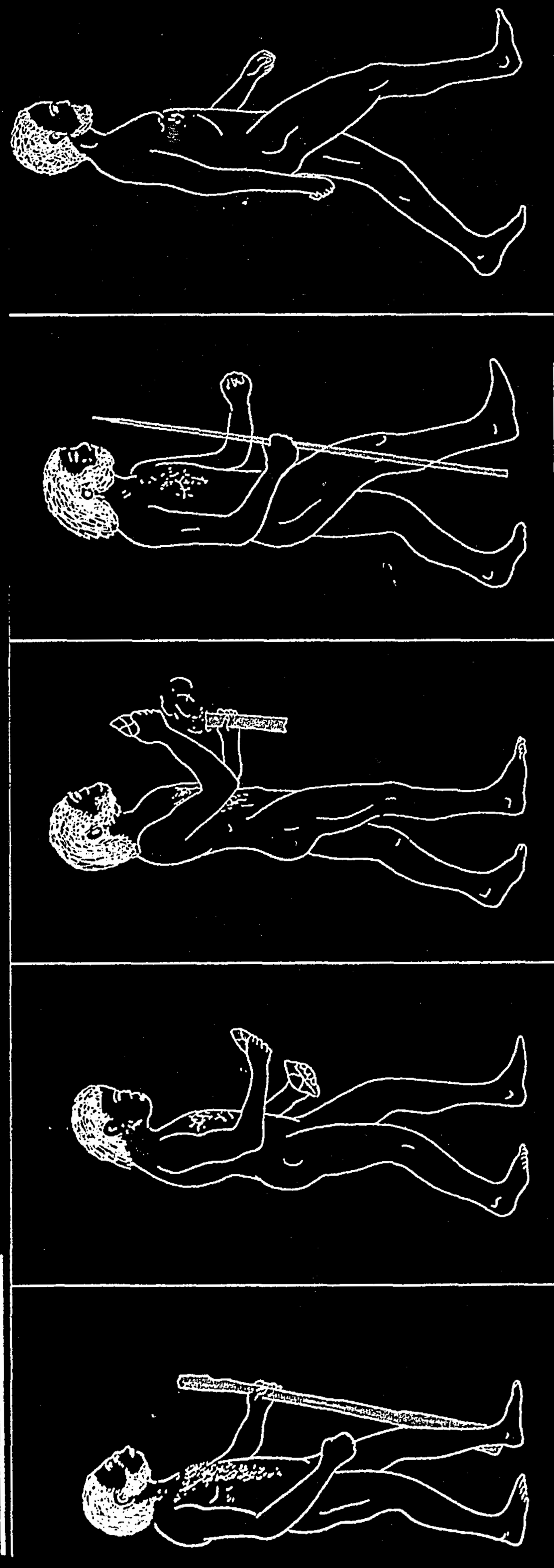
FINAL PROJECT RESEARCH 1998

Research And Development Institute

RAMZI RAHAL



RESEARCH....

DEVELOPMENT.......

EPSn
350

CONTENTS:

CONTENTS

Design Methodology

SKETCH DESIGN:

-Basic approach.
-Volumetric
-Space division/layout
-Organizational aspects
-Sustainability/Maintenance/Building age
-Final draft

BIBLIOGRAPHY

The State Of Agriculture In Lebanon:

*The public sector in Lebanon produces seed for the major crops of cereals, lentil and chickpea. The private sector imports and produces the seed and other propagating material of vegetables, fruit trees , ornamental and other crops. However , the bulk of the Lebanese seed production is in the informal sector (farm-saved seed and farmer to farmer diffusion). There are no restrictions on private investment in the seed business in Lebanon, but there is no enforced seed law or policy.

A seed law was written in the early 1970's, but was never enforced because of the war. Most of the seed in Lebanon is imported and general trade laws apply to seed. Locally-produced seed is not governed by any special law. The rules apply more specifically to import and export provision.

Few are the institutes in Lebanon that are directed towards research and development. The Lebanese Agricultural Research Institute ARI, The AUB Farm, and the USJ and Lebanese University programs, ~~other than these there exist~~ satellite centers for ICARDA, ~~and centers for~~ companies mainly oriented towards commercialism. The agricultural sector trade amounts to 28 million US dollars.

The people involved in this sector are governmental personnel , scientists , merchants and farmers. The breeding organization, which under certain circumstances may be limited in its activities to the screening of internationally available varieties and the maintenance of certain cultivars, supplies the starting material or base seed to each seed station. The seed station then propagate and distribute the quality seed or the certified seed via sales organization to the farmers, under government supervision.

This summarizes the agricultural condition in Lebanon , within which the creation of such a Research and Development facility a necessity . Whose scope governs the Mediterranean basin. The institute sets the enhancement and development of specific plants, the development of farming techniques and the creation of quality and wild life seed banks as target to be achieved. This in addition to some personal prejudice towards two aspects of the project , technology and complexity of space formation on one hand, the creation of a place to harmonize with nature and the curiosity to investigate such type of architecture which I haven't been exposed to before were major triggers in the selection of this project.

However other issues arise while researching the project , and the more exposed to it the more elements of interest arise, these are to be dealt with throughout the document.

WHAT IS ICARDA?
ICARDA is The International Center For Agricultural Research In The Dry Areas, it is one of 16 centers strategically located all over the world and supported by The Consultative Group On International Agricultural Research
(CGIAR).
ICARDA works through a network of partnerships with national, regional and international institutions, universities, non-governmental organizations and ministries in the developing world; and with advanced research institutes in the industrialized countries. Its main research station and offices are based in Aleppo, Syria.

MISSION :
ICARDA's mission is to improve the welfare of people through research and training in dry areas of the developing world, by increasing productivity and nutritional quality of food, while preserving and enhancing the natural resource base.
The environment in dry areas is harsh, stressful and variable, and agriculture in these areas faces more complex challenges than in areas with adequate rainfall.
ICARDA is committed to the advancement of agricultural research; free exchange of germplasm and information for research; protection of intellectual property rights, including indigenous knowledge of farmers; human resources development; the sustainable use of natural resources; and poverty alleviation, particularly among women and children.

RESEARCH MANDATE:
ICARDA serves the entire developing world for the improvement of **barley, lentil,** and **faba bean;** and dry-area developing countries for the on-farm management of water, improvement of nutrition and productivity of small ruminants(sheep and goats), and rehabilitation and management of rangelands. In the West Asia and North Africa (WANA)region, ICARDA is responsible for the improvement of **durum** and **bread wheat**, **chickpea**, **pasture** and **forage legumes** and farming systems; and for the protection and enhancement of the natural resource base of water, land, and biodiversity.

GEOGRAPHIC MANDATE:
The geographic mandate of ICARDA covers the countries of West Asia and North Africa (WANA), including Central Asian Republics(CAR) of the former Soviet Union, as well as developing countries with subtropicaland temperate dry areas. Collectively referred to as "dry areas", these dry areas account for an estimated one third of the world's land.

ICARDA'S regional programs:

-Highlands Program
-Arabian Peninsula Program
-West Asia Program
-North Africa Program
-Latin America Program
-Nile Valley and Red Sea Program

The Research Program:

-Crop germplasm enhancement
-Natural resource management
-Institutional strength
-Production-systems management
-Socioeconomic and policy

PHYSICAL FACILITIES:

ICARDA has a 948-ha farm at its headquarters near Aleppo, in addition to its offices and laboratories. Greenhouses, controlled environment facilities, laboratories :biotechnology, GIS, pathology, entomology ,virology, physiology, seed health, soil physics, soil fertility, food and feed quality and animal health and nutrition; a modern library, a publishing facility(+a graphic arts unit), a photo unit, a typesetting unit, a printshop and finally a computer and biometrics service unit.

WHO SUPPORTS ICARDA?

ICARDA receives its core funding from the CGIAR, which is supported by an international group of donors. Direct donor funding is also received for specific research in a particular country or a group of countries. Donors to ICARDA have included the Arab Fund, Australia, Austria, Canada, China, Denmark, Egypt, the European Commission, FAO, the Ford Foundation, France, Germany, IDRC(International Development Research Center), IFAD(International Fund for Agricultural Development), India, Iran, Italy, Japan, the Netherlands, Norway, OPEC(Organization of Petroleum Exporting Countries), Spain, Sweden, UNDP, UNEP, the United Kingdom, USAID(United States Agency for International Development), and the World Bank.

FOR the RESEARCH and DEVELOPMENT satellite center for ICARDA IN BEIRUT?

A new program is to be initiated :**The Mediterranean Basin Program**.

This program is to include along with the already stated aims of the ICARDA an expansion of the research and development section in Aleppo, by the addition of two major branches through a satellite center in Lebanon (Beirut outskirts):

1-Basic Research Branch

2-Applied Research Branch

The first will deal with basic experimentation which are related directly to different institutions(educational, governmental as well as public and private institutions)- such research usually gets funding through applying to competitive grants-

- The second -the applied research section-has a main target of working on leguminous plants in the Mediterranean basin. This section is composed of several sections dealing with different projects, some set by the institution , others guided by scientists whose projects get adopted by the institute-these get direct funding from organizations and governments.

PROGRAM OF REQUIRMENTS: *list of functions, operations, design criteria for these functions, space needs, projected staffing and equipment needed in the building.*
**space planing strategy is associated with the development of space function bubble diagrams.*

Four Main Basic Areas :

- **Area of Research.**
- **Administrative Offices**
- **Support Facilities** (Auditorium, Cafeteria , Library, Dormitories…)
- **Service Facilities** (Shops, Boiler, Plant…)

-Area Of Research:

PLACE	# OF USERS	AREA	DESCRIPTION
Gene Bank	2-3	25-->50m2	Controlled storage
Seed Bank	2-3	60m2	Controlled storage
Tissue Culture	1	360m2	growth areas
Cold storage		10--5--(-20)--->3*20	storage
Warm storage and incubator		30m2	storage
Sterile and dust free room		20m2	lab
Chemical distillation		40m2	lab
Radioactive facility	1	30m2	lab
Computer Room	2	80m2	computer lab
TOTAL	8-12	**~755m2**	

-Labs:

Applied Research:		
Genetically modified varieties Labs	(1phd-4assist)	~200m2
Herbicide resistance Labs	(1phd-4assist)	~200m2
Fungal resistance Labs	(1phd-4assist)	~200m2
Insect resistance Labs	(1phd-4assist)	~200m2
Virus resistance Labs	(1phd-4assist)	~200m2
TOTAL	**25 users**	**1300m2**

Detail within each lab:.

Labs:1-3*5=15m2 & 1- 5*9=45m2→60m2
(rooms: staff-15m2-, seminar-20m2-, small office-15m2- ,storage-15m2-, closet, plant-2m2-, preparation-20m2- ,buffer-3m2-)

(# OF USERS is indicative of the # of personnel/or operative people)

Basic Research:

Laboratories	varies	3*15m2 =45m2
Laboratories	varies	2*60m2 =120m2
TOTAL		~165m2
Green Houses	1 to 2 / greenhouse	1/250-->~2500m2

-Administrative Offices:

PLACE	# OF USERS	AREA	DESCRIPTION
Director	1	30m2	Cellular Office
*Offices	10	10*30=300m2	Cellular Office
Secretary	2	2*30=60 m2	Reception
Storage		20m2	Storage
Archives	2	2*20= 40m2	Storage
Kitchenette	1	10m2	
Lounge		20m2	
Toilets		12m2	
Janitorial	2	12m2	
TOTAL	**18**	**~600m2**	

***Offices:**

Fund, Extension, Public Relations ,Accounting ,Marketing ,Research and development, Purchase department.

