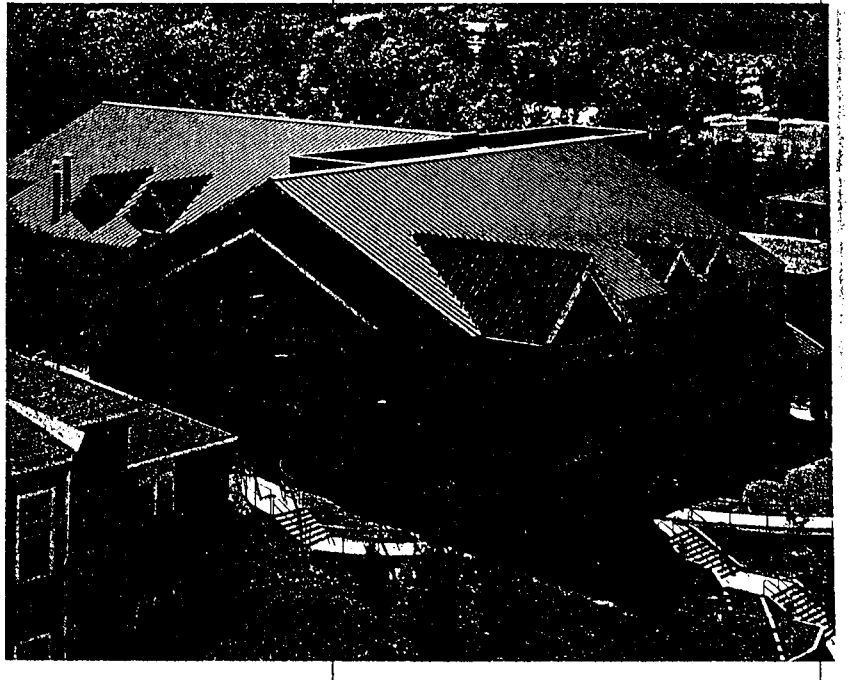
To capitalize on attributes of its location and site, a veranda is designed to extend the interior space of College Inn and allow enjoyment of the outdoors during pleasant weather.

Photos by William Mathis

Colorful tile floors and an open ceiling structure in College Inn and student areas provide an open, friendly atmosphere.

An elevated, two-lane running track surrounds the gymnasium, the hub of the facility.



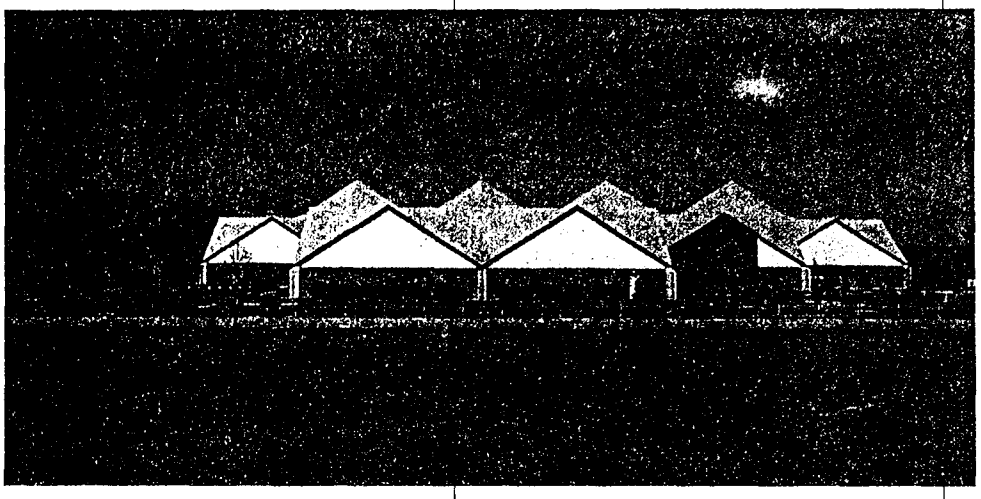


Mechanical equipment is screened from view behind the sloping roof surfaces, which also serve to reduce the silhouette of the building.

Architectural Showcase

Barbee Center The Woodberry Forest School Woodberry Forest, VA

Tully Associates
Melrose, MA
Cost: $4.6 million
Square Feet: 75,600
Occupancy: September 1987

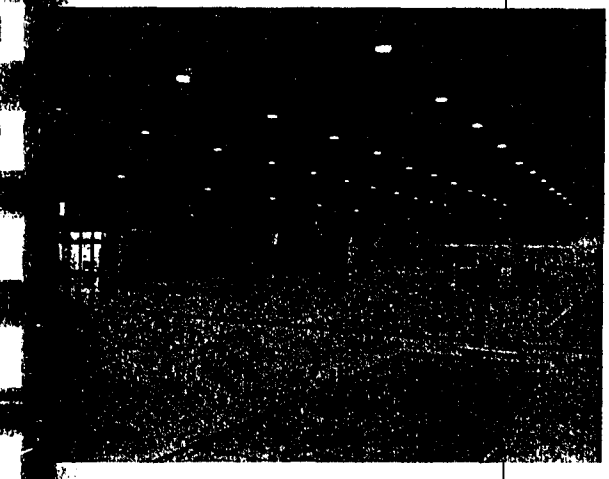


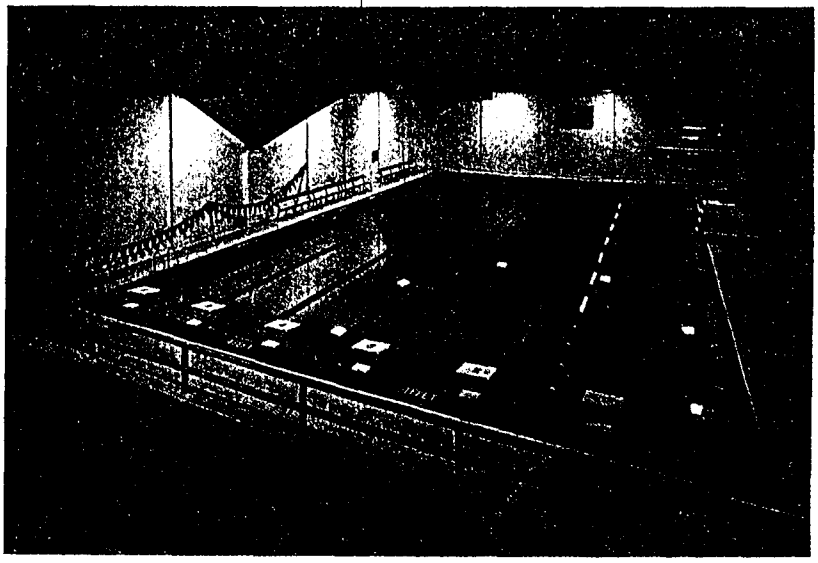
The sloping roof forms emulate the gently rolling hills of the Virginia site.

The Barbee Center represents the optimization of quality and economy in athletic facility design. Utilizing a design-build approach, the architect designed a fully functional, multipurpose facility for $61 per square foot, including fees.

With student athletic participation greatest in late afternoon, the school required a large facility containing a field house with a 200-meter indoor track, a natatorium, a squash/racquetball complex, a training facility and locker rooms.

The design employed a thin-shell wood hyperbolic paraboloid structural system, offering cost economy comparable to that of metal buildings, yet because of the rich texture and color of wood, the athletic environment has a club-like feeling.





The natatorium includes a 25-yard pool with diving area, while the field house courts (left) are surrounded by a 200-meter track. The entire building is handicapped accessible.

Architectural Showcase

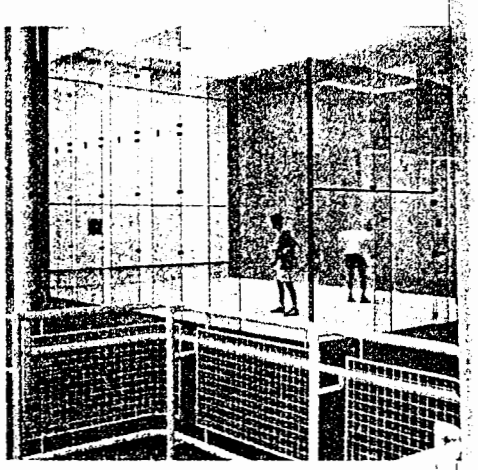
The John W. Berry Sports Center Dartmouth College Hanover, NH

Gwathmey Siegel & Associates Architects
New York, NY
Cost: $7.3 million
Square Feet: 69,000
Occupancy: May 1987

Architects of The John W. Berry Sports Center at Dartmouth College were charged with the responsibility of expanding and reconsolidating primary athletic facilities through new construction and renovation within the context of a traditional New England brick and stone Ivy League college campus.

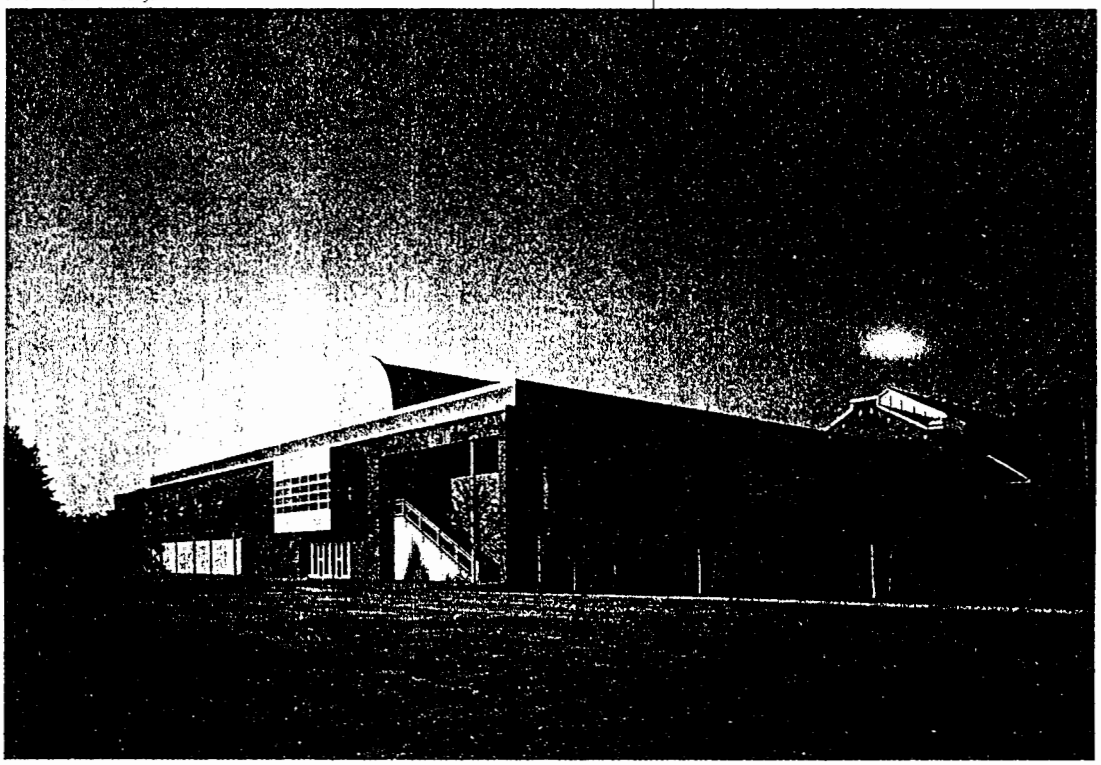
The new 69,000-square-foot building houses a 2,200-seat intercollegiate basketball arena, which reconfigures into a gymnasium with three regulation basketball courts through the use of movable seating. The facility also includes seven competition squash courts, including one exhibition court with three glass walls; six racquetball courts; a fitness center; a dance studio; varsity locker rooms; a multipurpose classroom and a ticket office.

A new bridge on the second level connects the new facility with existing Alumni Gymnasium, where the pool, basketball courts, running tracks, crew tanks, lockers and staff offices were renovated.



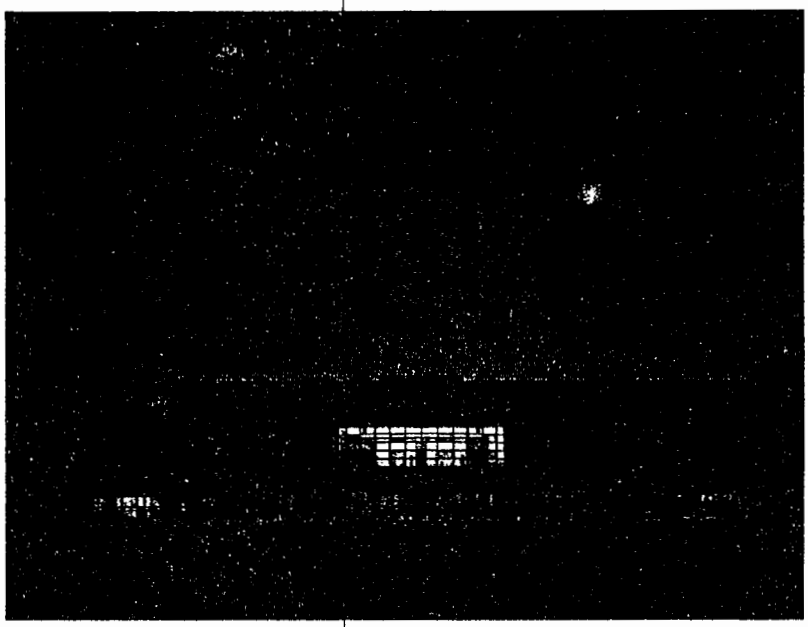
The exhibition squash court features three glass walls, which allow spectators to view the fast-paced action taking place on the court.

Photos ©Richard Bryant

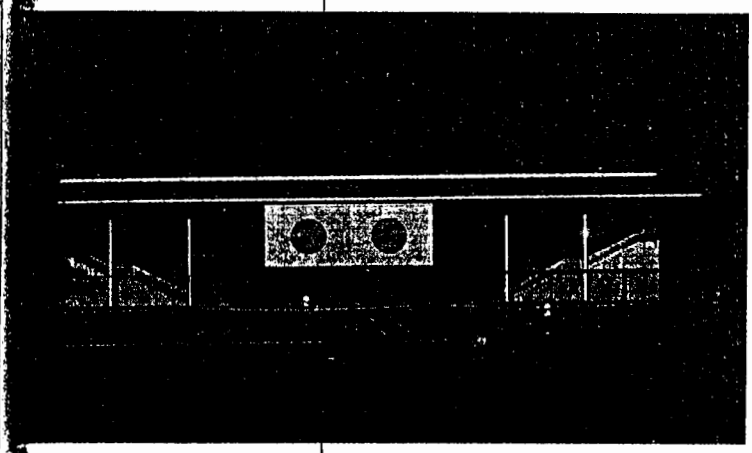


A pedestrian bridge on the second level connects the John W. Berry Sports Center with Alumni Gymnasium.

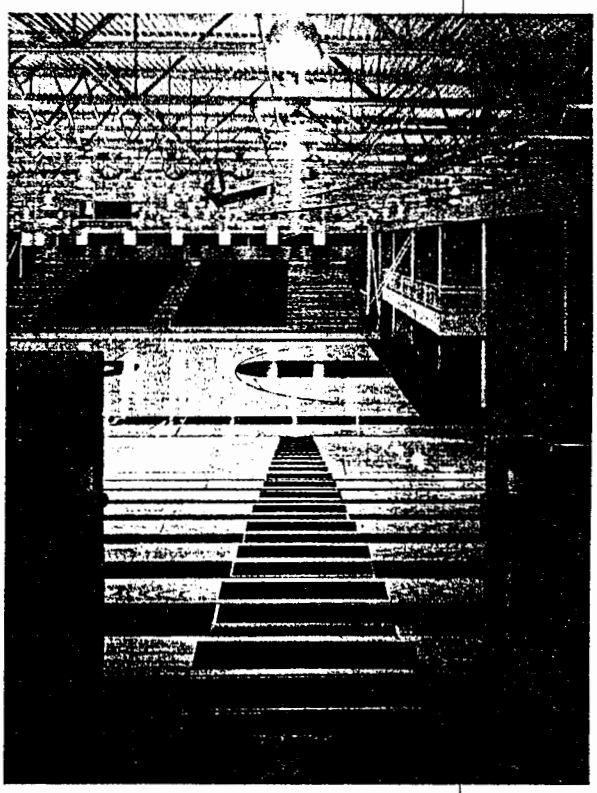
Passersby can see students at work in the dance studio on the upper level and fitness center below.



Eight outdoor tennis courts surround the traditional New England brick and stone facility.



Some 2,200 spectators can crowd into the new basketball arena, which can be converted into three regulation-size basketball courts through the use of movable seating.



Architectural Showcase

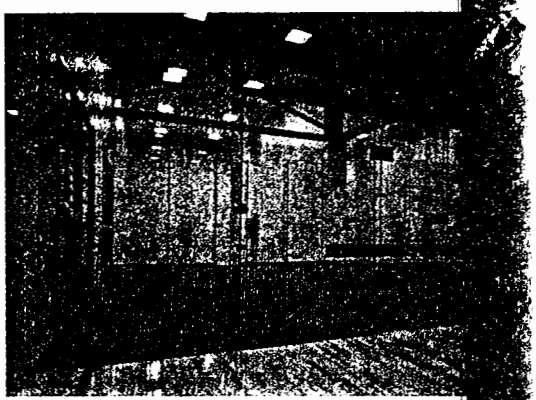
Physical Education, Recreation, Intramural Facility University of Hartford West Hartford, CT

Tully Associates
Melrose, MA
Cost: $8.7 million
Square Feet: 92,000
Occupancy: January 1990

Making the old new again was the goal of the renovation and expansion of the University of Hartford athletic facility. When finished, a contemporary multipurpose athletic, recreation and physical education facility resulted, offering total access control, segregation of spectators and participants, and merchandising of program offerings via interpenetrating views.

The new multipurpose field house employed intersecting wood barrel vaults sheathed with heavy timber decking. The cruciform design minimized building volume by concentrating high space only where needed at center court and at second-tier spectator seating.

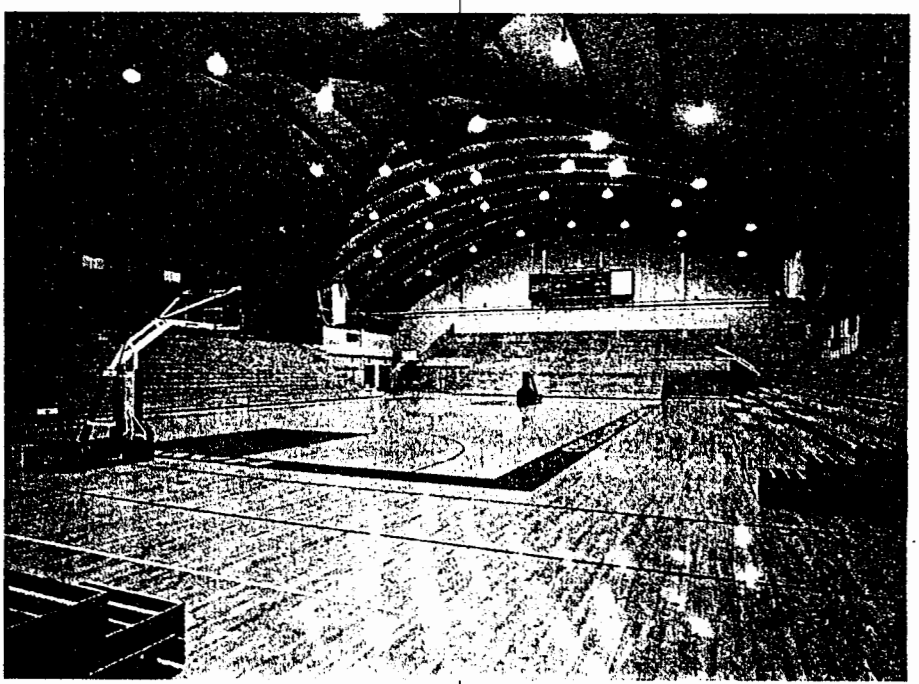
Cost economy was obtained by adaptively reutilizing an existing gymnasium for locker rooms, an aerobics room, a practice gymnasium and a squash/racquetball court complex. A new natatorium containing an eight-lane, 25-yard pool and diving area was naturally illuminated by a barrel vaulted greenhouse that creates a positive relationship with the outdoors.



The upper section of an old gymnasium was remodeled into squash and racquetball courts.

Synergy was enhanced by incorporating classrooms, offices, weight training, sports medicine and student health services into the project.

The design employs energy-saving HID light fixtures in activity areas and fluorescent fixtures elsewhere. The building is interconnected with the campus-wide energy management system. The entire facility is handicapped accessible.



New facilities at the University of Hartford include an eight-lane, 25-yard pool and diving area (above) and a multipurpose field house (right).

Architectural Showcase

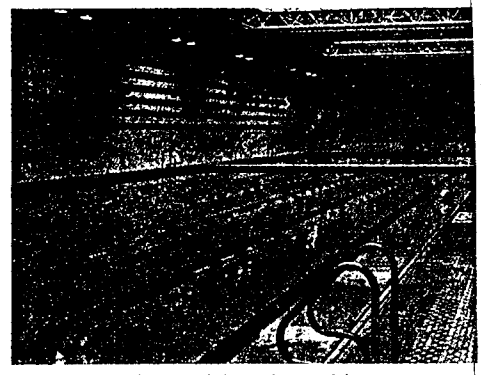
Recreational Sports Complex & Parking Garage Loyola University New Orleans, LA

Hastings & Chivetta Architects Inc.
St. Louis, MO
Cost: $9.5 million
Square Feet: 80,000 (rec center)
240,000 (parking garage)
Occupancy: February 1988

The Loyola campus had two very pressing needs: a facility for student recreation and more parking. This presented quite a challenge, for there was limited space on the land-locked, urban campus. In addition, due to the high water table in New Orleans, nothing could be built underground.

The solution was innovative, yet simple. The new recreational sports complex was built on top of a four-story parking garage.

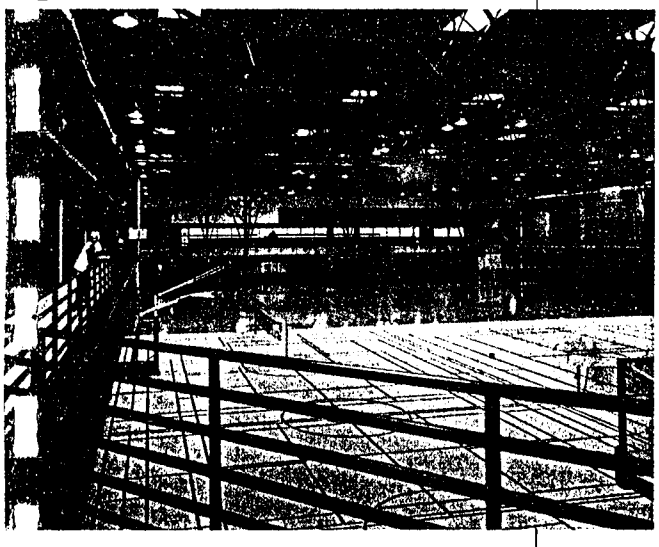
Nearly half of the square footage in the recreation complex, 34,500 square feet, is devoted to a multisport forum. It contains six independent, multipurpose courts, each of which is striped for various court activities. Through the use of drop nets, each court can be isolated, allowing for several different activities to take place simultaneously. Three of the courts' surfaces are wood and three are carpet to allow for sports like tennis and indoor soccer.



A movable bulkhead divides the pool into two sections by rolling to any position along the length of the pool.

The natatorium houses a 45-by-125-foot, six-lane "stretch" pool and a recreational whirlpool. Other amenities in the facility include a jogging track, handball/racquetball courts, a free-weight room, a machine-weight room, exercise rooms, meeting rooms, administrative offices, a combatives room and locker/shower rooms.

The tight budget and compact sight are reflected in the design, which eliminates the excessive use of corridors and allows for plenty of natural light throughout the building to help limit operating costs.



The elevated jogging track surrounds the multisport forum and overlooks the major activity areas.

Photos by Timothy Hursley

Students enter a lobby through a centralized control area that monitors the building's use.

Architectural Showcase

Lands' End Activity Center Dodgeville, WI

Martinson Architects Inc.
Green Bay, WI
Cost: $6.7 million
Square Feet: 80,000
Occupancy: February 1989

Charged with creating a first-class facility to be actively used by all employees of the clothing manufacturer, architects of the Lands' End Activity Center designed an open environment with multipurpose spaces. Centrally located between the distribution center and office building, the center is equally accessible to all employees and underground connections ensure use in inclement weather.

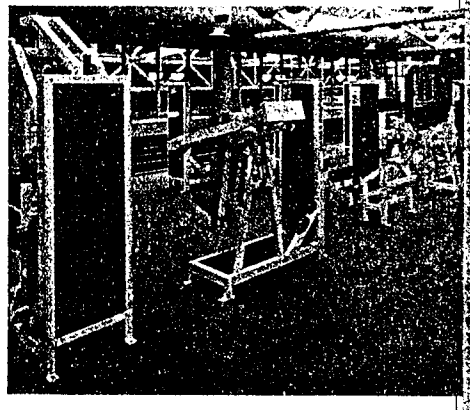
Extensive use of glass for exterior walls, interior partitions and skylights, and a skillful, open organization allow employees to simultaneously view various activity areas, encouraging their participation. Natural lighting enhances the open feeling created by supplemental indirect lighting and a roof composed of round tubular members, painted white and left exposed to complement the center's informal, active character.

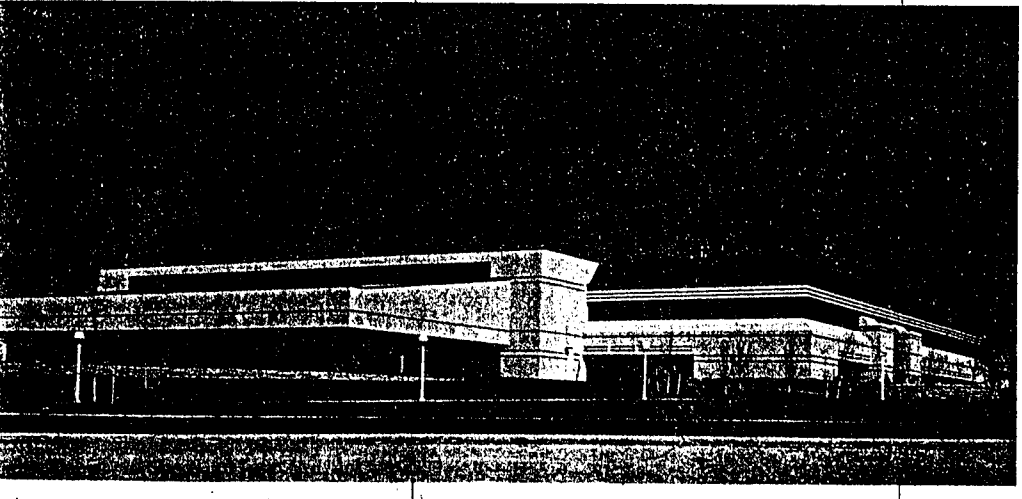
The center's pool contains six 25-meter lanes for lap swimming, a low diving area and a radiused end area for water aerobics and other classes. Special detailing keeps the temperature of exposed surfaces above the dew point, eliminating condensation of pool windows caused by Wisconsin's subzero temperatures.

A motorized net divides the gymnasium's full-size basketball court into two cross courts, and there are two volleyball courts, four badminton courts and bleacher seating for 250. Exterior glass walls at the second level filter in natural light. With a cover for the floor, theatrical lights above and two sound system spheres suspended from the ceiling, the gymnasium can be used for dining, assemblies or other programs.

In addition to the pool and gymnasium, the facility includes a track, exercise equipment area, 25-person aerobics room, physical testing/evaluation area, meeting rooms, 11-person whirlpool, two racquetball courts, laundry, dining area and full-service kitchen.

Computers located at all main entrances and locker rooms allow individuals to call up their exercise records for monitoring and updating.





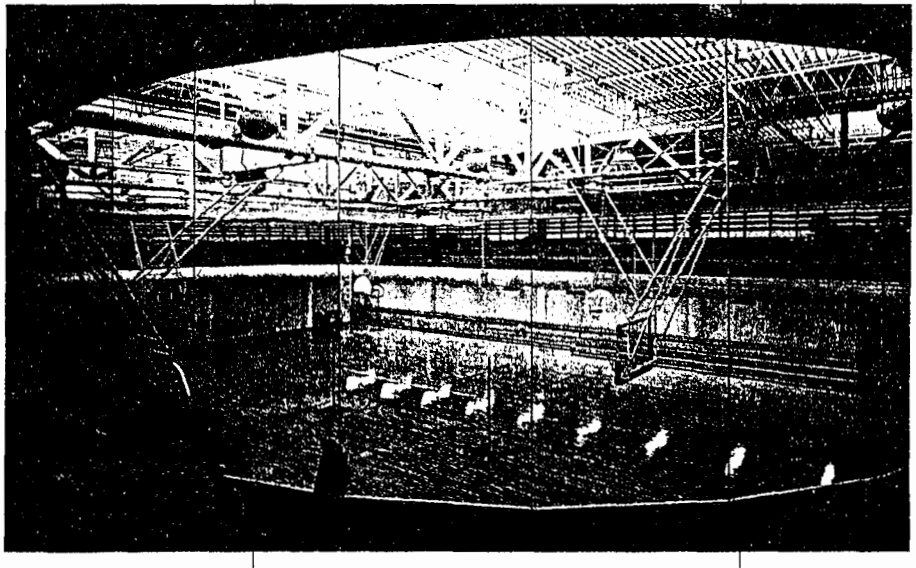
©Eric Oxendorf

The Lands' End site features an outdoor tennis court, basketball court and volleyball courts, as well as an ice skating rink and softball field.

90

The exercise equipment area overlooks the two-story atrium lobby. The open environment encourages employees to participate in the center's many facilities and programs.

Overhead sound and lighting baffles for acoustical control and glare reduction, indirect lighting, natural lighting from exterior glass walls, and a landscaped deck create a pleasant pool environment.



A banked, ⅛-mile running track overlooks the gymnasium, which features a cushioned wood floor that can be used for basketball, volleyball or badminton.