Support Facilities :

PLACE	# OF USERS	AREA	DESCRIPTION
Auditorium	2	200m2	
Cafeteria	3	100m2	
*Library	4	300m2	
Conference Hall		150m2	
Seminar room		125m2	
Multipurpose		100m2	
Toilets		24m2	
Janitorial		12m2	
TOTAL		**~1050m2**	

***Library:**

(stacks , librarian, counter, reading, archives, closed area, reference, microfilms, multimedia)

Service Facilities :

PLACE	# OF USERS	AREA	DESCRIPTION
Shops	3-5	2*60=120m2	Machine Rooms
Boiler	1	45m2	Mechanical
Plant	2	60m2	Generator
Mechanical floor/s			
Maintenance department:			
1-main office	2	25m2	Cellular Office
2-3support	3	75m2	Cellular Office
3-lounge		20m2	
4-technical	3	30m2	Cellular /storage
Security services	6	2*20=40m2	Cellular Office
Toilets		12m2	
Janitorial	2	12m2	
TOTAL	22-24	**~450m2**	

Dormitory spaces for visitors:

PLACE	# OF USERS	AREA	DESCRIPTION
10 units each consisting of	10	40m2→400m2 total	
bedroom space	1	24m2	/ living
desk space	1	8m2	
kitchenette	1	5me	
bathroom		3m2	
5 units each consisting of	10	60m2→300m2 total	
bedroom space *2	2	24m2	
living		16m2	
deskspace *2	2	12m2	
kitchenette		5m2	
bathroom		3m2	
common lounge / café	2	75m2	
laundry	1	15m2	
janitorial	2	12m2	
storage		9m2	
toilets		12m2	
TOTAL	**25**	**525m2**	

TOTAL:

TOTAL WITHOUT GREEN HOUSES	**~5100m2**
TOTAL WITH GREEN HOUSES	**~7600m2**
Total # of employees	**~100 personnel**

DETAILS:

Tissue Culture laboratory:

a-general.

-electricity supply-emergency generator
-main water
-gas supply
-air conditioning
-chairs and stools
-vacuum/compressed air
-cupboards
-fire extinguishers
-first aid box

-Culture media preparation-60m2
-store room 15m2
-Glassware washing/drying 20m2
-sterilization room 28m2
-cold room 25m2
-shower & personnel 35m2
-collection of explants 20m2
-sterile transfer room 50m2
-growth room 100m2

b-washing-up
c-media preparation and storage
d-culture inoculation and transfer
e-culture incubation
f-culture examination
g-in vivo transfer
h-office
i-store

Ancillary techniques:

a-advanced light microscopy and histology
b-electron microscopy
c-photography
d-culture storage

Genebank:

Two types of In Vitro Genebank:

a-In vitro active Genebank where cultures are maintained under slow growth.(IVAG)

-tissue culture preparation lab
-transfer room (forming embryonic tissues that are transferred to soil)
-propagation room(controlled REPRODUCTION)
-in vitro storage room
-biochemistry(electrophoresis) laboratory
-virology lab
-computer center
-photographic, graphic arts and library facilities
-glasshouses
-screen houses

b-In vitro base Genebank where cultures are cryopreserved.

The spectrum of research activities:

-**BASIC RESEARCH** :is intended to derive new knowledge that may or may not have application. The genesis of basic research is often an inconsistency in a scientific paradigm, which, through experimentation ,results in new knowledge and the eventual evolution of a new paradigm.

-**STRATEGIC RESEARCH**: is undertaken with intention of altering an agricultural system in major ways. An example of strategic research was the breeding effort conducted on wheat and rice that resulted in the Green Revolution. The intention of this strategic research was to alter plant architecture so that shorter plants could withstand higher rates of nitrogen fertilizers. The research had global significance.

-**APPLIED RESEARCH**: is undertaken to solve specific problems identified for an agricultural production system. The results of applied research may or may not be applicable to other locations, but the intention is to obtain targeted answers and solutions.

-**ADAPTIVE RESEARCH**: is site-specific problem-solving, often conducted at the farm level. An equivalent private-sector term might be "product development."

(**MAINTENANCE RESEARCH** :is research intended to protect technology advances once they are gained.)

The Basic ingredients for an agricultural research program are ***people, funding* and *facilities***. It is how they are brought together that makes the difference.

There are four dimensions for an agricultural research system:

- -POLICY
- -PRIORITIES
- -PROGRAMS
- -PROJECTS →targets

Two types of Funding for agricultural research:

- -Award for institutions
- -Awards for individual researchers

Six terms used:

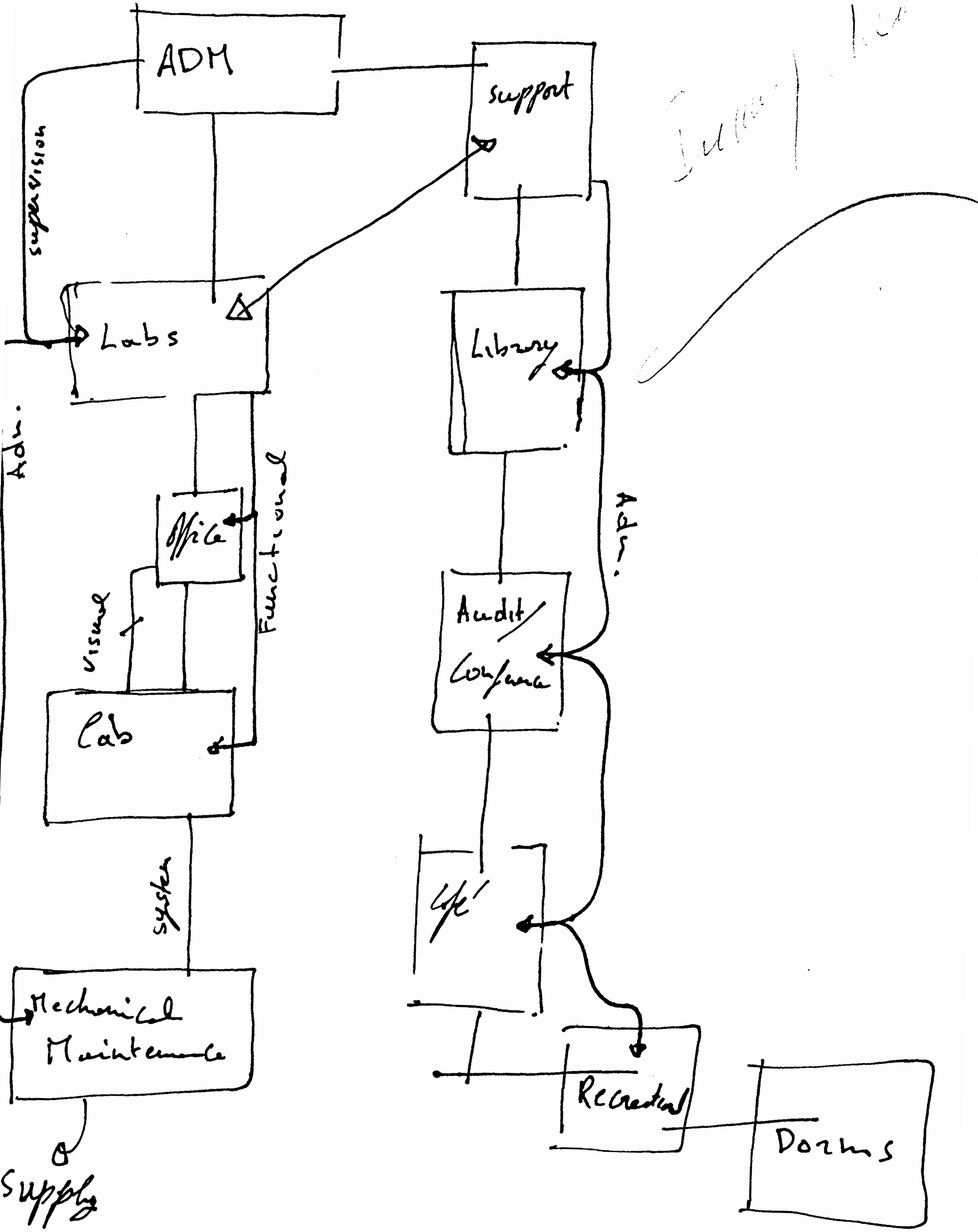
- -Peer review
- -Policy & Funding
- -Research relevance
- -Hierarchical structures
- -Directed research
- -Two-tired review

The division of public and private responsibilities varies by commodity, historical practice, scientific momentum, and the efficiency of enforcing intellectual property rights.

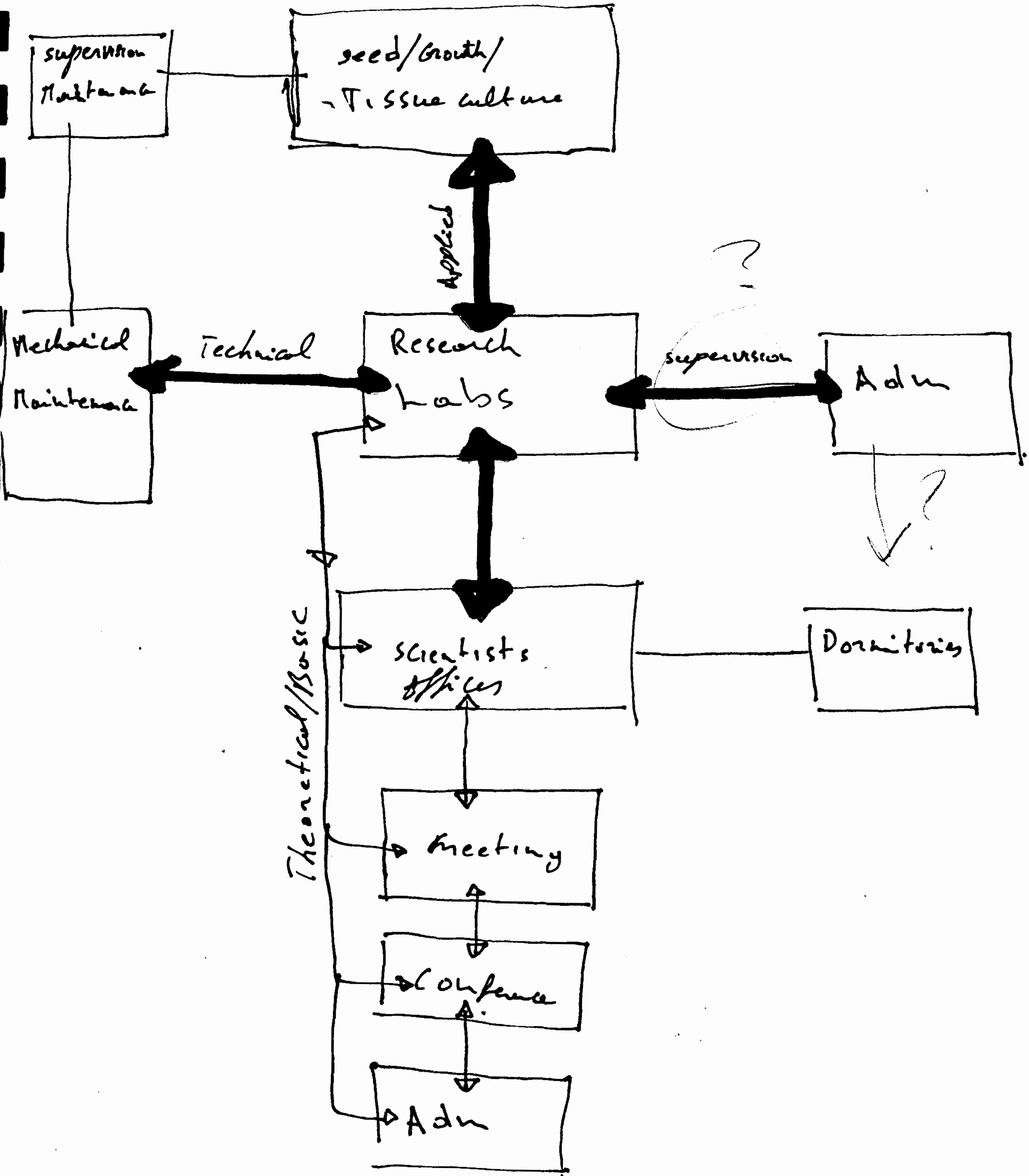
Publicly-funded agricultural research must be relevant to be sustained. It must be accountable, equitable, and responsive to public need.