Architectural Showcase

Marion Burk Knott Complex College of Notre Dame of Maryland Baltimore, MD

Bonnett & Brandt Inc.
Baltimore, MD
Cost: $3.6 million
Square Feet: 37,000
Occupancy: November 1989

The Marion Burk Knott Complex was designed to replace an existing gymnasium constructed in 1926. Although entirely inadequate for modern-day sports and fitness—both because of its size and antiquity—the gym occupied an important place in the main facade of the college. As a result, the design required that there be little or no changes to the building's facade, the entrances be architecturally sympathetic to existing buildings, and the new facility provide for continuous student use and participation, in addition to those uses normally associated with a gymnasium.

More than 22,000 square feet of new facilities were added and the existing 15,000 square feet refurbished. The 500-seat, 10,000-square-foot gymnasium, the centerpiece of the facility, accommodates basketball, volleyball, badminton and other team sports. Overlooking the gym are athletic offices; the student activities area, which includes a variety of student organization offices; a seminar room; a game room with snack, Ping-Pong and pool facilities; and two racquetball courts.

Downstairs are a dance and aerobics room, a fitness center, a training room and a classroom. Existing locker areas were refurbished, and more than 1,100 square feet of new storage was added.

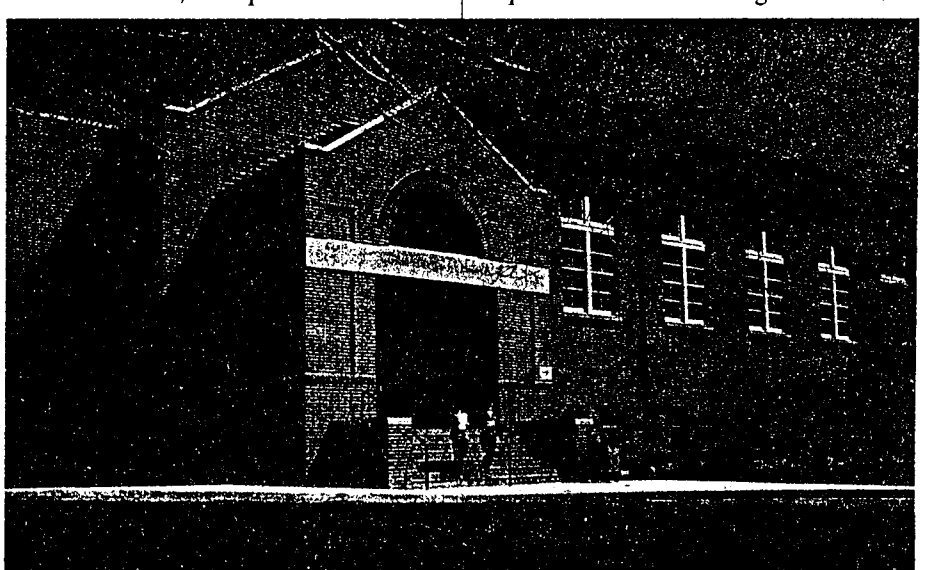


Photo by Diane Markert

Brick with limestone trim and a slate mansard roof were utilized on the front of the complex.

The 1,500-square-foot, double-height game room offers students snacks, drinks, and Ping-Pong and pool tables.

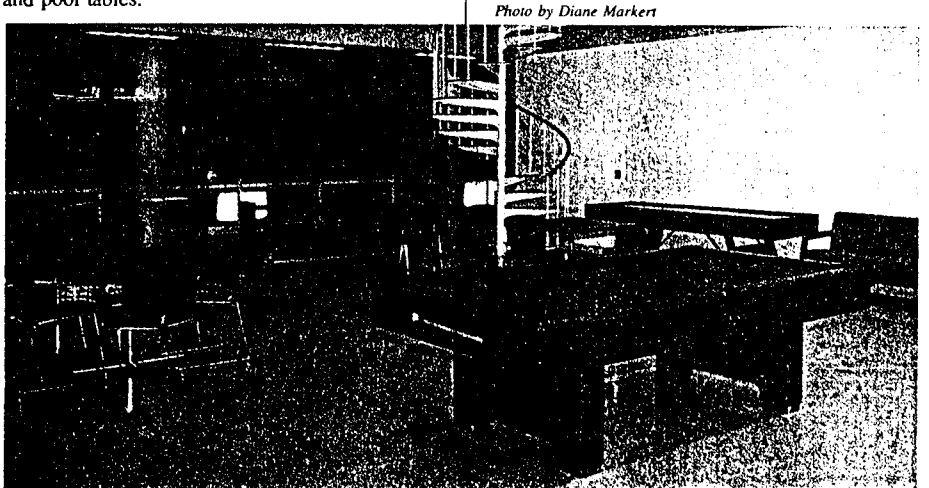
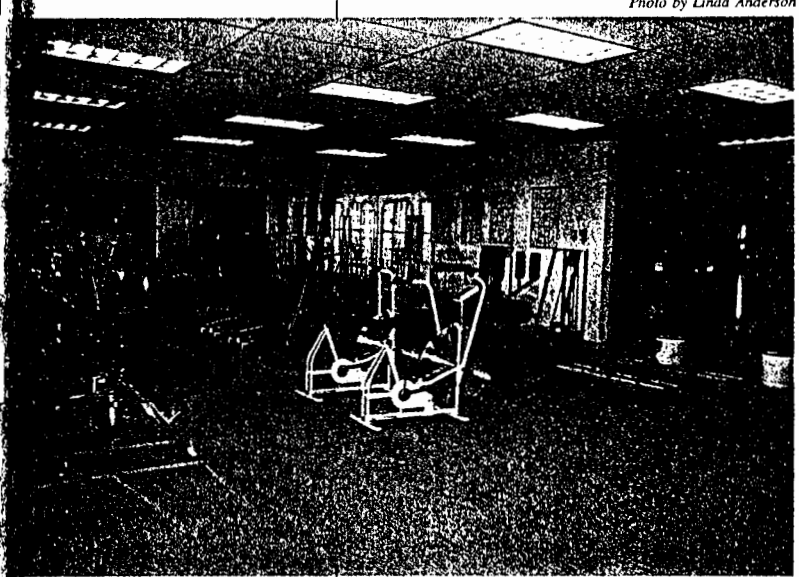


Photo by Linda Anderson

Photo by Bob Stockfield

The athletic offices, with window views into the gymnasium, consist of five offices and a waiting area.

Photo by Linda Anderson



The 1,030-square-foot fitness center features weight training equipment and opens through glass walls out onto the gymnasium.

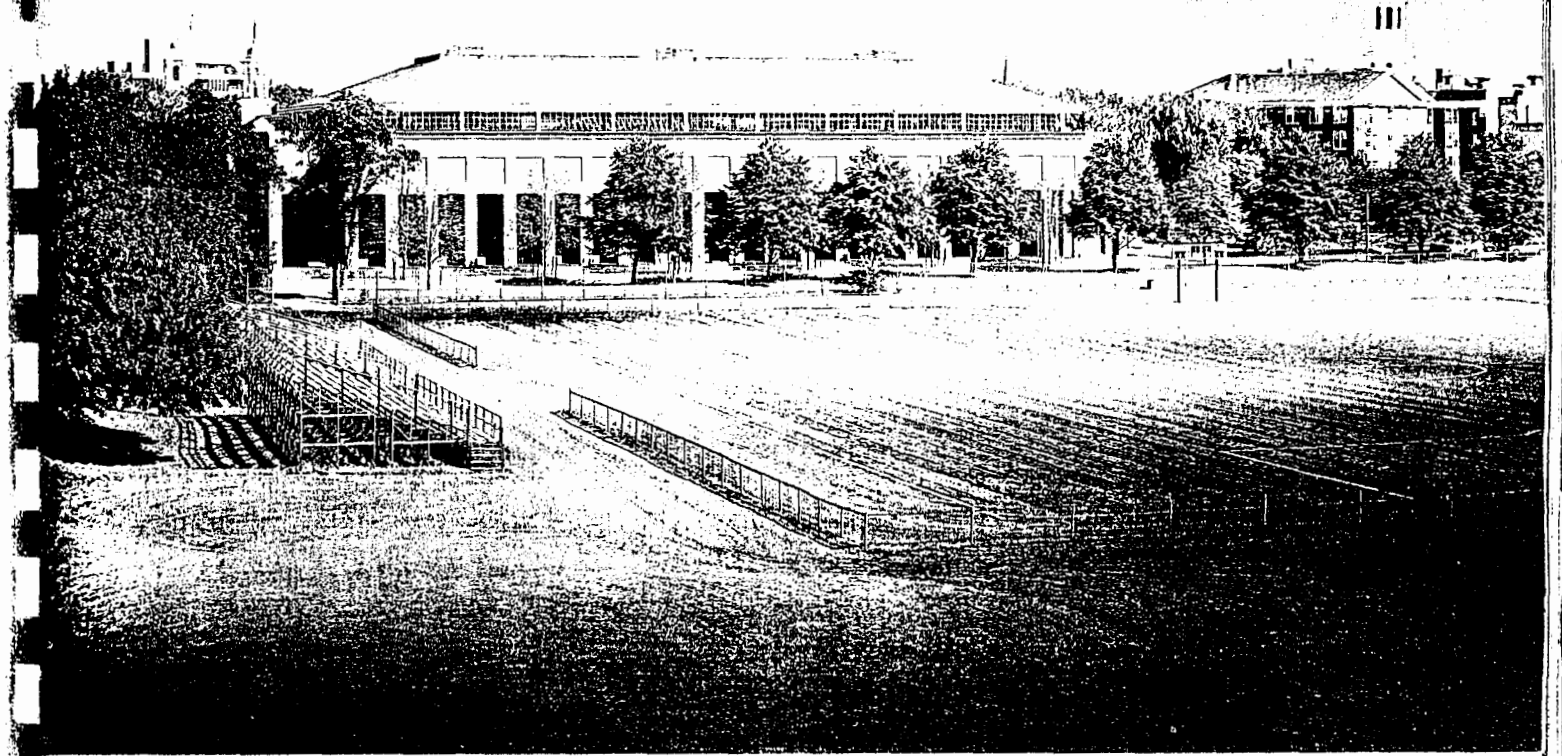
Photo by Linda Anderson

Adjacent to the gymnasium, dance and aerobics classes are held in the dance studio, which features a cushioned floor and two 32-foot dance bars.

University challenge

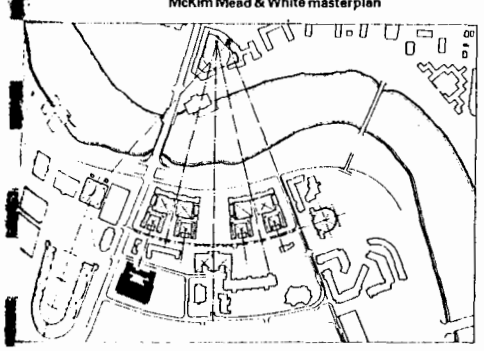
Athletics Centre, Harvard, Boston, USA
Architects
Kallmann McKinnell & Wood
Criticism
Brian Carter

The athletics and fitness centre for Harvard's Graduate School of Business Administration tames a normally dreary and unwelcoming building type and, in so doing, makes it part of a continuing collegiate tradition.



1

site plan:
radiating lines from Eliot Hall define a 1927 McKim Mead & White masterplan



2

1
Outer screen wall helps reduce apparent size of sports hall and allows a cloister, transforming what would otherwise be an imperforate brick box and anchoring it to its setting.
2
Main entrance is off-centre, closing a vista from a traditional path.

Perhaps because the requirements of leisure lack clear definition, new centres for recreation seem to be less distinct in form than many other architectural types. Buildings designed for the organised pursuit of sport and leisure take many different shapes – some reflect a spartan austerity which refers to ideas of clean and healthy bodies and minds, while others create an out-of-working-hours fantasy world of persistently blue water with palm trees on wave-machine washed islands. Because of the nature of the programme and sites suitable for it, they also often tend to be buildings which are large and inward-looking and built in the midst of a sea of asphalt on urban fringes.

Shad Hall, the new Athletic and Fitness Center for the Graduate School of Business Administration at Harvard is a sharp contrast to this grim pattern. It occupies an important position within a planned academic village in Boston. Unlike the original campus which is made up of an eclectic accretion of buildings integrated by the open spaces of Harvard Yard, this

Athletics Centre, Harvard, Boston, USA

3
The building takes cues from the proportions, composition and materials of the surrounding buildings – and is informed by the master plan of the campus.

4
North elevation. Entrance, if cumbersome, is generously formed under a glass roof.

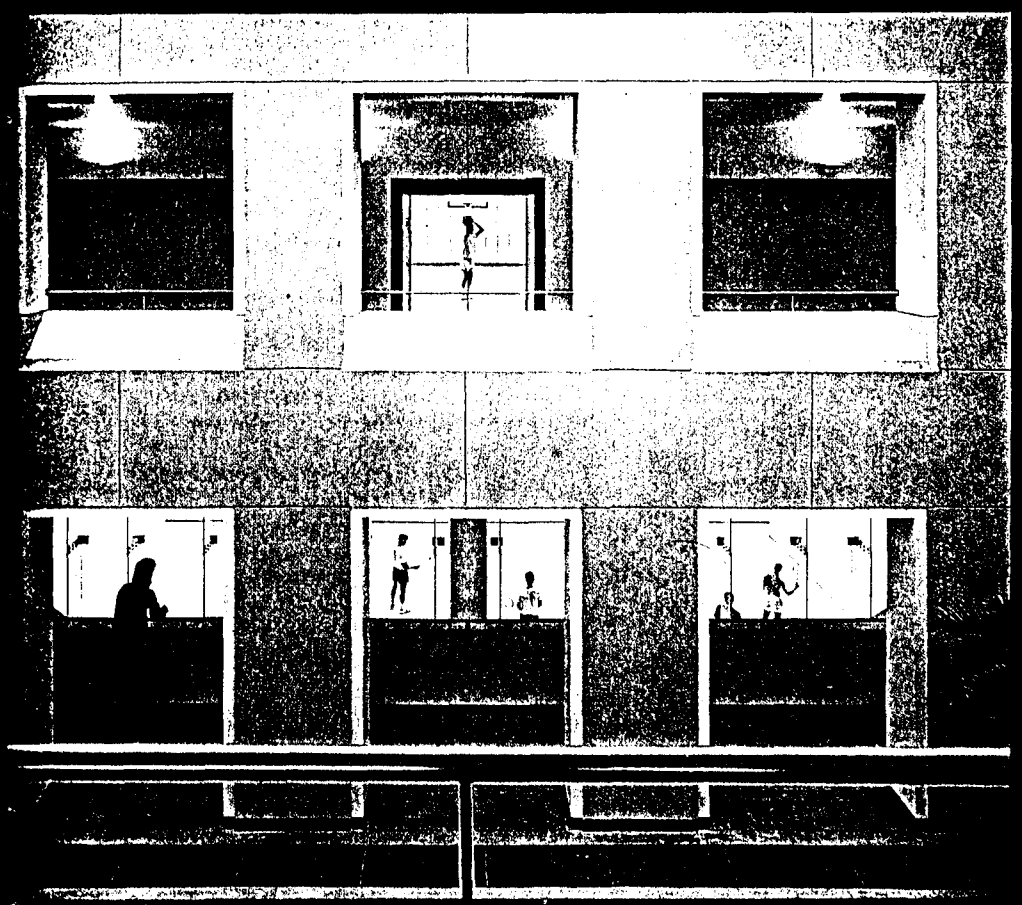
5
Stairs down to squash courts from atrium.

6, 7
The atrium which links the two halves of the building: a tall narrow space that is defined by a perforate wall making a series of cloisters.

8
The gymnasium is a double-height space with a running track over three basketball courts.

5

6



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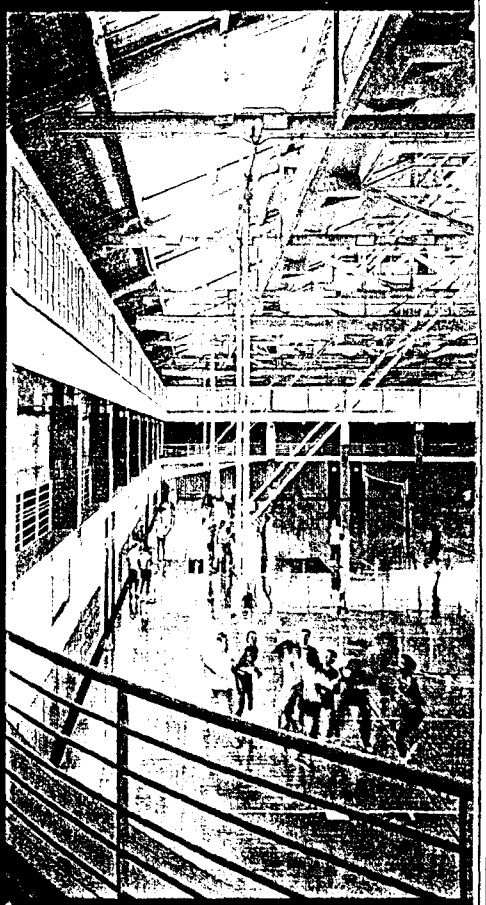

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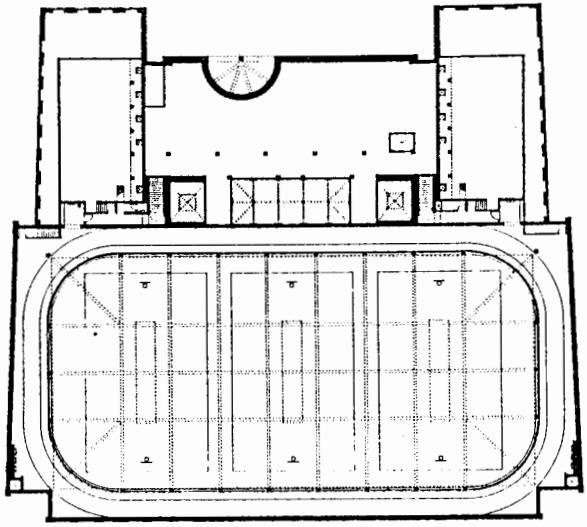
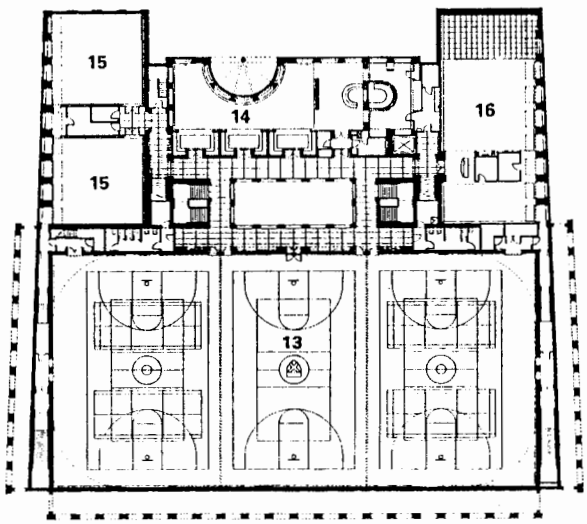
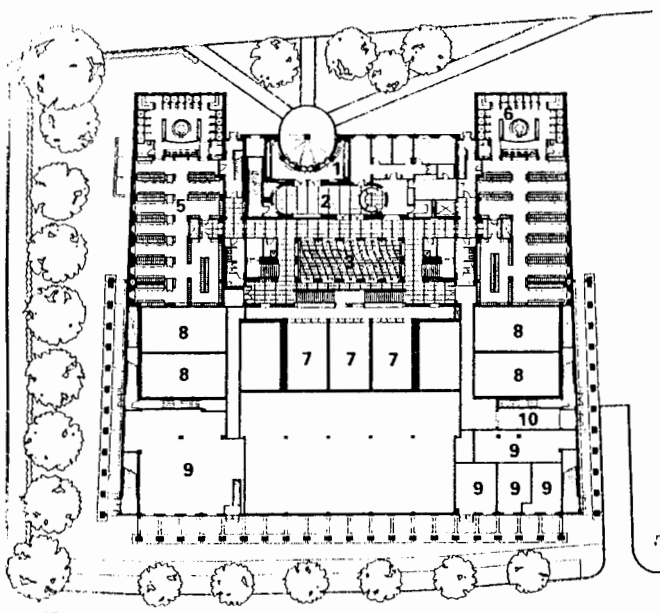


second floor



first floor



1. mud room
2. lobby
3. atrium
4. men's lockers
5. women's lockers
6. showers/whirlpool
7. squash courts
8. rackets
9. mechanical
10. delivery
11. future expansion
12. office
13. gymnasium
14. café
15. aerobics
16. fitness conditioning

ground floor

campus has an overall order established by a master plan which formed the competition-winning submission prepared by McKim Mead & White in 1927. It outlined a layout for the site generated by a series of radiating lines originating from Eliot Hall on the opposite bank of the Charles River and set down patterns for the form and scale of new development to create a campus of Neo-Georgian style red-brick buildings forming a network of collegiate quads and grassy courts.

The new centre is a building of more than 11 000 sq m in area and almost 20 metres in height. It is bounded by the colonnaded walls of the Harvard Stadium to the north-west with the domestic scale buildings of the residence halls and the Baker Library to north and east. It provides a wide range of educational, sporting and recreational facilities for the 2500 members of the Business School community.

This setting has obviously provided much of the inspiration for the designers and early sketches by both Kallmann and McKinnell show studies which make reference not only to the proportions, composition and materials of the surrounding buildings but also to the basic structure of the plan for the campus. The organisation of Shad Hall is clearly developed from the plans of the first buildings on the campus. This first group, which was built in 1928, consisted of a mix of residential and educational facilities orientated to the Charles River and the original campus beyond, with the Baker Library at the centre framed by two identical sets of buildings forming collegiate quadrangles. Within these quadrangles, residential rooms were aggregated to enclose three sides with the fourth side formed by smaller stucco pavilions of offices and public functions framed by the projecting wings of the brick residences. This design established a dominant pattern for development on the campus. But several buildings added during the '60s and '70s ignored the outlines of the original master plan and the design of Shad Hall (which has re-adopted and developed many of the ideas of the plan) clearly demonstrates the value of learning from the existing landscape.

It consists of two buildings. They refer to the established brick and stucco patterns and, like the traditional college field houses of many American universities, they combine the qualities of barn and club room. One building – a large sports hall planned on two levels – accommodates squash and racketball courts with a single volume on the upper floor for a gymnasium with three basketball courts and a high-level banked indoor running track. The second – a four-storey block – houses a mix of different uses including the main entrance, exercise rooms and club facilities in a series of smaller rooms. The two buildings are linked around a toplit atrium, the focus of the centre.

The different internal spaces have been located to respond to the differing scales of the surroundings. So the large volume of the gymnasium has been placed alongside the Harvard Stadium to form the southern wall of the court, while smaller spaces make up the other three sides and front the residential quadrangles to the north. Like the original buildings, the side walls of Shad Hall are splayed to respond to the radial layout of the campus and this is further emphasised by the addition of an outer screen wall of brick around three sides of the building. The device helps to reduce the overall scale of the sports hall while introducing an order which articulates a base, middle and setback attic storey, and creating a cornice which aligns with the surrounding buildings. These gestures, and the creation of a cloister-like space around the edges of the building along Gordon Drive, North Harvard Street and the playing fields, transform what

9

Athletics Centre, Harvard, Boston, USA

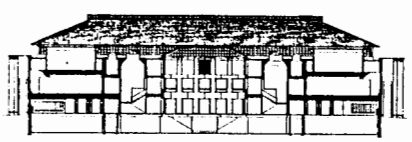
9, 10
Café, lined with panels of stained red oak, will mellow comfortably with age.

might otherwise be a large and virtually imperforate brick box and anchor it in its setting. In its detail, this wall reflects an interest in the building which recalls the work of Kahn. In many studies, he suggested wrapping buildings in ruins – an idea which he was to subsequently develop along with his obsession with the nature and making of the masonry wall. Perhaps the most significant of these is the library for Philips Exeter Academy in New Hampshire, where the wall developed a depth which housed rooms for study and formed a cloister around the building. The architects have developed a similar theme for Shad Hall and although, rather surprisingly, parts of the arcaded space here have been landscaped and consequently discourage its use as a walkway or a place for shelter, this device brings a presence and weight to this otherwise ill-defined corner of the campus.

Against a carefully organised and symmetrical plan the main entrance is set off-centre with the central stucco pavilion so as to close a vista from a traditional campus path and complete the small courtyard between Cotting and Morgan Halls. It is marked by a single totemic free-standing concrete column with a rawly gilded steel capital. This column supports a tapered steel lintol and a glazed roof on a series of radiating beams. Although this is all rather cumbersome in detail, it forms an entrance with a generous threshold contained within a glassy *porte-cochère*. In an obvious response to the form of the fenestration of the surrounding buildings, the windows in this block are formed with deep brick heads and sills to white gridded frames. However, in that effort to respond to the existing patterns, tectonic details seem to have been overlooked in favour of an essentially graphic visualisation. The original buildings rarely had brick sills and their arched brick heads are delicate, but the shallow sections of pre-finished window frames which have been used in the new building read as rather crude imitations.

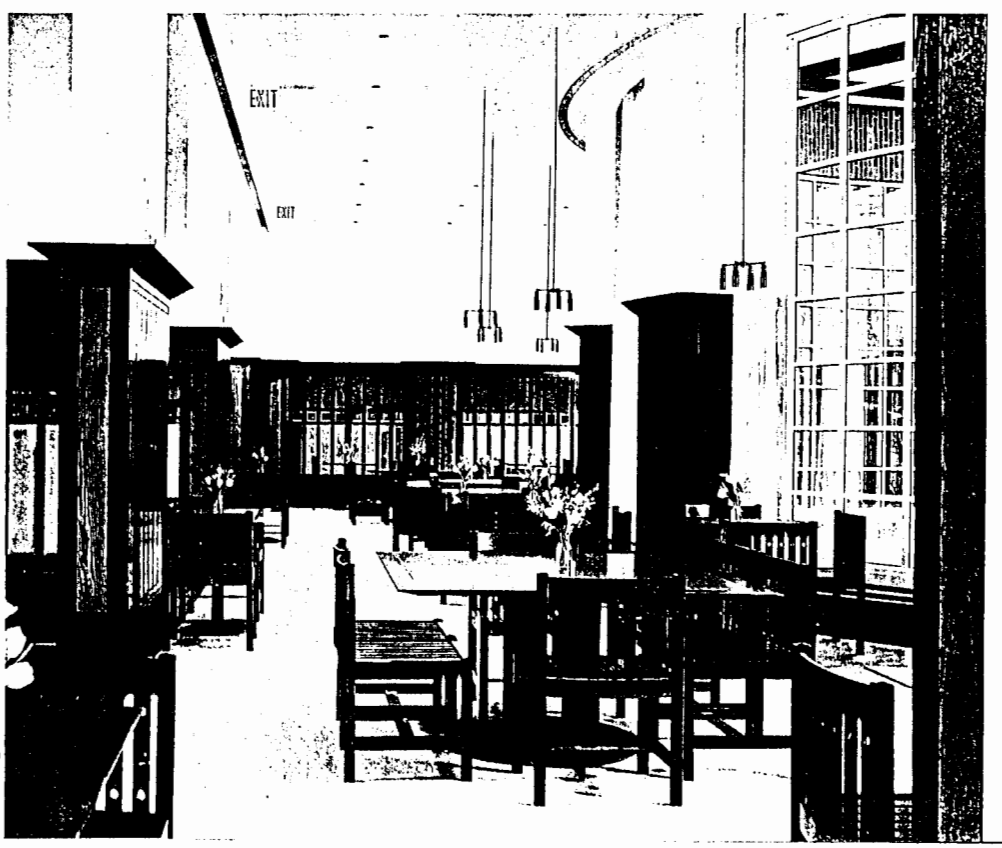
Internally, spaces are organised with a spartan attention to detail and clarity which reflect the order of the activities they house. Wings of lockers for men and women, generous in their provision of both facilities and space, are set symmetrically about the entrance; exercise and fitness rooms are thoughtfully planned and the large hall housed within a daylit barn under a workmanlike roof of steel and timber. Most spaces are finished in white except in the café. This long room, with views out over the entrance and to the courtyards beyond, has been lined with panels of stained red oak with an occasional inset grid of small mirrors. It hints at Mackintosh and perhaps the pannelled rooms designed by Emerson, Arthur Little or McKim Mead & White for the rambling Shingle-style houses a little further down the coast of New England. Here, new and not yet hung with the trophies, team photographs and inevitable paraphernalia of competitive sports, the space has an impressive elegance which should mellow comfortably with age. However it is the central court, with its grand staircases and layered walls cut back to frame the activities of the athletes, which establishes the building. By comparison with the large halls for sport, this is a tall, narrow space defined by a perforate inner wall which forms a series of arcaded cloisters. At the centre of the space, under a steel and glass skylight, the floor is finished in polished slips of grey green stone. Like the atrium at the centre of an ancient villa, this reads like a still pool which mirrors the sky. It is a contemplative space at the centre of this sweatbox which has some of the calm presence of the courts created by Kahn at the heart of the Exeter Library or the Center for British Art at Yale.