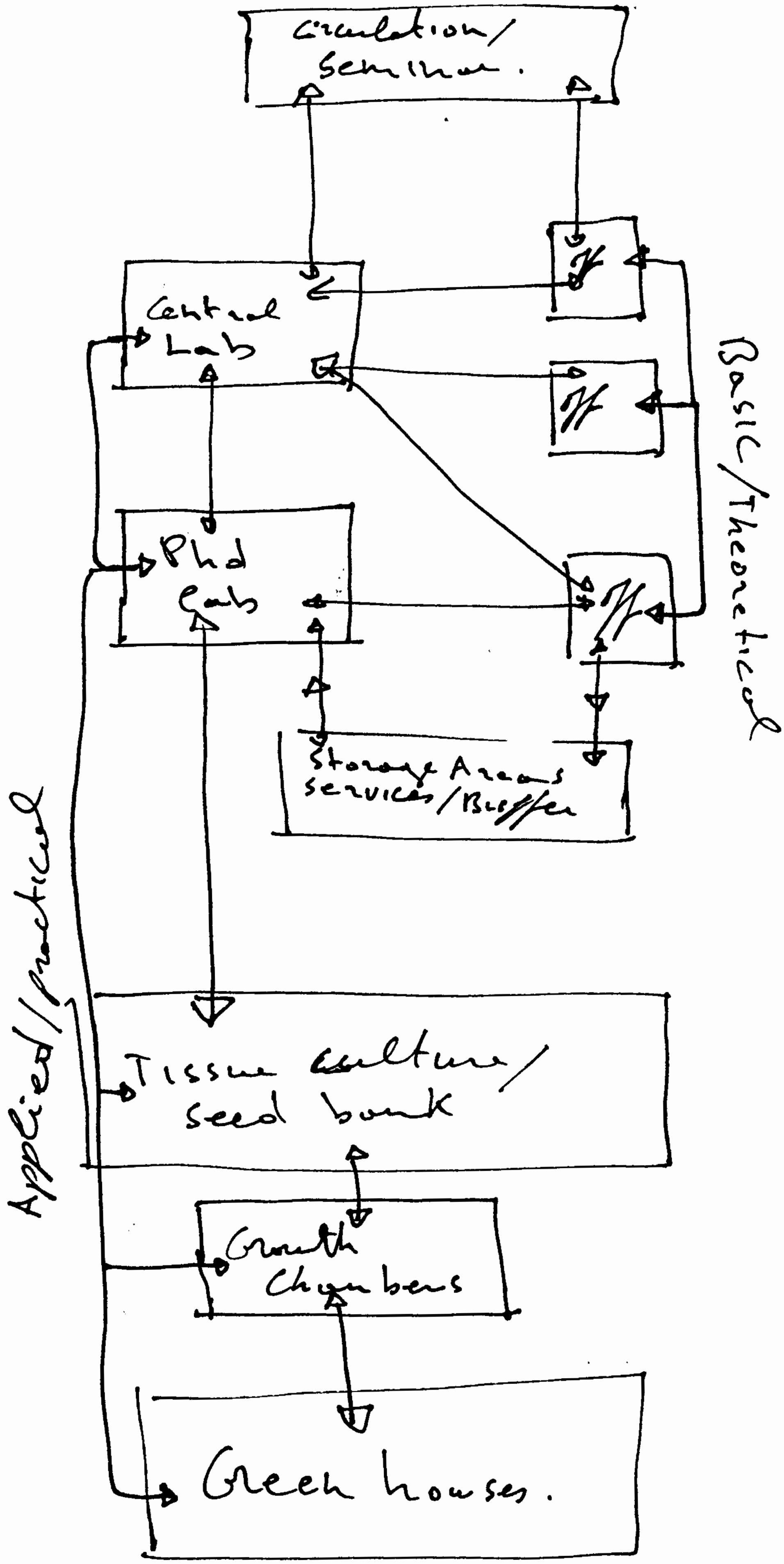
It is within these criteria that the RESEARCH AND DEVELOPMENT INSTITUTE has to operate. Thus the four main components stated before have got to complement each other . The aim is to create places/spaces of high productivity, through proper interaction / casual meeting and recreational spaces without sacrificing the essence of the technological aspects .

Program - Relations.



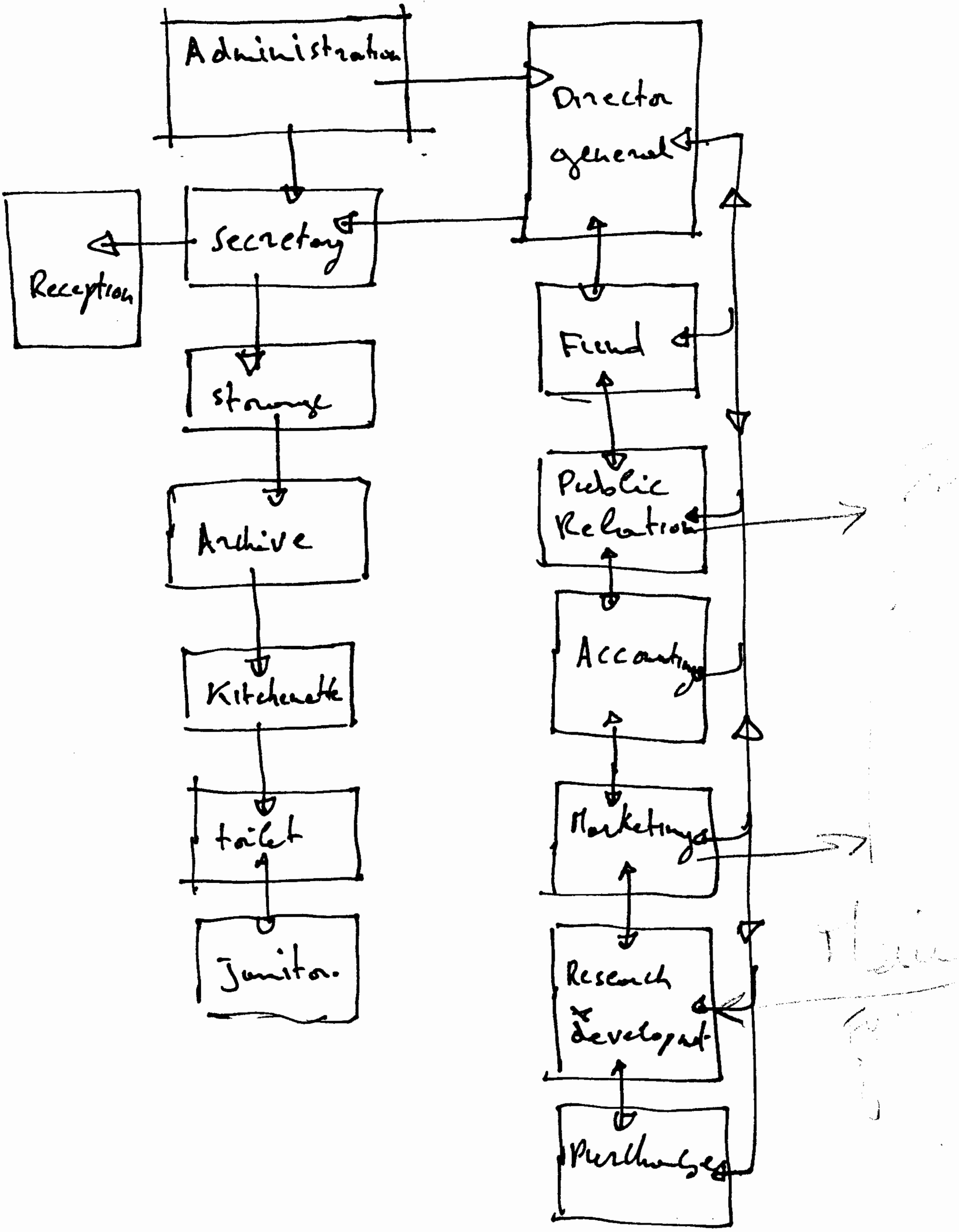
Hierarchy of relations:
From. labs.





circulation/
Seminar.
Central
Lab
Phd
Lab
Storage Areas
services/Buffer
Basic/Theoretical
Applied/practical
Tissue culture/
seed bank
Growth
Chambers
Green houses.

Administration



• TECHNICAL ISSUES:

THE LABORATORY BUILDING:

-The design is highly dictated by the heating, ventilation air conditioning systems and the utility distribution layout. Leading through careful planing to efficiency structural flexibility and growth.

-The research area : the research area of the laboratory is itself divided into several basic elements:

1- desk space
2-bench space
3-many experiments require some sort of controlled environment, with closely regulated temperature and humidity.(these sometimes cannot be accommodated within the research area)
4-Scientist wish to have conference rooms directly associated with research
5-Storage requirements

The relation of desk space with the laboratory itself ranges from being incorporated within the laboratory to being totally separated from the laboratory, four basic types of industrial laboratories:

- The first one places the desk space within the laboratory itself.
- The second places the offices on one side of the corridor and the laboratories on the other.
- The third plan provides core laboratories and perimeter offices .
- The fourth provides a peripheral corridors and interior laboratories.

Musts for research facilities:

-flexibility: Through considering the different possible location and utilization of different systems.(chemical fume hoods)

-capability: to meet various ventilation needs for different functions, to control varying temperatures, meet the need for fume hoods, air supply, exhaust, electric power supply.

-utility distribution: requires a great deal of emphasis. Heating, ventilation, and air conditioning systems and the multiple pipes for the various laboratory services such as water, gas , vacuum, and oxygen create a demand for cubic space as well as floor space, as a consequence there is a need for maintenance and operation engineers and craftsmen who in addition require their own spaces.

the selection of these systems influence the design, configuration and cost of a research laboratory building.

-sanitary piping system-venting(for each fixture)
-acid resistant piping(no galvanized iron or steel) should be applied for all the laboratory building. This system should empty into a neutralization and dilution sump prior to discharge into the sewer.

-domestic water supply system- municipal supply is preferred
-water treatment: a chemical analysis should be obtained. Sometimes water softeners are needed.
-interior water piping-mains should be near the ceiling of the lowest story-no cross connections with waste/drain vent and sewer piping(direct or indirect)-backflow protection.

-distilled or demineralized water-the quality of water determine the type of piping-size of system , tanks should be large enough to assure an adequate daily volume.- stills and demineralization equipment should be located an elevation within the building sufficient to provide gravity flow.-materials of construction, block tin, plastic, glass, aluminum, stainless steel.

-fire protection- standpipes and portable fire extinguishers, in addition to automatic sprinkler system and automatic detector systems.(in some spaces water use is harmful, thus manual or automatic protective systems are applied)

-gas piping-these lines should be sized to provide for expansion of the service and to maintain adequate pressure at the workbench. In general, gas piping should not run in trenches, tunnels, furred ceilings, or other confined spaces where leaking gas might collect and cause an explosion. -Piping materials- black steel pipes within the building, malleable-iron-banded fittings.-valves - should be located at two levels a-building level-b-section level.

-compressed air and vacuum systems-air filters and driers-compressed air must be of high quality, free of oil, impurities and water. Centrifugal compressors are used to provide oil-free air. Air driers are required -pressure at workbench need not exceed 40 psig (need for compressors).vacuum pumps should be connected to the outside for exhaust, with receptor jars to prevent liquids from coming into the pipes- these pipes are made of either copper or galvanized steel.

-hvac systems-heating, ventilation and air conditioning are of primary importance in research facilities.

-electric supply-flexibility and capability are highly needed-emergency sources must be provided .

LABORATORY PLANING

Three types of laboratories are to be used:

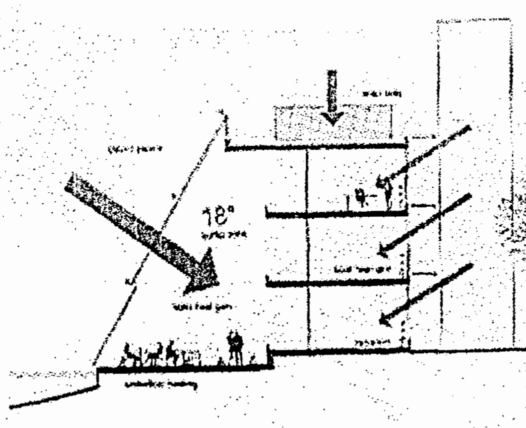
-***Type 1***:are laboratories designed with maximum capability for conversion from one program use to another. These are primarily intended for research in the basic scientific disciplines. The design criteria are intended to protect the integrity of individual research programs from interference by other research within the same structure and to reduce the possibility of infection or toxic hazards to personnel in present or future research projects.

-***Type 2***:these are facilities designed for research support, including such structures as stock barns, animal pens and runways, storage sheds, and utility structures.

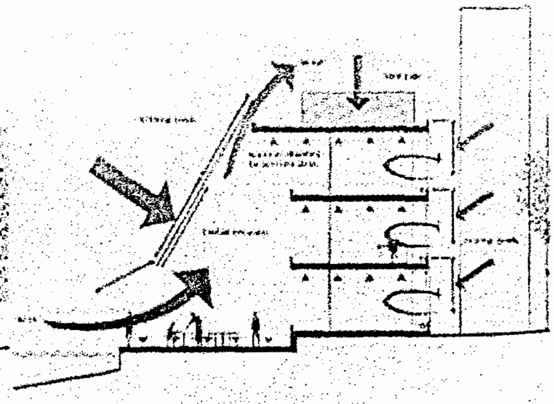
-***Type3***:these are designed for special research functions that require a specialized environment. Their structural provision render them unsuitable for conversion. Their design criteria are determined for each project.

These Techno/mechanical issues bare great impact on the architecture, spatially, functionally as well as formally .In addition to the site constraints they dictate a certain logic of hierarchy within the project, creating spatial relations, that might be guided only by their technical needs. This issue becomes a priority since the proper activity, survival and productivity(not to mention that the life of these institutes is measured by the adequacy of their different systems), are based on these systems proper functioning and maintenance as well as flexibility. A direct consequence on the spatial formation is to be seen in the increased height of lab ceiling(an average of 5.0m), thickness of walls and internal layout and distribution. Thus the creation of transitional spaces, as a hinge between both labs and other facilities. Hence a design vocabulary gets to be formulated, whereby elements are classified into - Technological (labs..)-Technical-Transitional/linkage-Administrative-Support-, with set criteria to determine relations.

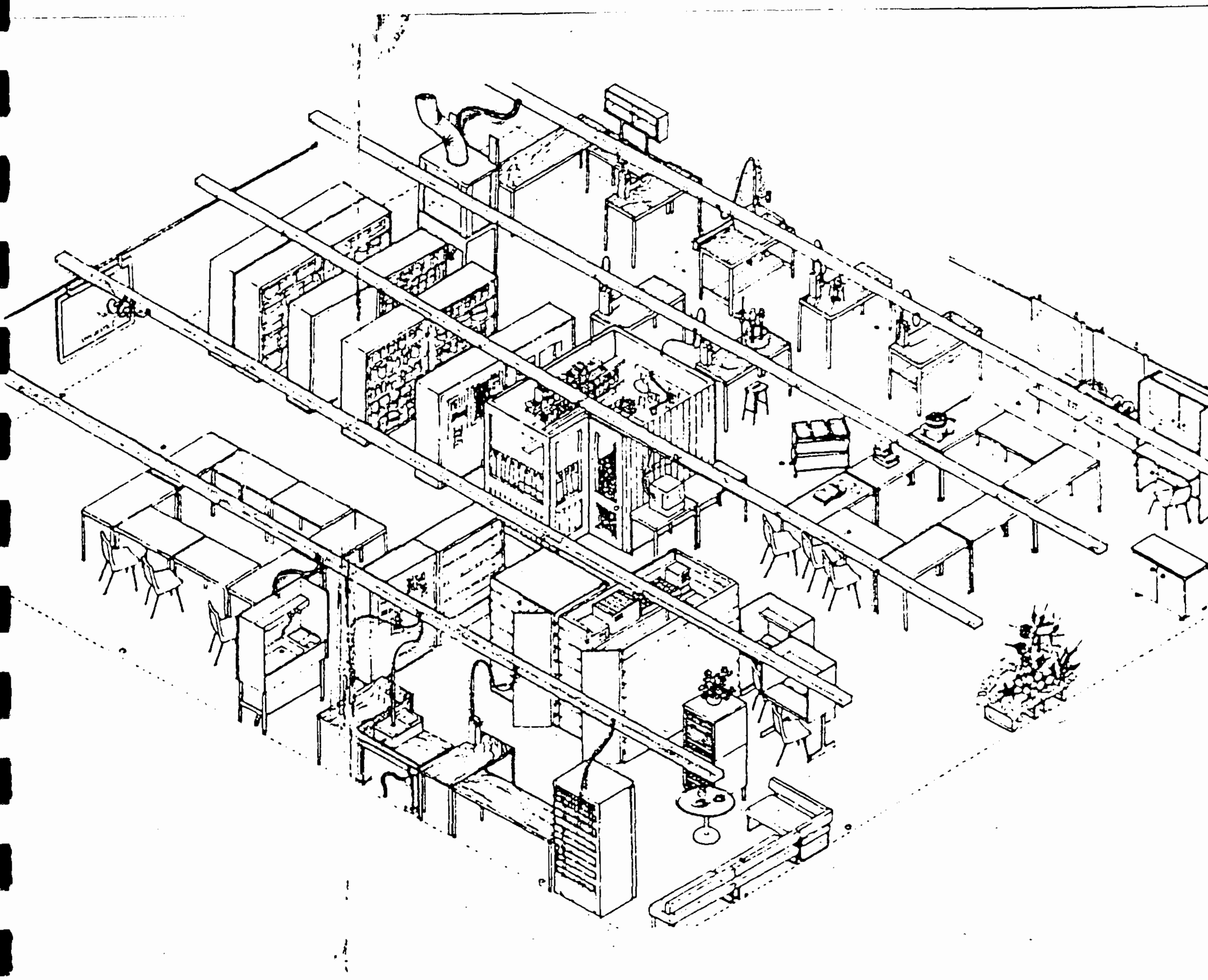
It is within this framework of technical/ mechanical necessities that the design strategy, as well as personal concerns to create a ***place*** *, which though highly technological, yet oriented and addressing the user. This is to be achieved by creating spaces of interaction and dialogue as well as recreational spaces without compensating the main aim of the facility.*

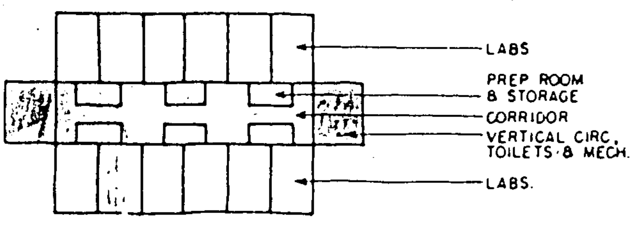


energy management principles: summer day

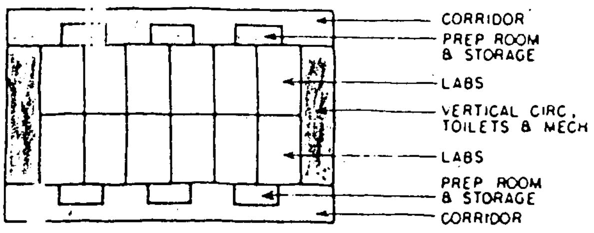


energy management principles: winter day

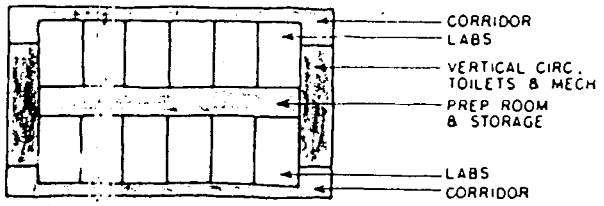




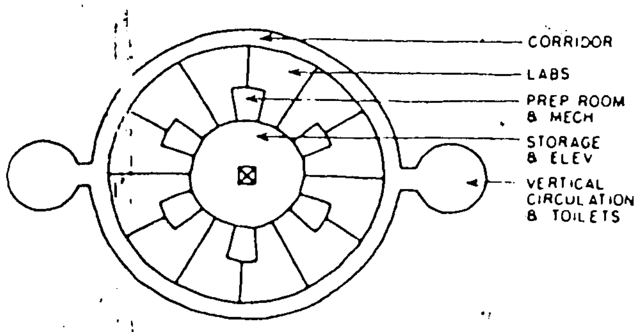
asibility: Structural: Compact plan may reduce cost. Mechanical: Although cores are separated, short mechanical ns reduce cost. Circulation: Double loaded corridors most nomical. Flexibility: Changes may be made easily.



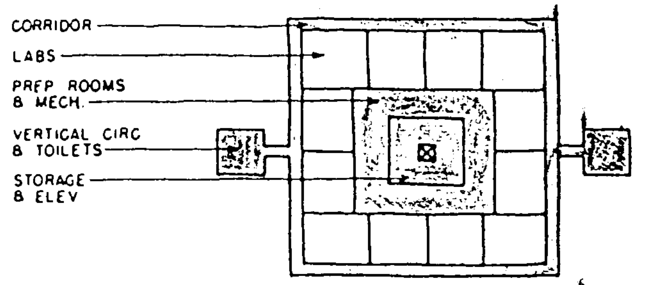
asibility: Structural: Compact plan. Mechanical: Separated es and double runs of ducts, etc. may add to cost. Circulation: Doubling number of corridors is uneconomical. Flexibil- Rooms may be changed and added with ease.



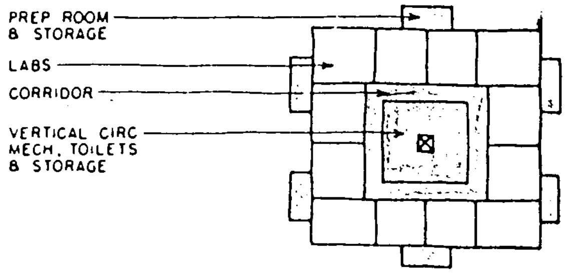
asibility: Structural: Compact plan may reduce cost. Mechanical: Compact system may reduce cost. Circulation: uble corridors uneconomical. Flexibility: Not as flexible as eme above.