This space in the middle of Shad Hall, with the scenographic references which have been adopted and developed in making the plan and elevation, allow this large new building to significantly contribute to and improve the setting. It is a design which builds on that lineage of an American Beaux Arts which links McKim Mead & White and Kahn and thoughtfully extends it to transform this particular university sports and fitness centre into a dignified place of physical well-being.



long section

cross section

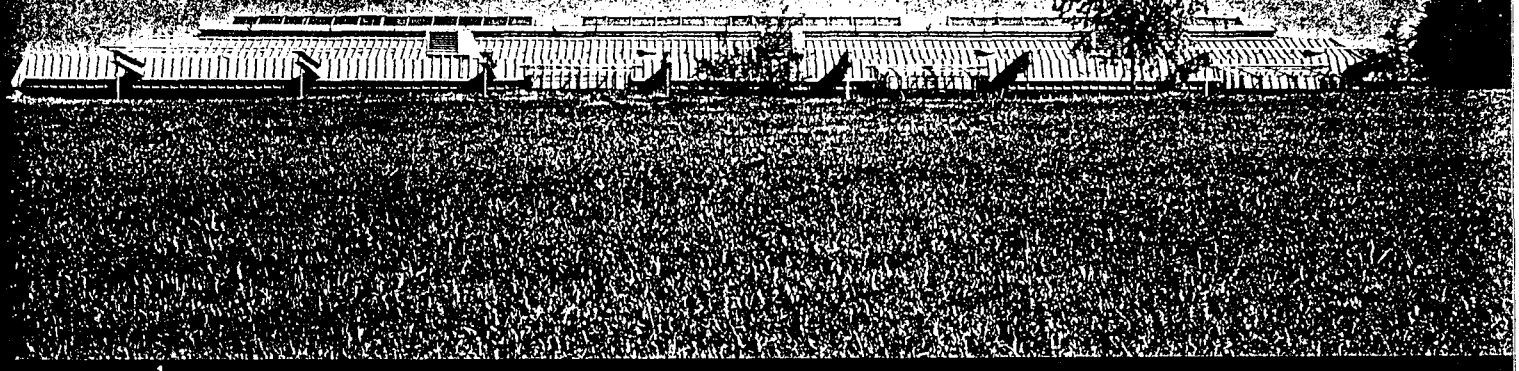


10

Behnisch sports

Sports halls, Germany
Architects
Günther Behnisch & Partner
Criticism and photography
Peter Blundell Jones
Additional photography
Christian Kandzia

Although the AR has published several major buildings by Günther Behnisch & Partner in recent years, their many school gymnasia and sports halls have remained largely unknown outside Germany. Peter Blundell Jones charts the 20-year evolution of the building type in the hands of this firm and describes some of the best examples.



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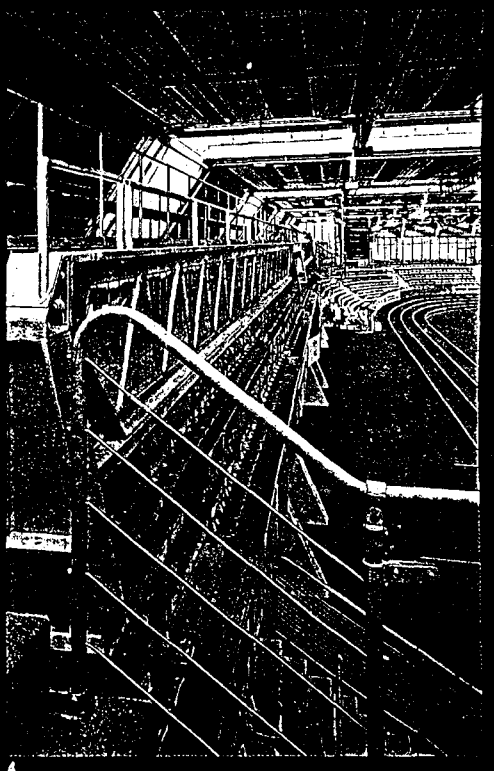

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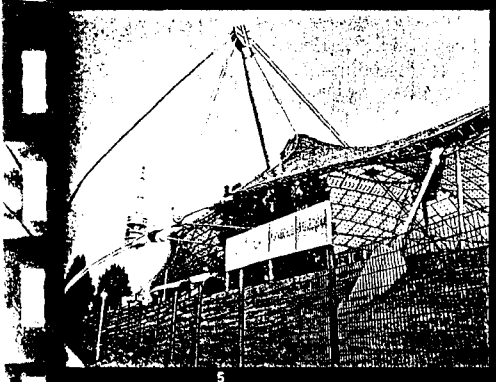

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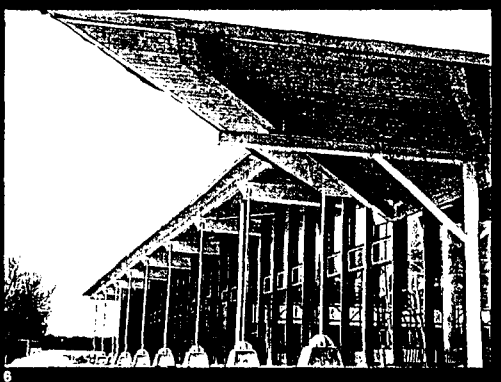
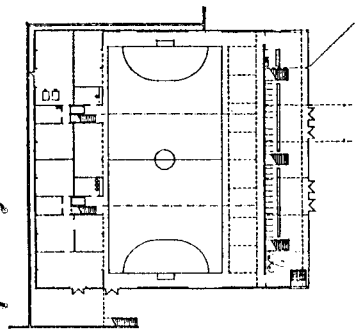


6

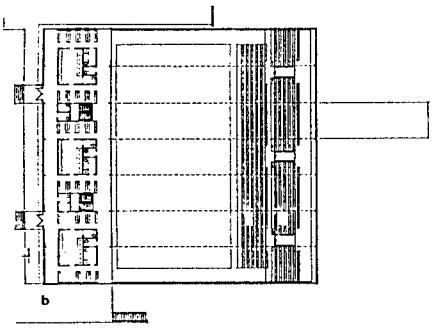
1
School sports hall at Lorch, 1976.
2
School sports hall at Waiblingen, 1970.
3
Olympic training hall, Munich, 1972.
4
Large public sports hall in Sindelfingen, 1977.
5
Main Olympic arena, Munich, 1972.
6
The most recent Behnisch school sports hall at Bruchsal, 1989.

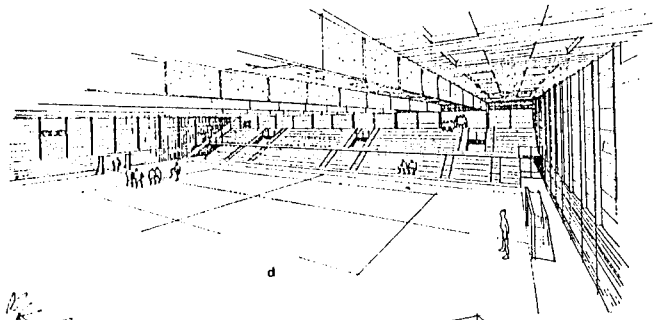
Eighteen years on, and with buildings like the Eichstätt Library (AR March '88) and Post Museum (June '90) in mind, it is all too easy to forget that it was the Munich Olympic complex of 1972 that first brought Günther Behnisch & Partner to international notice. The result of a competition in 1967, this project marked the Stuttgart-based firm's first engagement with large-scale sports buildings, though they had already some gymnasia associated with schools which they had planned. In subsequent years they went on to complete a whole series of sports buildings, to date no less than 17 of various sizes.[1] While this experience gives them an undoubted authority in planning buildings of this type, lending the later ones at least a considerable exemplary value, the 25-year pattern of evolution is also of interest for the way it reflects the changing perceptions and concerns of the firm. The following selected examples show the main path of development, taking in chronological sequence, first the halls of modest size, then a couple of the larger ones.

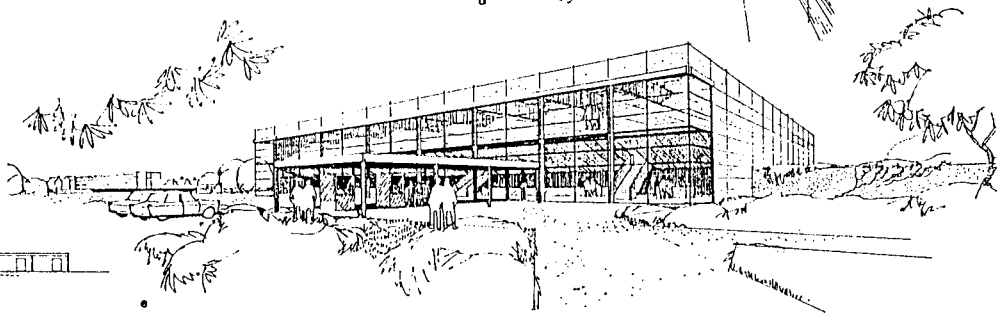


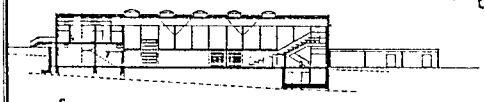
Schwenningen 1969

The design for a sports hall at Schwenningen of 1968-69, may come as a shock to devotees of recent Behnisch work, for there is hardly a hint of the expressed construction and layering which is the hallmark of the later buildings. Typical of the time, it belongs to a whole series of prefabricated school buildings by the firm using concrete elements, and expressing a hard repetitive discipline of assembly. The regular gridded box, its roof edge completely suppressed, is relieved only by two-storey glazing and a projecting entrance canopy. Internally the structure is concealed, and rooflights are treated merely as holes cut in a flat plane. The organisation has some subtlety, however, exploiting the given slope to provide contrasted entrances on opposite sides and at different levels, for sports people and spectators. The public get a grand front entrance into a double-height glazed space with cloakroom facilities, arriving at mid level in the hall via a series of three straight staircases. From here they have access both to the gallery seating and to the lower banks of seats which can be folded away. Sports people arrive at the back more informally at the upper level, change, then descend to the arena. The space under the changing rooms is given to equipment storage and plant. It is a great arrangement, involving careful exploitation of the section.

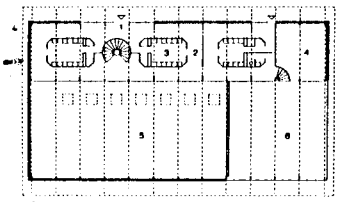


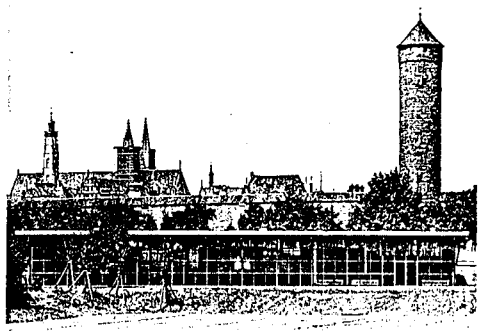






Schwenningen school sports hall, 1969
a, lower level plan.
b, upper level plan.
c, section, entrances for sports people left, public right.
d, internal perspective.
e, perspective of public entrance.

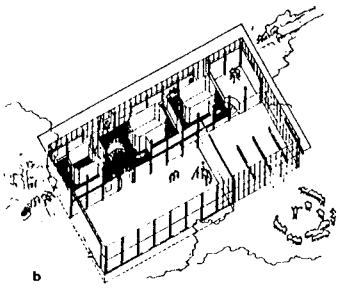


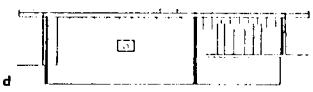


Rothenburg school sports hall, 1970
a, upper level plan.
1, entrance.
2, changing
3, showers.
4, plant
5, main sports hall
6, gymnasium.

b, isometric.
c, long section.
d, cross section.

7
School sports hall outside the medieval wall of Rothenburg, 1970.

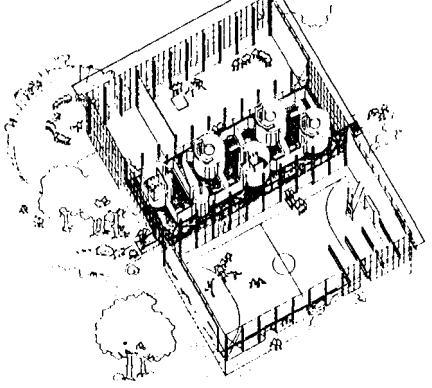




Rothenburg and Waiblingen 1970

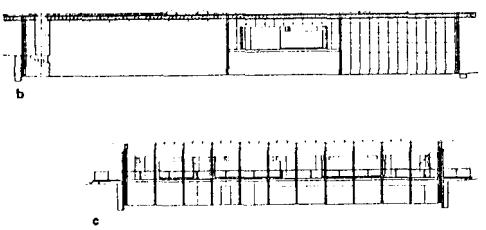
Completed only a year later, the school sports halls at Rothenburg and Waiblingen are radically different, and much closer in both appearance and conception to the Behnisch we now find familiar. The organisational strategies are similar to that of Schwenningen, with the orthogonal discipline of structural bays still present, but suddenly structure and construction are laid bare, while the materials used are steel and glass. The projecting roof and transparent walls make both buildings more pavilion-like and less boxy, and begin to produce a contrast between the manipulation of the ground – earthworks – and the provision of a sheltering canopy. This contrast is exploited again and again in the subsequent work of the firm, and was the guiding idea behind the Olympics design, in which earthworks play against vast cable-net roofs.

The sports hall at Rothenburg stands in front of the famous medieval town wall as a finely-proportioned long low pavilion, fitting into its historical context well. The main hall is sunk 1.5 m into the ground, crucially reducing its visual impact, and since the site slopes, the building can be entered 2.5 m above hall level at the back. The entrance leads directly to changing rooms at the same level, allowing storage and plant below. The open changing room cubicles stand as separate cells on the intermediate floor, in the manner of Corbusian *plan libre*, leaving the metal ceiling deck and structure to run through uninterrupted, while the main roof beams

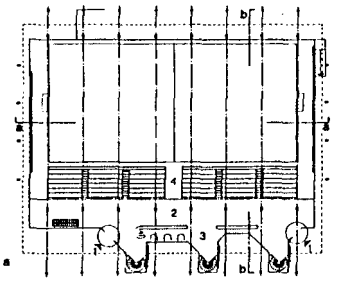


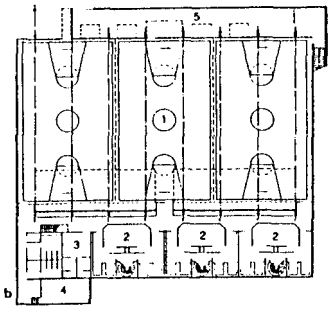
penetrate the glass with a detail which has since become almost a Behnisch cliché.[2]

Waiblingen sports hall employs the same ideas on a larger scale, with changing rooms on a bridge-like upper floor between halls of different sizes. Again the building is sunk, but the ground is excavated at the lowest corner to produce an external amphitheatre and to allow one of the halls to relate directly to the outside. This technique, which exposes one corner to relieve an otherwise sunken building from seeming claustrophobic, can be found again in most of the later sports halls, including Lorch.



Waiblingen school sports hall, 1970
a, isometric.
b, long section.
c, cross section.





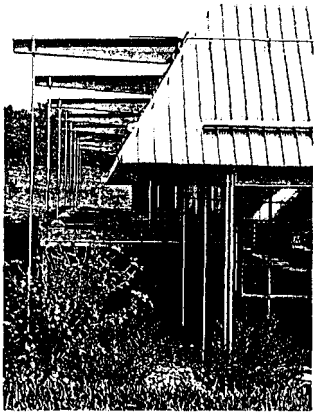
Lorch 1976

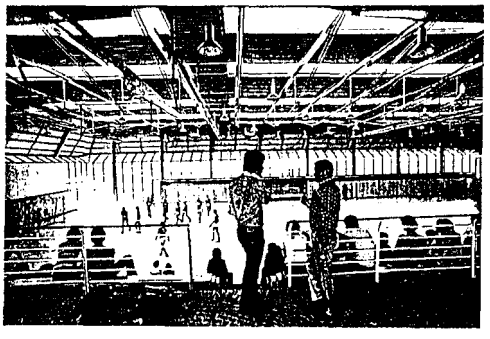
With a maximum span of only 12.5 m and bays of 3 m, the Rothenburg roof could be carried on simple rolled steel joists, but at Waiblingen the span is 21 m, and heavier castellated beams are used, still at 3 m centres. The roof structures on subsequent halls are more complex and differentiated, partly to produce larger clear spans and partly to allow smaller scale treatment of the building edges. Lorch, of 1976, represents a dramatic departure with two interacting structural systems, giving a clear span of nearly 30 m.