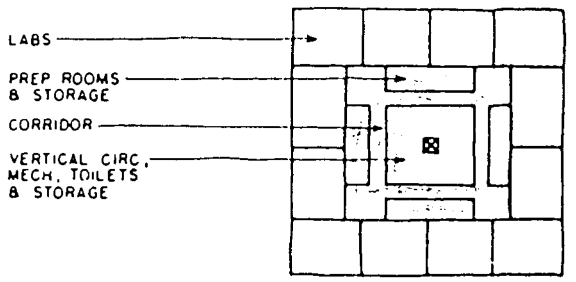
asibility: Structural: Good form for economical structure. chanical: Very compact and economical. Circulation: Ex-



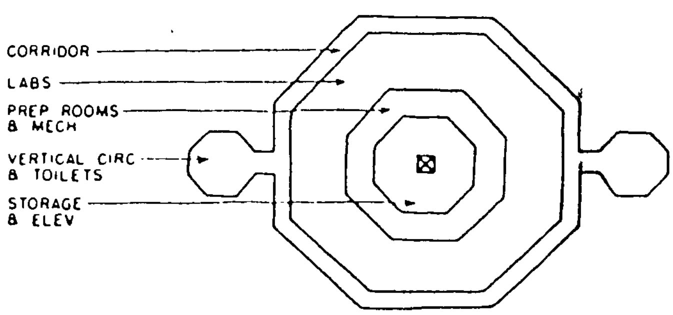
Feasibility: Structural: Economical arrangement. Mechanical: Very compact and economical. Circulation: Excessive corridors. Flexibility: Fair.



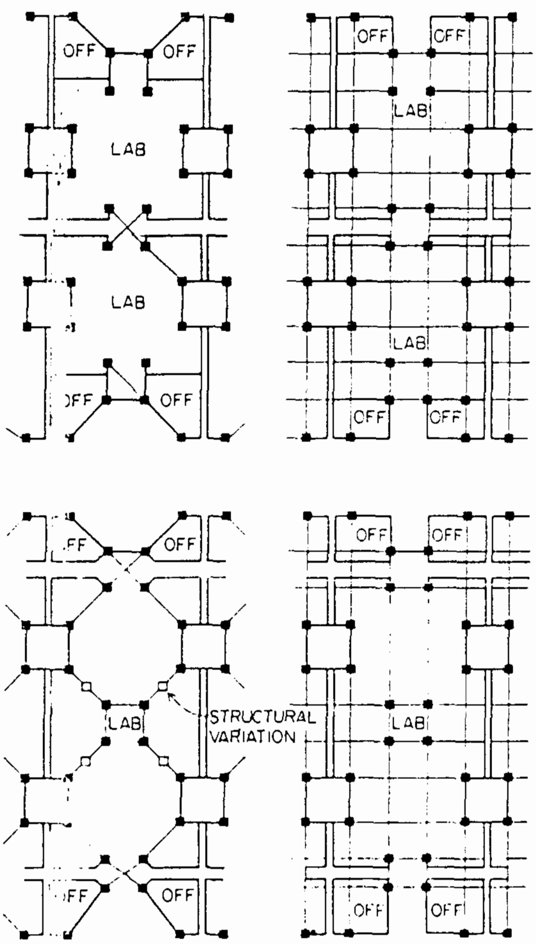
Feasibility: Structural: Fairly economical. Mechanical: Very compact and economical. Circulation: Very economical corridor arrangement. Flexibility: Fair.



Feasibility: Structural: Economical arrangement. Mechanical: Very compact and economical. Circulation; Minimum length of corridors. Flexibility: Rooms changed and additions made easily.



Feasibility: Structural: Economical structure. Mechanical; Very compact and economical. Circulation: Excessive corri-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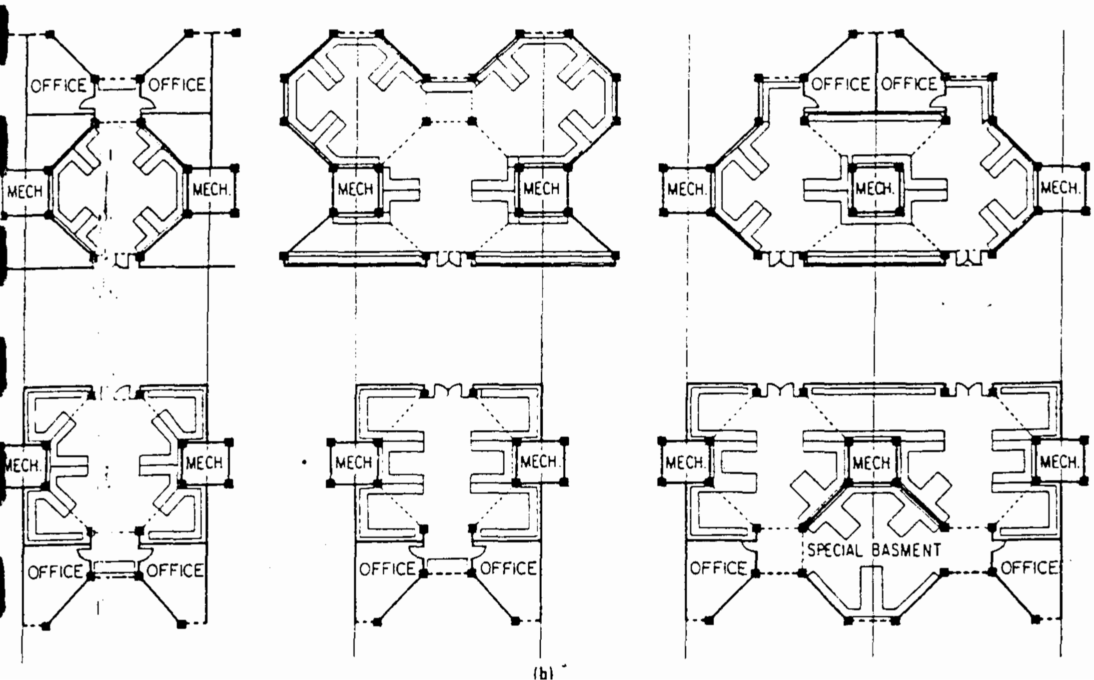
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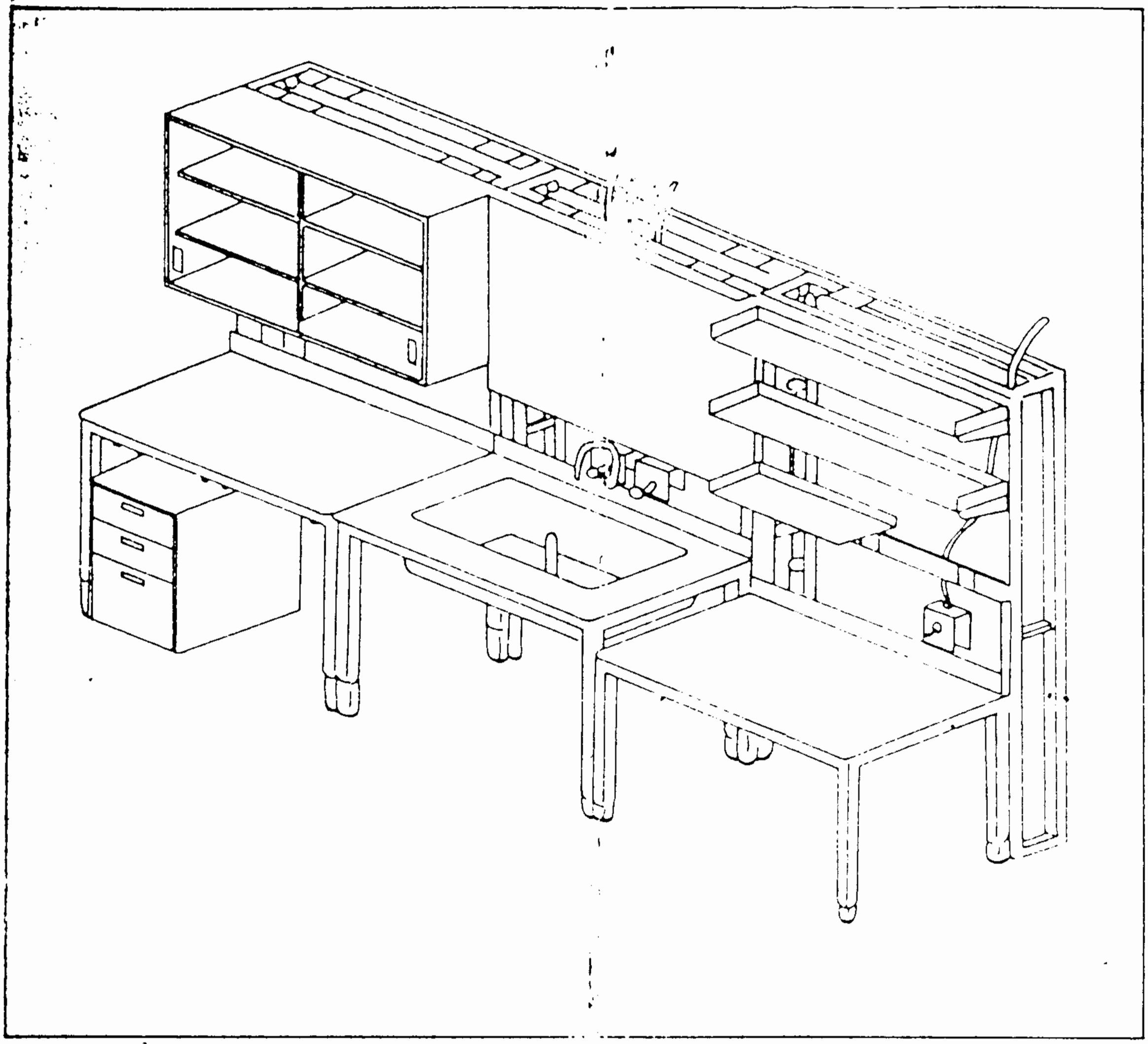
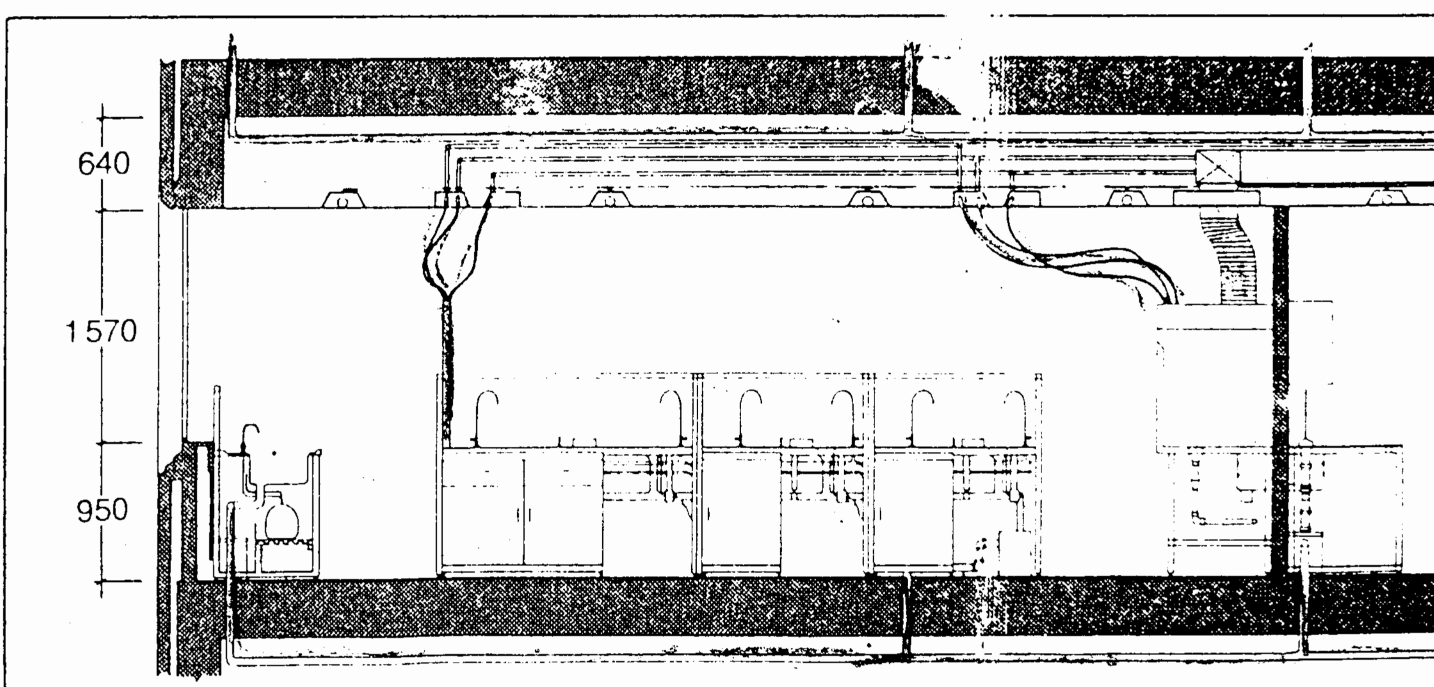
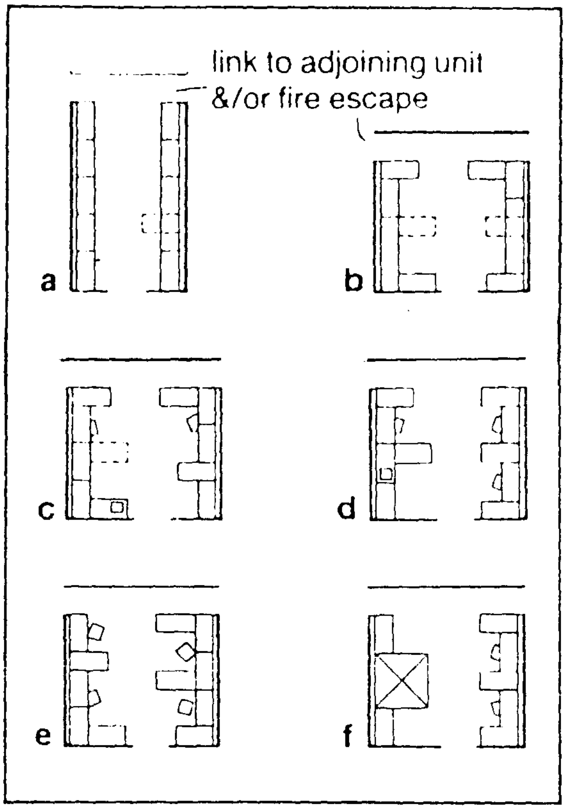
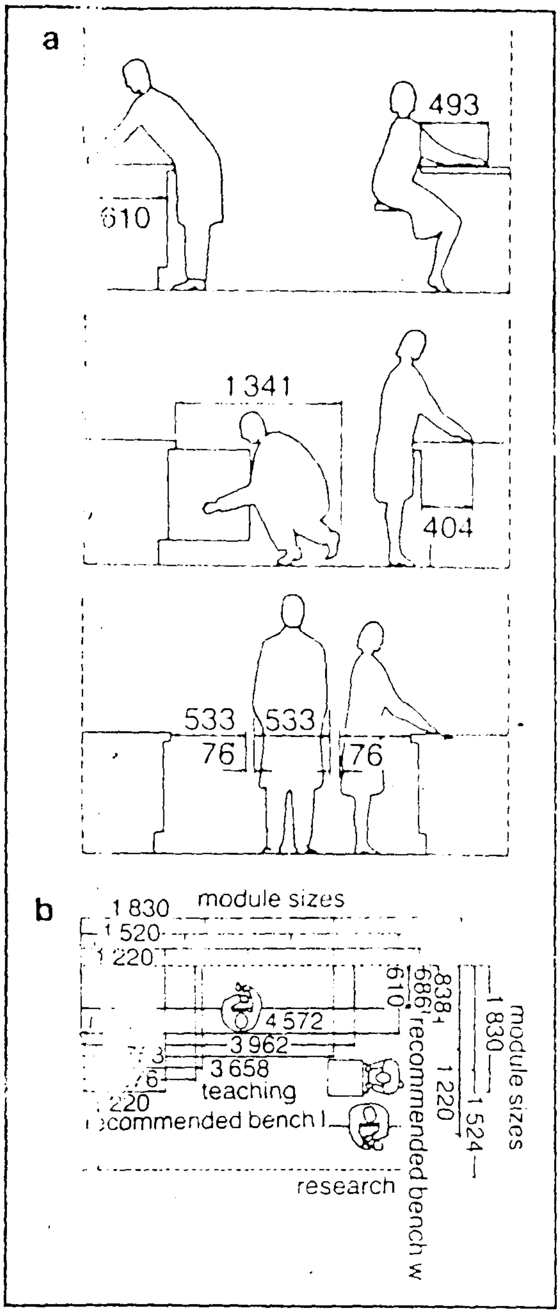
(b)