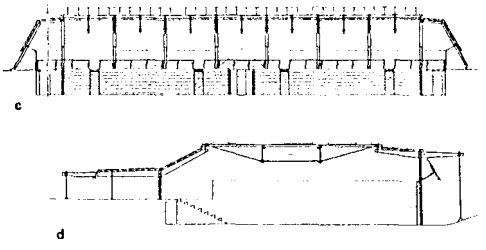
The central 20 m span supporting a flat roof is carried on a series of trusses made by adding downstand tension elements to steel joists. These occur at 3 m centres, transmitting their load via a frame to a series of Y- and T-shaped steel portals at 6 m centres, tensioned along the outer edge. The architectural advantage of this complex arrangement is that it brings the roof down at the outside, giving a gentler profile and smaller scale at the point of entry.

Rather than being subsumed under the all-embracing pavilion roof as in the earlier halls, the foyer and staircase arrangements at Lorch are treated as added elements along the edge of the building, set under their own subsidiary roof provided by the outer arm of the portal element, but setting up a freely faceted glass envelope which runs both within and beyond it, following the requirements of internal circulation. The interplay here between structural discipline and the shapes demanded by use and movement marks a new tendency in Behnisch work, taken much further in buildings like the second Lorch school[3] and Keller Haus.[4]

Specialisation of the perimeter also allows a clearer differentiation between front and back than that obtained with a pure pavilion. At sides and rear sloping metal-clad roofs come down protectively, producing a closed, barn-like image in contrast with the light and airy pavilion suggested by the earlier halls. This was partly to avoid environmental problems encountered with the earlier designs, for the high glass walls at Waiblingen had resulted in too much solar exposure, especially from low spring and autumn sun which could be dazzling and disruptive, and solar louvres had to be added. At Lorch sidelight is restricted by sloping roofs, while toplight is increased, using a series of linear skylights which run along the building across the main structure.





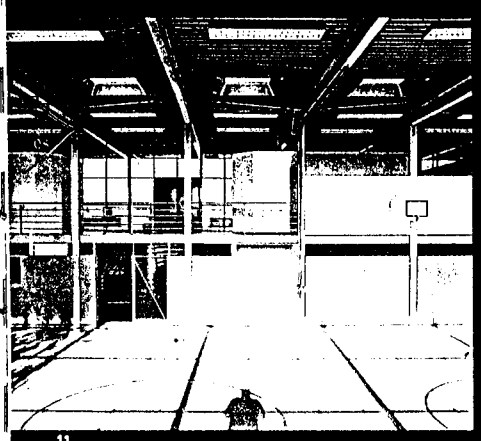


8, 9, 10
School sports hall at Lorch, 1976.

Lorch school sports hall, 1976
a, upper plan.
1, entrance.
2, foyer.
3, cloaks.
4, moveable seating.

b, lower plan.
1, hall.
2, changing and showers.
3, staff.
4, plant.
5, equipment.

c, long section.
d, cross section.



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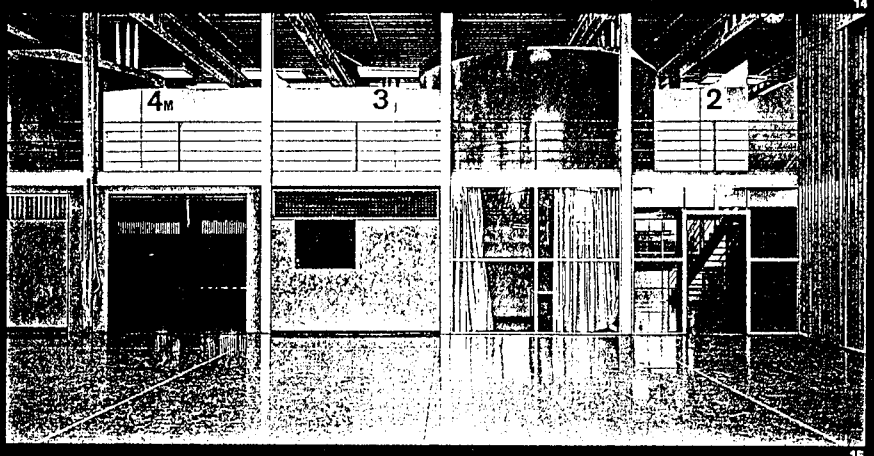

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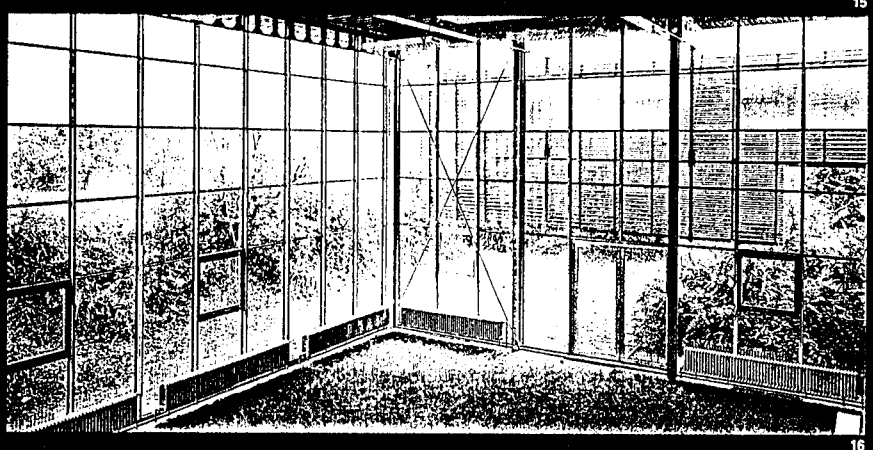

16

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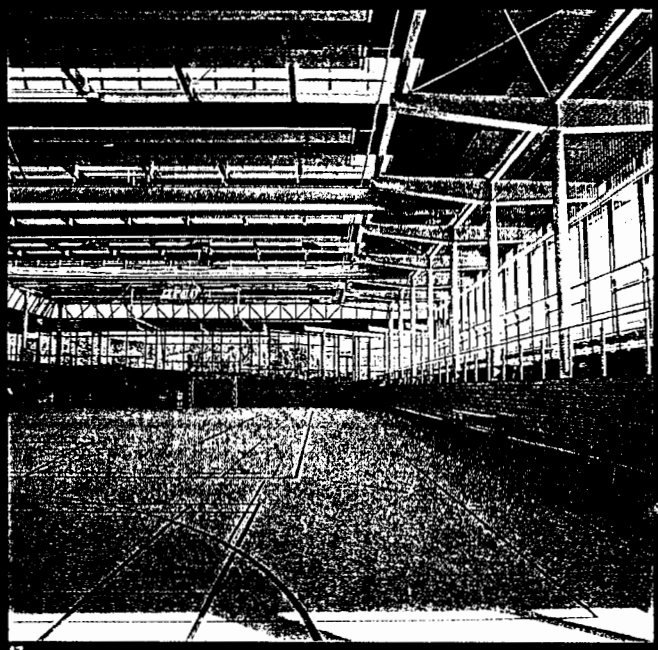
11, 12
School sports hall at Rothenburg, 1970.
13-16
School sports hall at Waiblingen, 1970. Exterior, large hall, small hall and corner gymnasium.

17-20
School sports hall at Sulzbach, 1984. These buildings stand at opposite ends of the series, showing by contrast the changing approach of the Behnisch office over 14 years. The hard materials and schematic organisation have given way to a softer and more responsive methodology: the structure is more subtle and combined with generous skylights.

Behnisch sports



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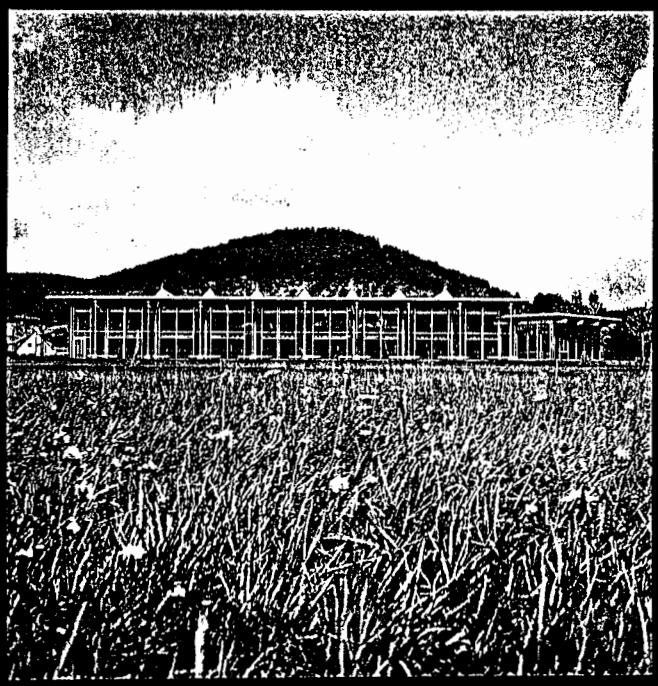

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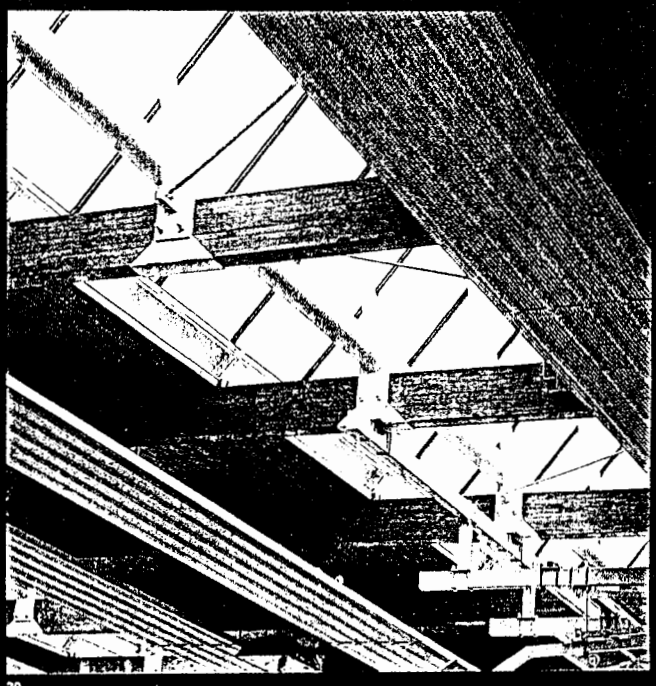
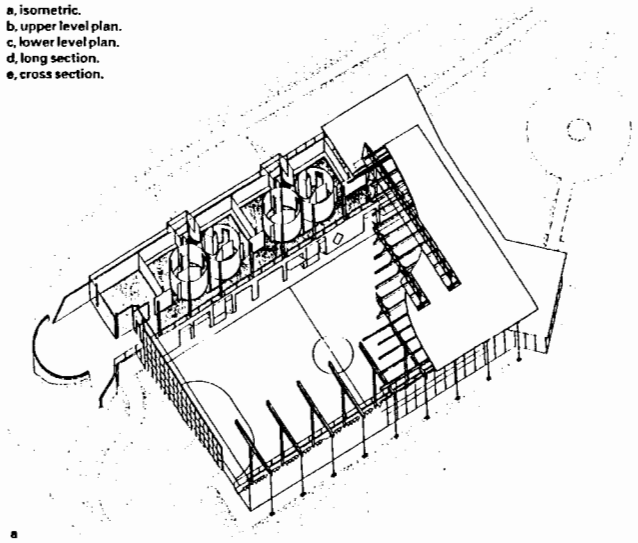
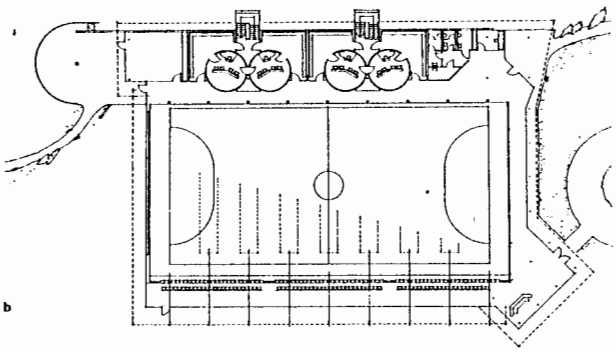


20

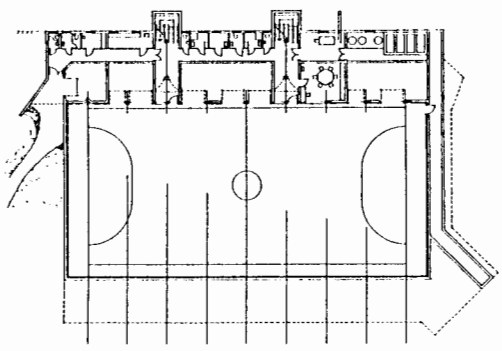
Sulzbach
a, isometric.
b, upper level plan.
c, lower level plan.
d, long section.
e, cross section.



a



b



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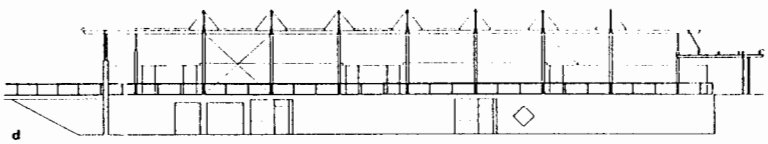

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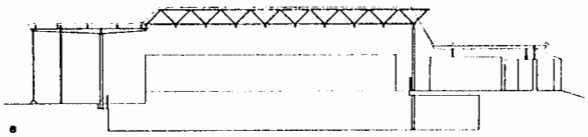


e

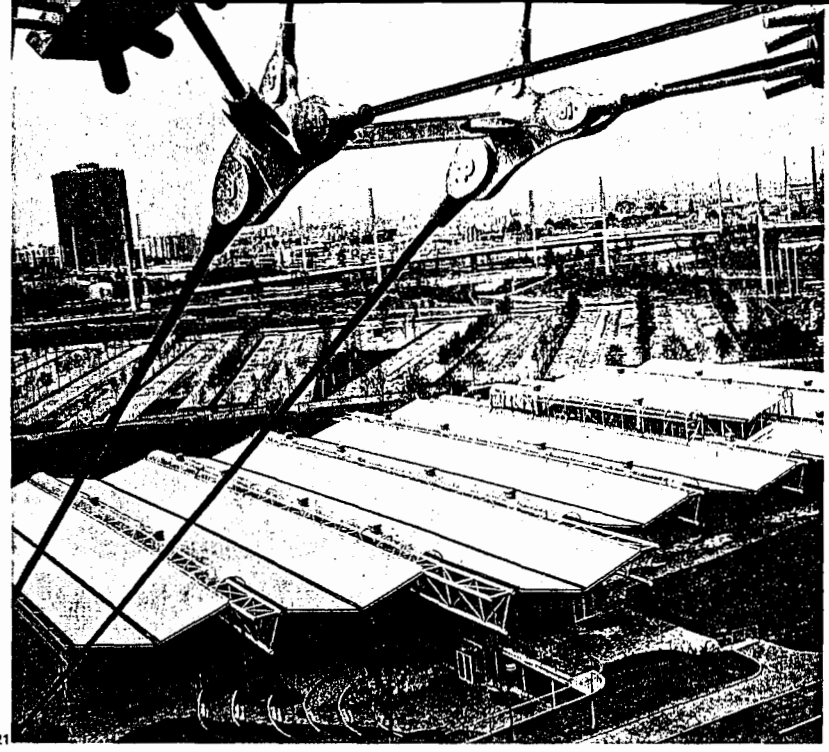
Sulzbach 1984

In later halls, the pavilion returns, but it is combined with a lower subsidiary element for entry and changing, under a separate small-scale structure. Both structural order and hierarchy of organisation become clearer. The hall at Sulzbach of 1984, and the recently completed hall at Bruchsal, are similar both in conception and appearance.