1 Details of lab benches in science bl::ck Wellesley College Massachusetts USA



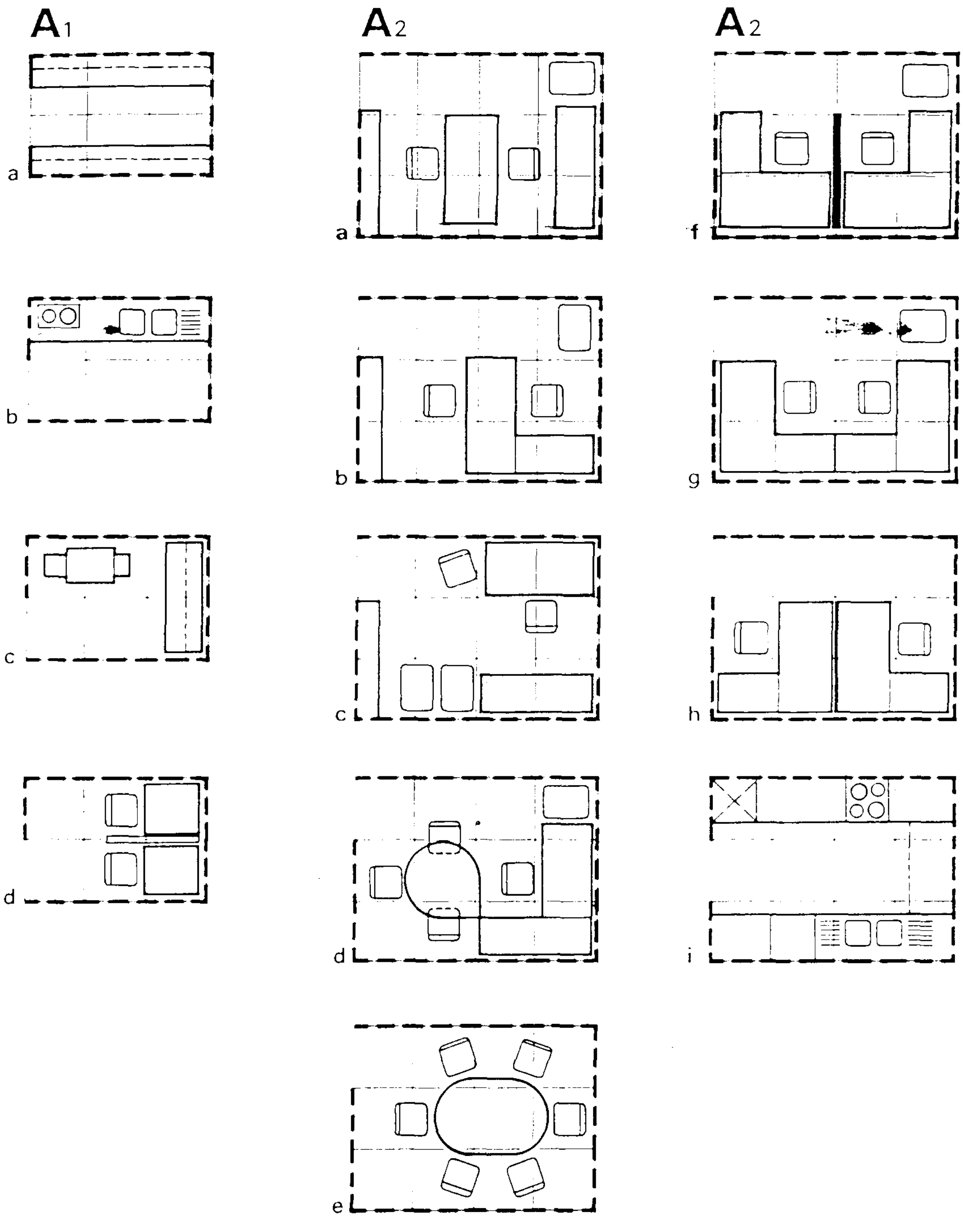




1 Comparison of square & rectangular lab units of equal ar showing greater flexibility offered by square layout **a** rectangular unit (24.8 m^2) **b** square unit (24.5 m^2) **c** 2 workers & shared eqp **d** 3 workers & shared eqp **e** 4 workers & shared eqp in central ar **f** 2 workers & large rig

2 **a** **b** anthropometric data governing bench spacing for both teaching & research

type	bench h	seat h	min w kneehole	min vertical distance floor to under bench
sitting only	700	425	575	606
sitting & standing: women	850	625	575	800
sitting & standing: men	900	675	575	850

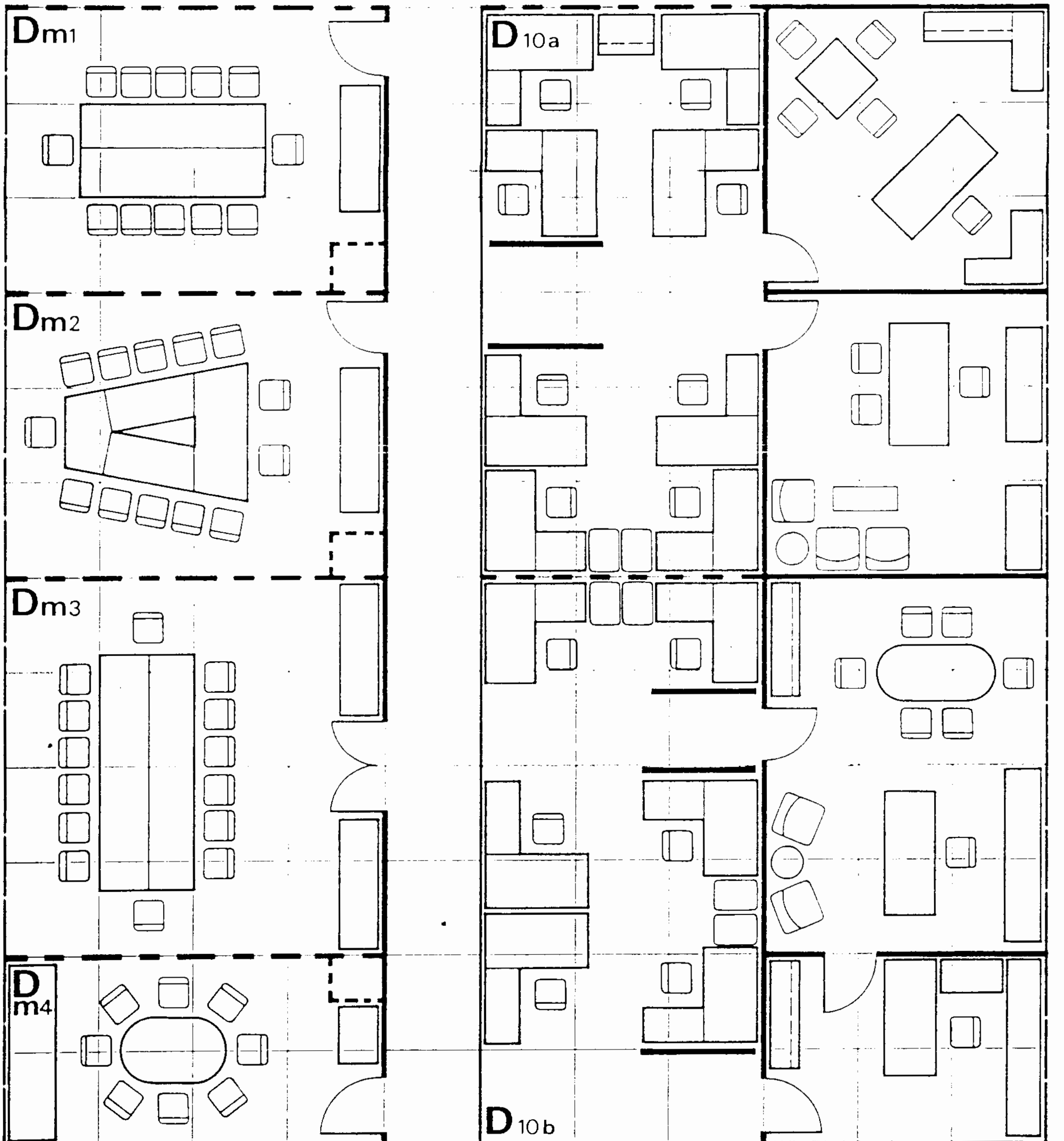


1:100

A1	2.7×1.8m/*8′8″×5′9″* = 4.9m^2/*52ft^2*.
a	Store room.
b	Beverage point.
c	Photocopy room with low level storage and worktop.
d	Telephone room for private conversations.
A2	3.6×2.7m/*11′8″×8′8″* = 9.7m^2/*105ft^2*.
abcd	Small private office 9.7m^2/*105ft^2* per person.
e	6 person meeting room 1.6m^2/*171ft^2* per person.
fgh	Shared office (2 admin staff). Storage of files elsewhere 4.9m^2/*53ft^2* per person.
i	Kitchen, with fridge, cooker and sink.

Note. General densities are rounded off to the first decimal point.

3.19

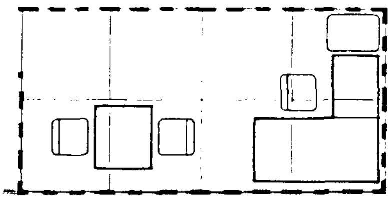


Dm1 12 person meeting room 27m²/*290ft²*, 2.2m²/*24ft²* per person.
Dm2 13 person meeting room 27m²/*290ft²*, 2.1m²/*23ft²* per person.
Dm3 14 person meeting room 36m²/*387ft²*, 2.6m²/*28ft²* per person.
Dm4 8 person meeting room 18m²/*24ft²*, 2.2m²/*194ft²* per person.

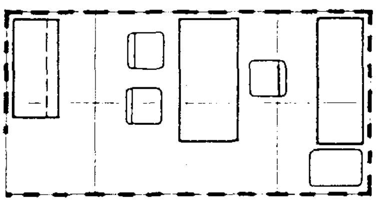
D10 9.0m×9.0m/*29'5"×29'5"* = 81m²/*872m²*.
D10a 2 private offices 20.3m²/*218ft²* per person + 8 workstations 5.1m²/*55ft²* per person.
D10b 2 private offices 27m²/*290ft²* per person + 13.5m²/*145ft²* per person + 6 workstations 6.8m²/*73ft²* per person.

Note. Meeting rooms are divided by acoustic sliding partitions.

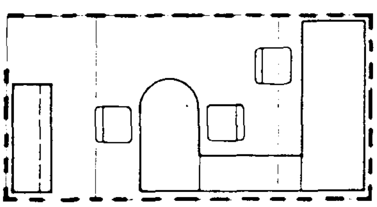
B2



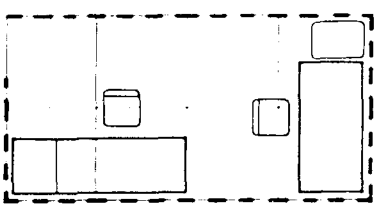
a



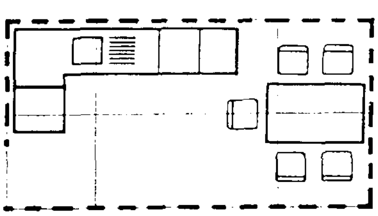
b



c

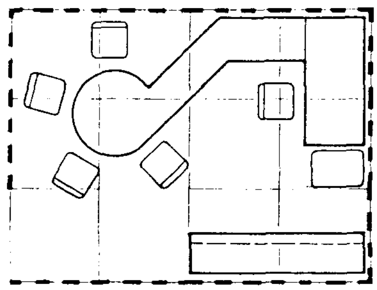


d

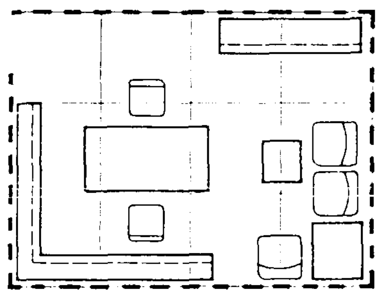


e

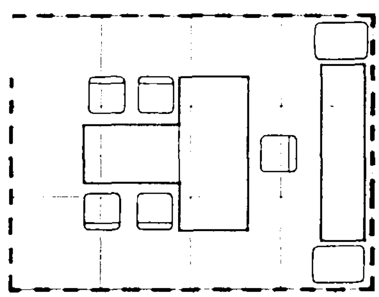
B3



a



b



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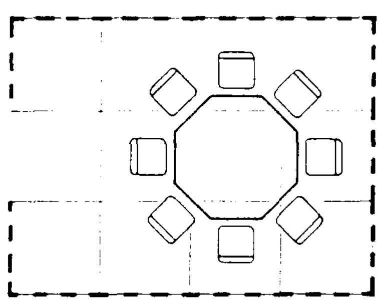
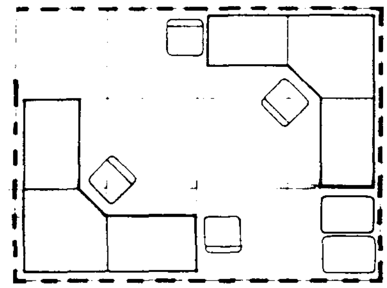


d

B3



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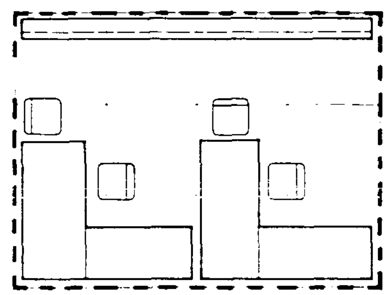
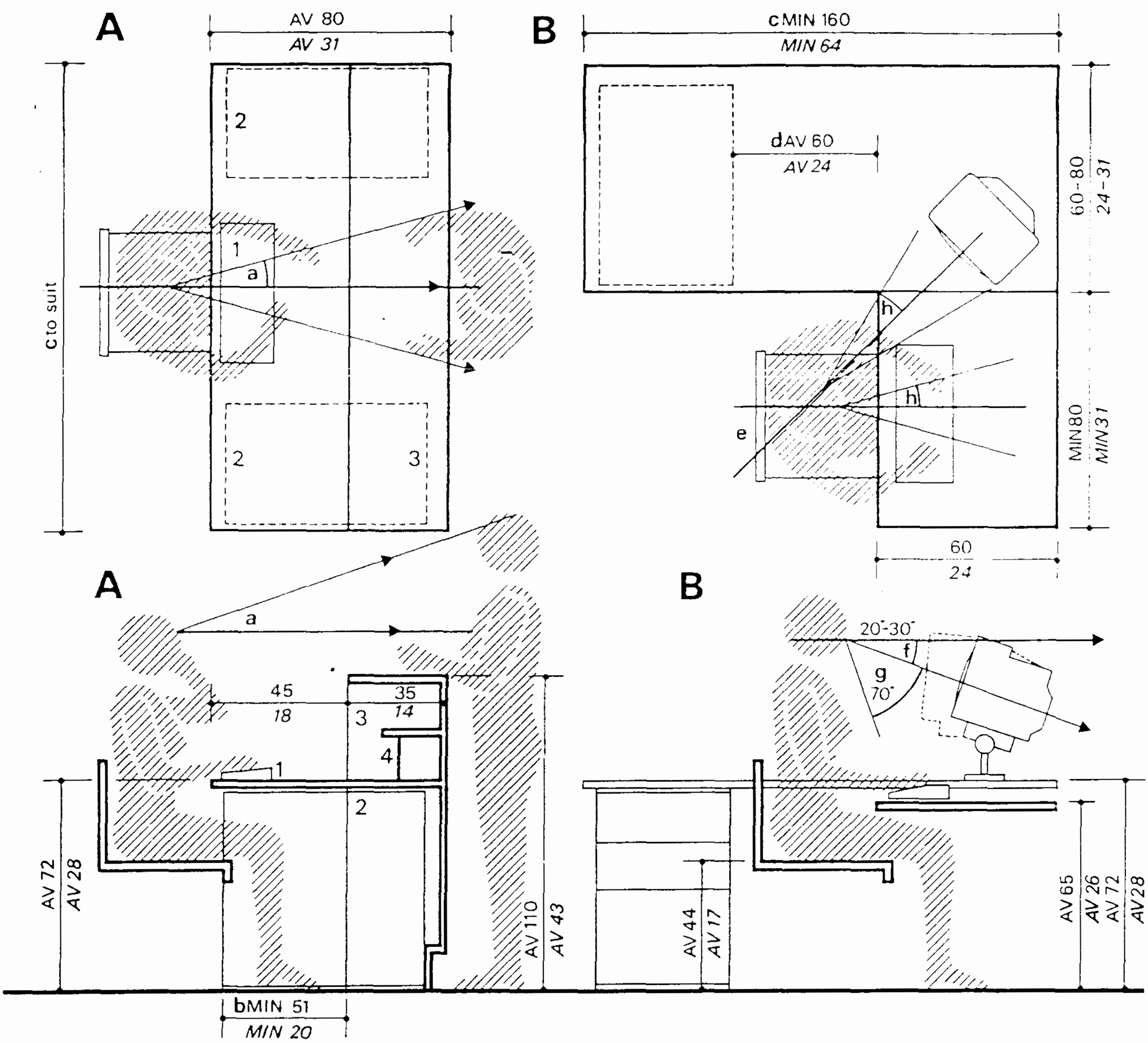


f

1:100

B1 See **A2** (**B1** ≤ **A2**) (plate **3.06**).
B2 4.3×2.4m/*14′1″×7′9″* = 11.5m^2/*124ft^2*.
abc Private office 11.5m^2/*124ft^2* per person.
d 2 person office 5.8m^2/*62ft^2* per person.
e Kitchen with seating area.
B3 4.8×3.6m/*15′7″×11′8″* = 17.3m^2/*186ft^2*.
abc Private office 17.3m^2/*186ft^2* per person.
d 8 person meeting room 2.2m^2/*24ft^2* per person.
ef 2 person shared office 8.6m^2/*93ft^2* per person.