At Sulzbach, there are three structural zones. The main span is achieved by 20 m trusses forming 5 m bays, and the truss depth is kept above ceiling level by neatly incorporating each truss within a projecting glazed skylight (an idea pioneered at the larger hall of Sindelfingen described below). The clear span is extended to 23 m by carrying the trusses at one end on a series of T-shaped portal elements as at Lorch, again tensioned along the outer edge, beyond the glass envelope. This is the second structural zone, but it does not produce a clear division of the internal space, for the horizontal ceiling runs through uninterrupted. It is a clever arrangement, for the portal structure carries the flat roof out to a delicate thin edge, presenting a pavilion-like appearance to the sports field to the east which it fronts. The deep roof overhang and spectator gallery limit solar penetration to a low angle. White internal roller blinds can be unfurled to reduce the low winter sun.

At its rear end, each truss is taken vertically by a column, and beyond this is the third structural zone, an independent lower and smaller-scale system of trusses which runs along the back of the building and the approach side, covering entry, foyer and changing arrangements, and even allowing itself to be skewed around in celebration of the corner entrance. Timber is used for the smaller spans, even between the main trusses, while white-painted steel elements take the larger loads. This treatment intensifies the reading of structural hierarchy. The layering of elements is also explicit, going as far as the exposed plywood roof deck. The combination of materials provides a warmer and acoustically softer environment than the all-metal surfaces of Rothenburg or Waiblingen.

Sulzbach combines the accumulated ideas from the earlier halls in a fortunate way. The simple flat ceiling achieved by pushing the structure up into the rooflights seems more harmonious than the clutter at Lorch, while the pavilion image has the same noble simplicity seen at Rothenburg. Not a trick is missed in the manipulation of the ground level,[5] which helps greatly in differentiating the four sides. The lower level to the east gives a generous view from the open side of the hall, sets the spectators at a suitable level, and produces the large-scale pavilion elevation seen in long view from the field. The west-facing back with its two roof layers is opaque and protective, but also more gentle in scale, since the ground is raised here to internal upper floor level. On the north, facing the approach road and adjacent schools, the ground ramps down towards the corner entrance both inside and out, and the glazing follows the slope dramatically, increasing awareness of the way the whole volume is carved out of the ground. On the least important south side, the slope runs the other way to provide access at basement level. This is not seen from inside, for a solid end wall terminates the space, relieved only by glazed corners and clerestory. This slab-like element provides a backdrop for activities orientated on the long axis of the hall, besides reducing the solar gain. A turret-like retaining wall at the south-west corner reconciles the two ground levels.



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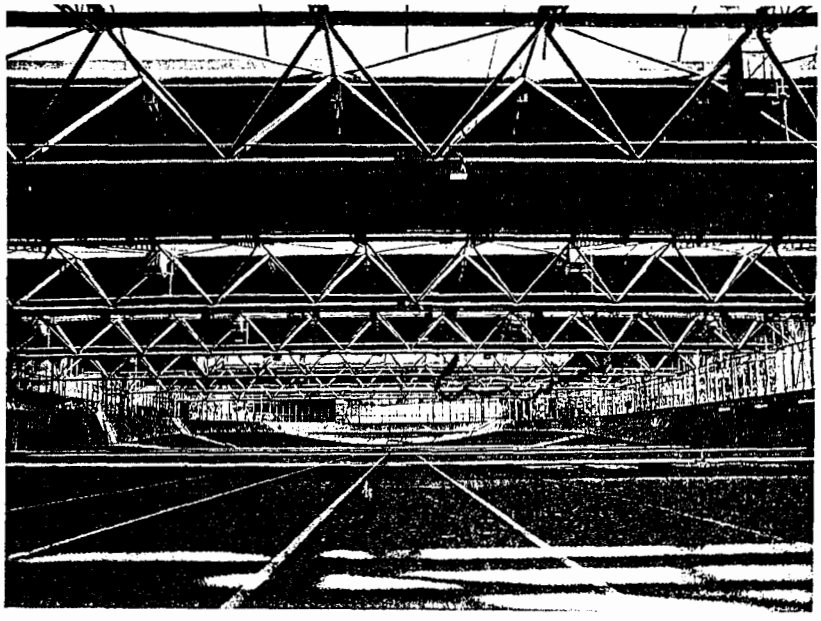

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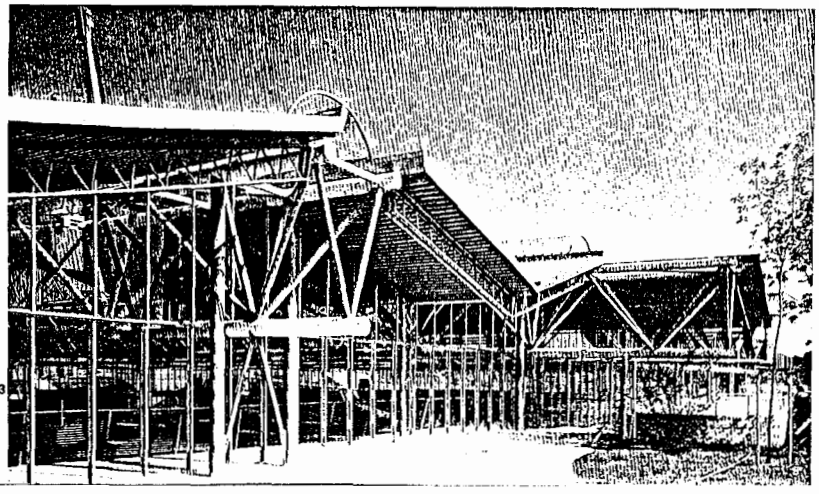


23

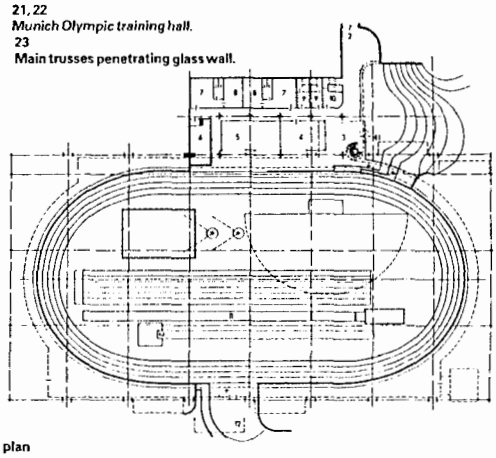
Larger halls – training and warm-up hall at Munich 1972

With larger halls the structural problems of creating clear spans becomes more acute, and the hardware involved more obtrusive. The impact of the whole building on the landscape tends to be greater, and the potential disparity of scale between major elements of the building and the single human being is also increased. The two halls considered here, Munich and Sindelfingen, both have spaces defined by semicircular-ended running tracks, and involve clear floor areas of 90 × 45 m and 77 × 40 m respectively.

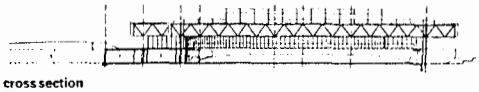
The Munich training hall is part of the whole Olympic complex designed by Behnisch & Partner between 1967 and 1972.[6] This was the first time the Olympics had been held in Germany since the infamous Berlin games of 1936. The architecture chosen was thus in conscious contrast to the ponderous monumental treatment of Hitler's architect, which had been intended to demonstrate the might and power of the Third Reich. Behnisch and his partners won the competition with a radically 'soft' proposal in which the major gestures were accomplished by manipulation of the landscape, the formation of artificial hills carved away to produce the great arenas, as with the outdoor ones of Classical Greece and Rome, but in a flowing and seemingly natural unregimented layout unencumbered with formal axes. The visible architecture was then provided by the great cable-net roofs and their compression masts, presented as a strong contrast to the landforms.

The training hall follows the same pattern in a much more modest way; the running track carved out of the ground, the changing and service rooms largely buried on one side. The 52 m span roof is divided into bays of 12.5 m, carried on a series of huge trusses of triangular section, supported on each side by paired steel posts. Over each truss is a rooflight, and a series of valley roofs on secondary trusses are slung between. The structure dictates its own rectangular plan shape, but over certain bays the intermediate roof is extended to provide a canopy. Between this disciplined roof and the groundworks is a skin of glass, which follows the curved running track around the ends of the building, playing against the rectangular system. The great trusses penetrate the glass wall in a suitably dramatic manner.

21, 22
Munich Olympic training hall.
23
Main trusses penetrating glass wall.

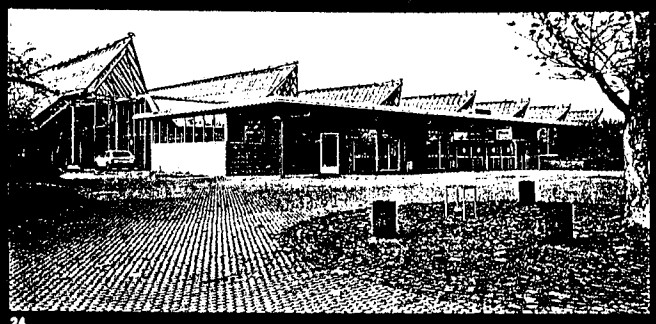


plan



cross section

long section



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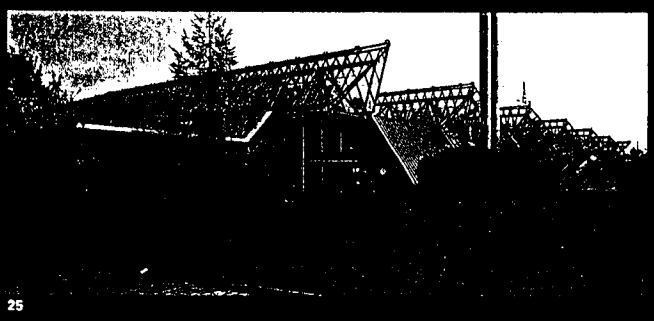

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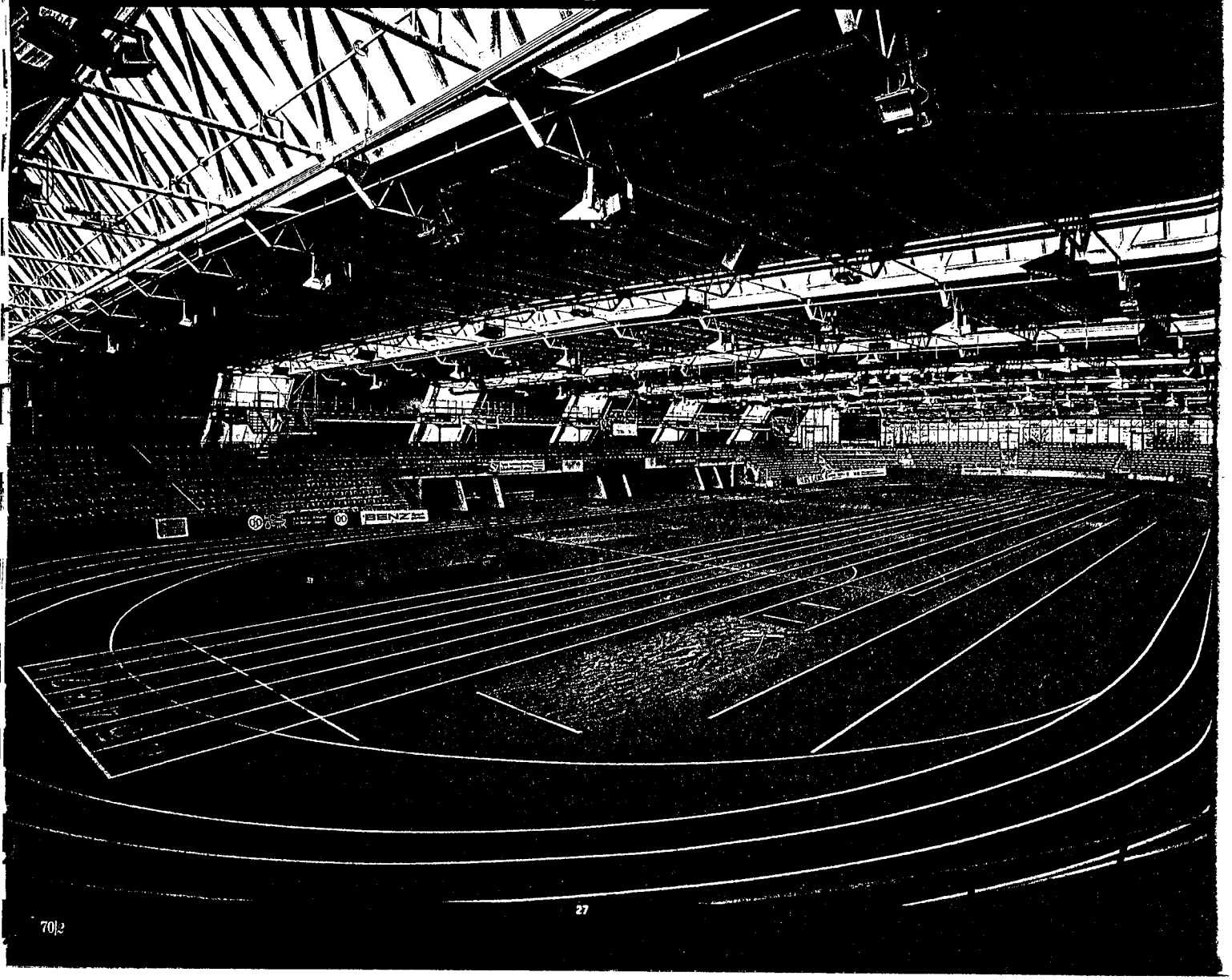

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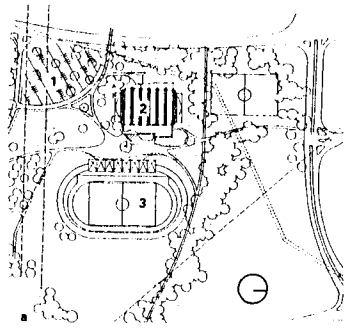
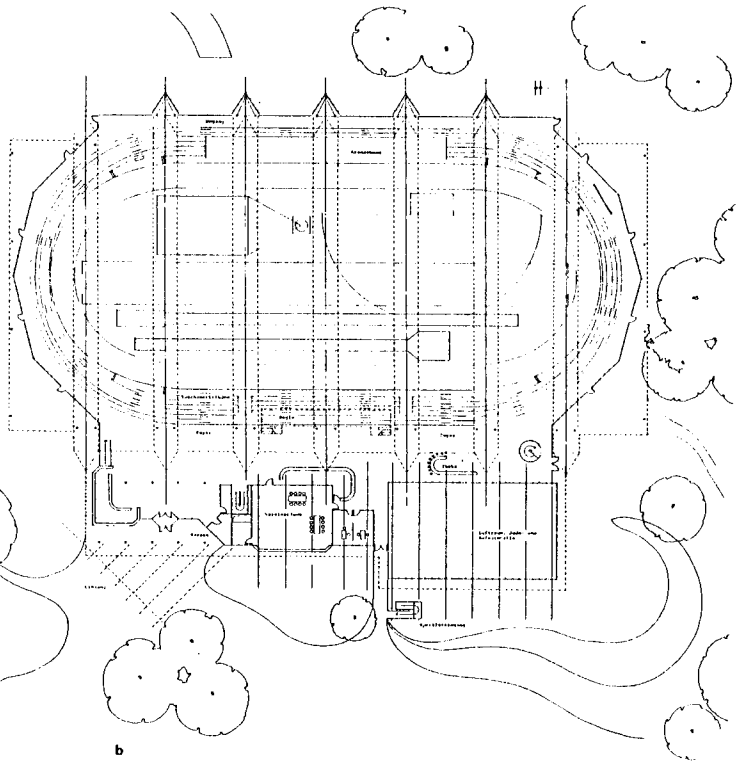


a

Sindelfingen
a, site plan.
1. car park.
2. sports hall.
3. stadium.

Sindelfingen 1977

The hall at Sindelfingen[7] is of similar size and follows the same initial principles as at Munich, but is much more subtle: indeed, it makes the other design seem almost diagrammatic in comparison. It serves a different purpose, being a public arena rather than just a training ground for sports people, and therefore requires large numbers of seats, a foyer, and a far taller space. Again the arena is carved out of the ground like a *Circus Maximus*, again services, many ancillary rooms and even a bowling alley are concealed in the ground. The steel roof structure consists again of triangular trusses, now spanning 54 m, with bays of 13 m, but this time the trusses are inverted and projected upward into rooflights, while the intermediate roofs are flat. This produces a far gentler ceiling inside and a surprisingly even quality of light, seeming bright even on a dull day. On the outside it produces a dramatic sequence of fin-like elements which help give the building a recognisable identity and reveal its scale. Unlike the Munich example, the truss ends are treated asymmetrically in sympathy with the programme, for on the west side banks of spectator seating just need to be contained and there is no reason to see out, while on the east side the arena must open itself to foyer and entrance. So the west ends of the trusses are cranked over to meet the ground, and the roof treatment carried over into a mansard-like side wall. At the east end each truss is carried on a pair of steel posts, and the main roof gives way to a lower, lighter structure for entrance and foyer. In recognition of the plan shape of the arena, the end trusses are shorter, and the curves of the spectator seating are covered by a low roof, a variant of the secondary structural system between the trusses. This brings the roof down gently, assuring that the approaches to the building are scaled down and reducing its impact in the landscape. It is astonishing how gentle it all seems when one reflects on how big this building really is.



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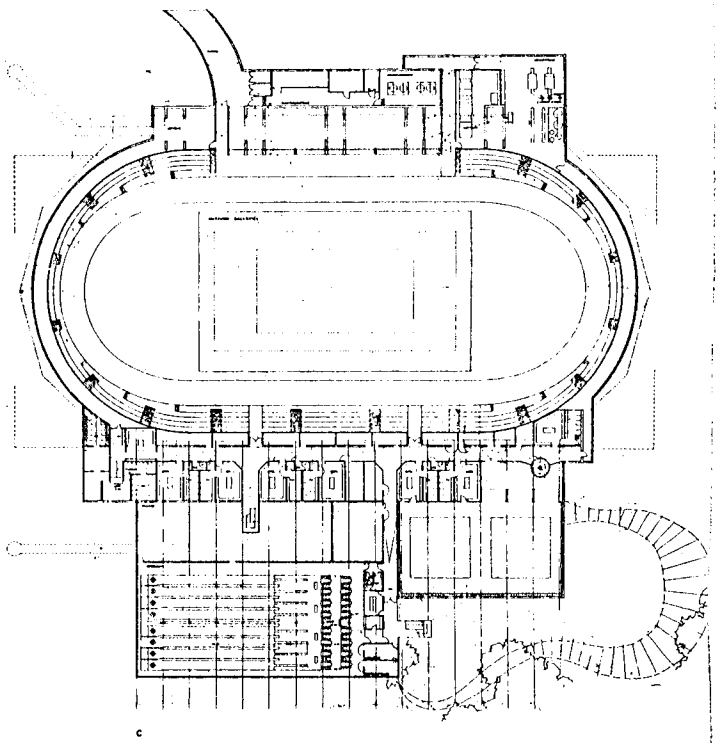

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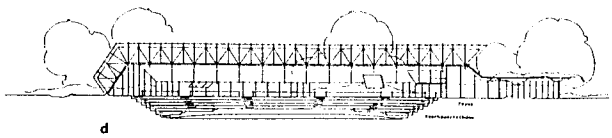

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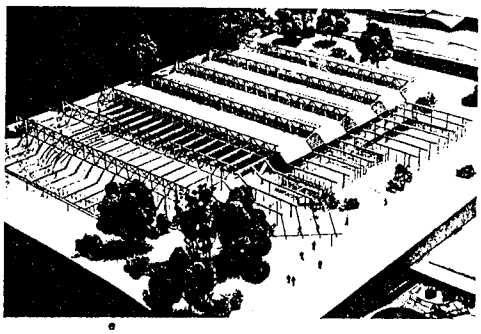

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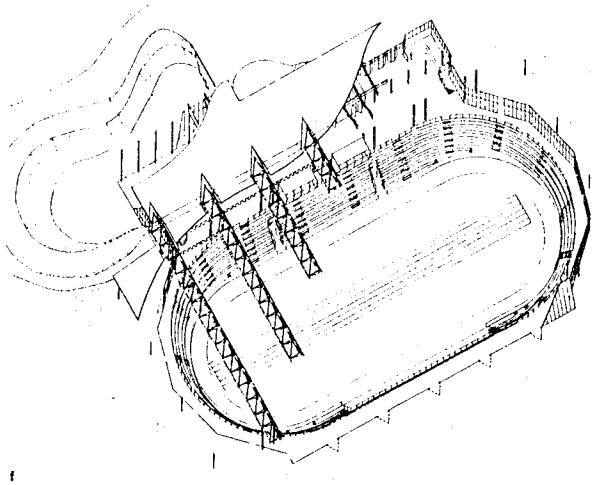
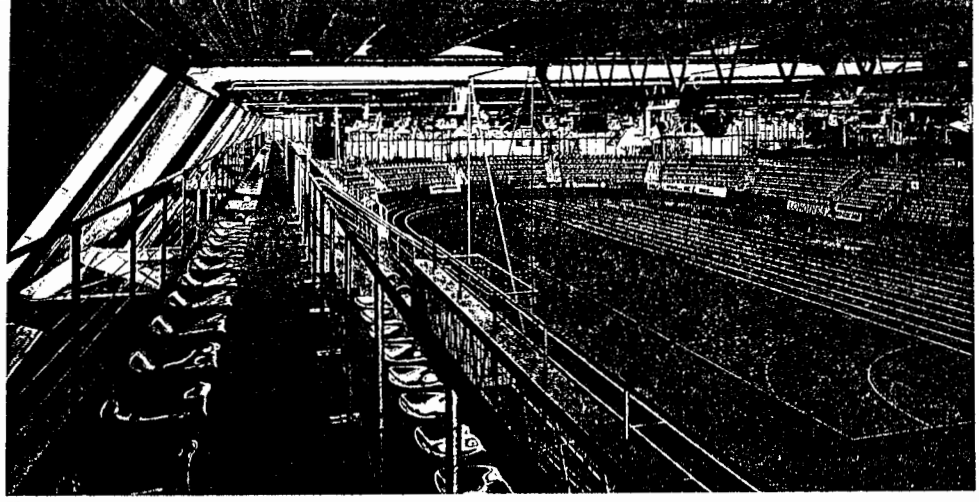


f

b, upper level plan.
c, lower level plan.
d, cross section.
e, model showing roof structure.
f, isometric.



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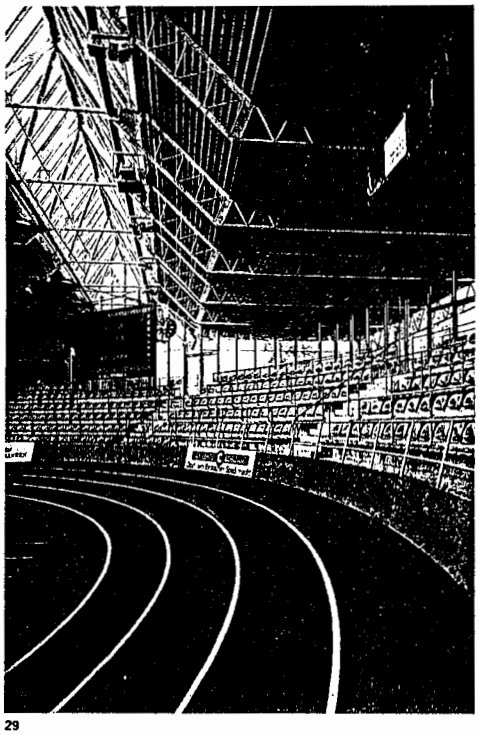


29

28
Sindelfingen, view from the top spectators' gallery.
29
View from running track.

Footnotes

1 Behnisch & Partner have not published a complete work list, but from publications and exhibition catalogues, I have compiled the following: Steissling 1966, Radolfzell, Oppelsbohm and Schwenningen 1969, Rothenburg and Waiblingen 1970, Munich Olympic and training halls 1972, Dachau 1974, Rothenburg 2 1975, Lorch 1976, Sindelfingen 1977, Ludwigsburg 1979, Reutlingen 1982, Herrenberg 1983, Sulzbach 1984 and Bruchsal 1989. These are completion dates.

2 Usually achieved by fitting a pane of acrylic sheet in the glazing where a beam comes through, dividing it and cutting each half to the shape of the beam, then sealing the gaps with translucent mastic.

3 For an account of the same development of ideas in school buildings see AJ 24 September 1986.

4 AR June 1985, pp46-56.

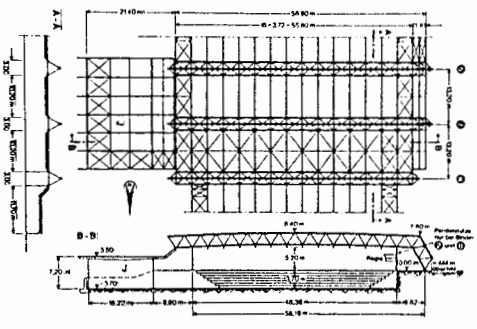
5 Because of the high water table, the ground around the Sulzbach hall is mainly built up rather than dug in, but the effect is similar.

6 Behnisch & Partner won first prize in the competition of 1967 with a complete design including the cable-net roofs which have always been the most prominent part. Frei Otto was involved only as consultant on the development of the idea: engineers were Leonhardt and Andrä.

7 This hall was the result of a competition in 1967, though in the eight-year delay before building both programme and design changed radically. Constructed 1975-77.

8 Its origin is explained in a fascinating essay by Utzon in the '60s annual *Zodiac* volume 10.

structural system



Conclusion

Throughout the work, even the very earliest halls, there is a sense of spatial progression; that how one moves through a building and is led from space to space has been consciously controlled and orchestrated. It gets better in the later examples, where there was more design freedom. The dominant subjective impression is, however, of an inspiring lightness: lightweight structures with plenty of daylight flooding in, offer the additional bonus, continuity with the world and nature beyond through generous glass areas. In the later halls, problems of solar gain and hard acoustics are convincingly solved, and the means merely add to the richness of the visual vocabulary. The halls are anything but boxy, quite an achievement when the primary requirement is a rectangular playing space of a certain size. The wide spans make structural considerations important in every case, but the ingenious design of the later roofs reduces this impact almost to the point where the ceiling appears to float on its own. In so many ways the virtue of these buildings lies in how everyday functional problems are turned to advantage.

The building type itself is a relatively new one and requires modern techniques, especially the great spans of the larger halls, so it is hard to see how such buildings could be done in a 'traditional' way: indeed the only Classical precedents seem to be the great outdoor arenas and circuses of the Romans, which could hardly be roofed reticently. Behnisch has followed this precedent to some extent with groundworks, while providing some contrasting skyworks detached through the transparency of glass. This contrast is a rich twentieth-century theme, most dramatically exploited in the works of Jørn Utzon,[8] and pregnant with possibilities for the future.

Over a quarter of a century the Behnisch office has gradually moved from a rigid and repetitive architecture based lagely on disciplines of construction to a much more open and responsive approach, fitting the building to its site and orientation, articulating parts of the accommodation, and varying the perceived scale. The interest in structure and construction has remained, but the vocabulary of materials and colours has become more catholic, and a new visual richness has emerged through exploiting the hierarchical layers of construction. Thus tectonic qualities have persisted and even improved, but much else of a place-making character has been added to enrich the work and lead it away from the sterility of the initial diagram. Perhaps the so-called High-Tech architects could learn something here, for some of them are still pursuing remarkably banal and autistic design strategies, even if detailing them with wit and elegance.

INTERVIEW WITH Mr. HALIME SPORTS AT AUB

Dec 3rd 1991 Athletic Department

Sports at AUB had undergone many changes in the past fifteen years. Prior to the war, the University had a considerable percentage of foreign students who showed enthusiasm for sports due to their socio-cultural background. In fact, they were examples for Lebanese students to follow. At that time sports facilities at A.U.B were limited; nevertheless, there were better athletes who had set records on a national scale.

During the war, interest in sports among students and faculty dropped drastically. This attitude was faced by the Athletic Department by improving the existing facilities like the construction of four outdoor tennis courts and the addition of new facilities for new sports. As a result, this improvement succeeded in raising the interest of students in sports.

Since then the number of students using sports facilities has been improving constantly. Presently, there is a large number of students who are practicing sports; however, the quality of athletes that existed before the war has dropped sharply. Thus, there are no record makers any more.

If asports center is to be built in AUB, it should include the following facilities:

- Gymnasium with a multipurpose court and a seating capacity of a minimum of 4,000 spectators.
- Practice court.
- Swimming/Diving pool.
- Combative room.
- Aerobics room.
- Body Building room.
- Archery.
- 3 Indoor Tennis courts.
- 4 squash courts.
- Medical Screening.
- Administration.
- Storage.

As for sports that are located in West Hall (like Marshal Arts Table Tennis and Aerobics); they should be definitly remouved from there because West Hall is a student uniun bldg not a sports center

end of interview

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* Interview with Mr. Halimi (director of athletic dept.)

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