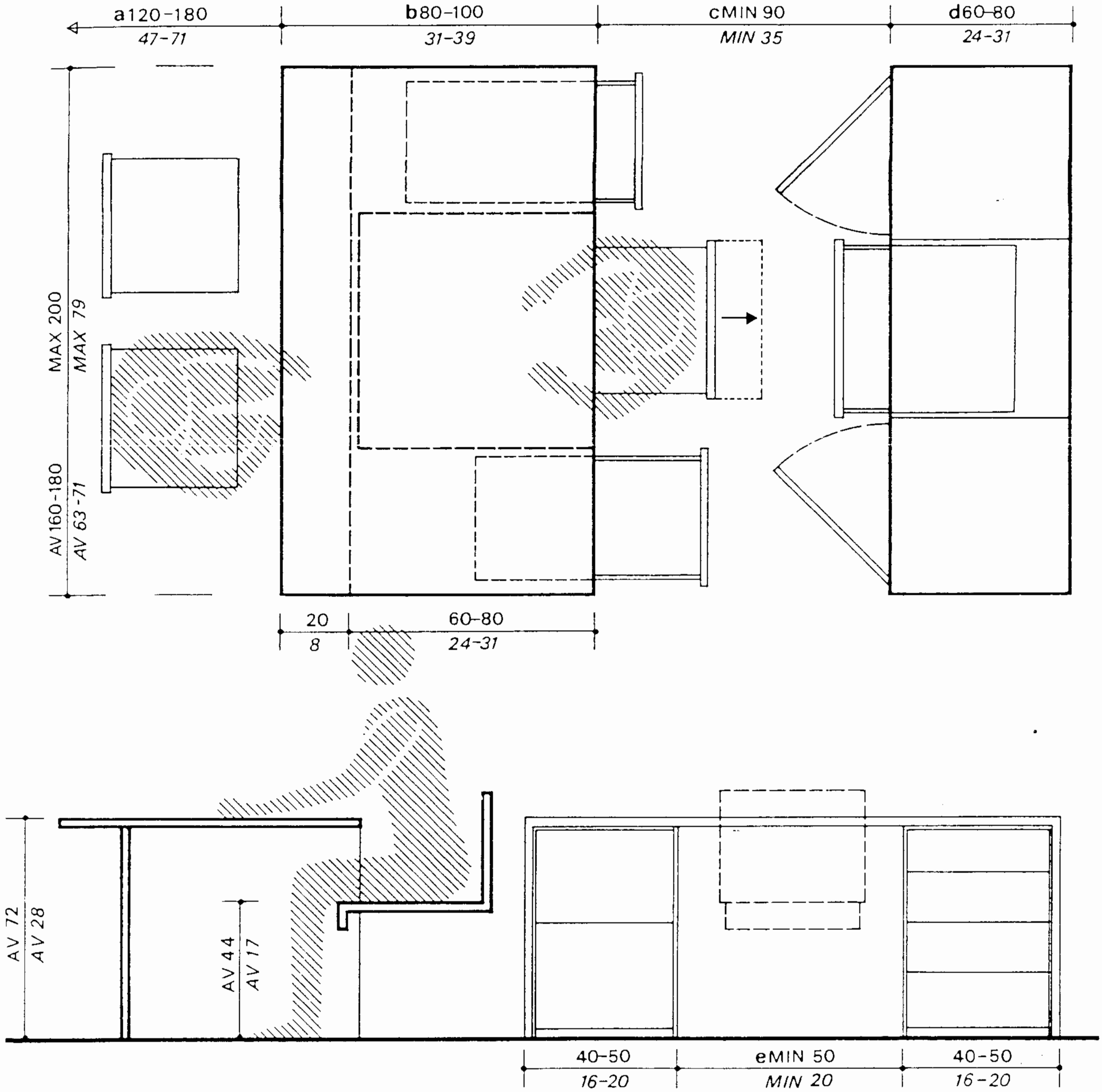


1:20

A Reception: the reception desk varies in shape and size. *The above dimensions are a guide.*
1 Telephone switchboard.
2 Drawer/cupboard.
3 High counter.
4 Optional recessed shelving for badges, etc.
a Easy eye movement 15°.
b Minimum knee well 51cm/*20″*; average 60cm/*24″*.

B Secretary/typist. The space requirement for the above is 5–9m²/*54–97ft²* (including circulation zone by workstation).
c Minimum dimensions; with storage cupboard 160cm/*64″*; without storage 120cm/*47″*.
d Minimum foot space 45cm/*18″*.
e Easy head movement 45°.
f Relaxed posture 20–30°.
g Low visual limit 70°.
h Easy eye movement, 15–20°.

1.06



1:20

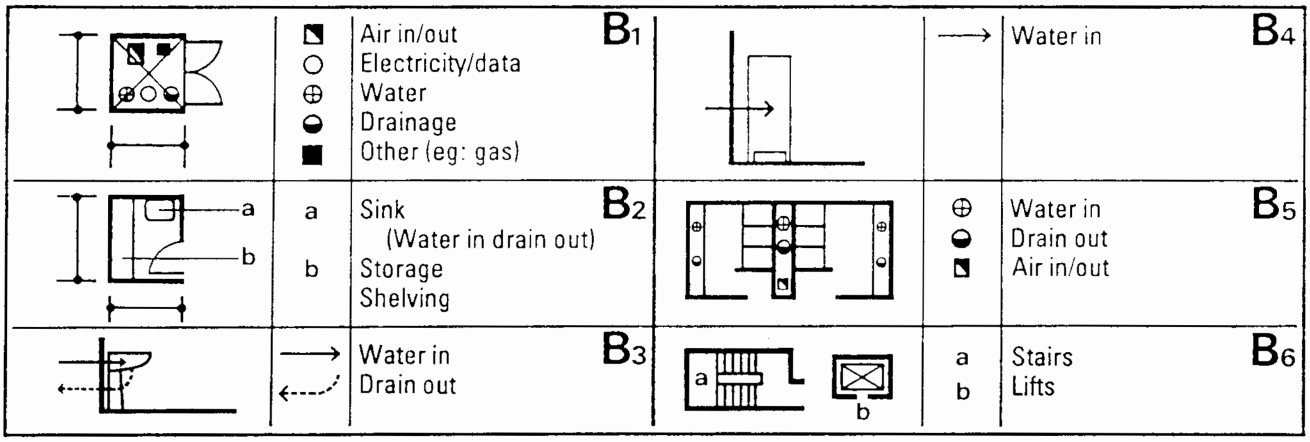
- Space requirements vary depending on open plan office or private office (see 3.02).
- Space for visitors is 1.8–2.0m²/*19–21ft²* per person in addition to the workstation requirement.
- The table size will also vary depending on the individual requirements and type of work.

a Space for visitor 120–180cm/*47–71"*.
b Work desk 80–100cm/*31–39"*.
c Minimum distance to wall storage units 90cm/*35"*.
d Optional storage 60–80cm/*24–31"*.
e Recommended legs clearance 60–80cm/*24–31"*.

A

MEETING AREA	USAGE	PER NUMBER OF STAFF: Consultancy organizations (eg 60–100 staff)	Administrative organizations (eg 350–450 staff).	Clerical organizations (eg 1300–1500 staff)
1 At workplace	For short discussions, personal interviews (partitioned if in open plan).	1 per 16	1 per 40	1 per 18
2 Serving a group of workplaces	Work session between team or informal meetings with outsiders. Adjacent to circulation.	1 per 20	1 per 12	1 per 26
3 Meeting room 6–8 persons	Meetings with outsiders, confidential internal meetings. Should be easily accessible from primary circulation. May require waiting area. Close proximity to cloaks and lavatories.	–	1 per 45	1 per 55
4 Meeting room 12–16 persons				1 per 280
5 Meeting room 16–20 persons		1 per 80	1 per 60	1 per 230
6 Conference room 22–28 persons	Presentations and Board meetings. Locate near catering facility if available.	–	1 per 200	1 per 1400
7 Board room 50+ persons	Board meetings.	–	–	–

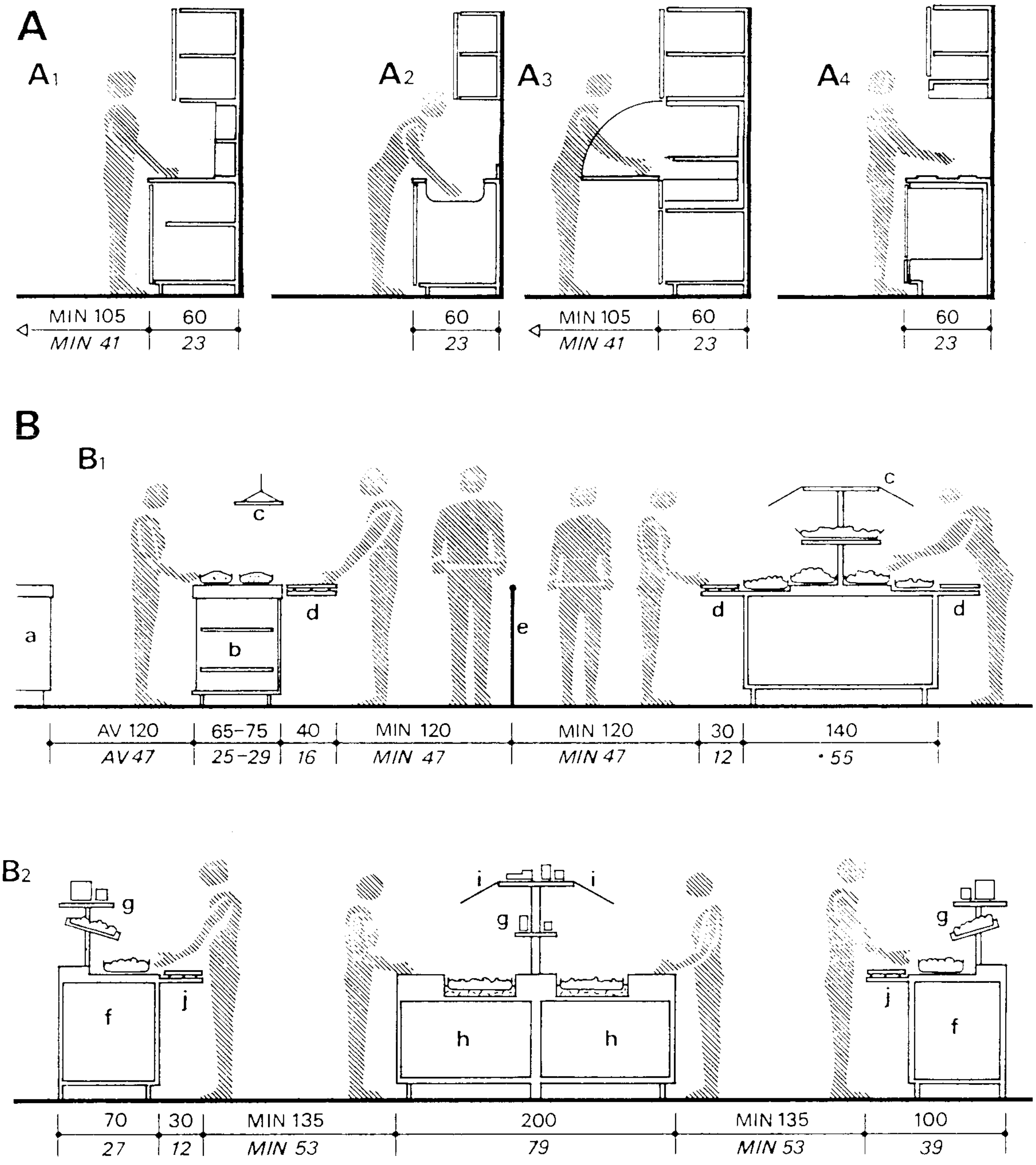
B



A Different types of meeting spaces serve different uses and should be located carefully around the building.

B Core elements.
B1 Duct riser.
B2 Cleaners cupboard.
B3 Water fountain.
B4 Vending machines (see **4.17**).
B5 Lavatories (see **4.12**).
B6 Vertical circulation (see **4.13**).

4.15



1:50

A Food preparation.
A1 Preparation.
A2 Washing up.
A3 Baking (wall oven).
A4 Cooking.
B Food serveries.
B1 Assisted and self service.
a Refrigeration equipment.
b Flat topped serving counter.
c Shelf or glass sneeze screen.
d Tray slide.
e Traffic rail.

B2 Self service hot and cold food counters.
f Heated counter with doors to hot cupboard under counter.
g Glass shelves.
h Cold counter with tiled recessed area to be filled with ice.
i Glass sneeze screen.
j Tray slide: useful for laying trays down while serving (tray slides do not connect).

- Kitchens and serveries will vary in size depending on size of organization and their requirements. Meals are usually free or subsidized.

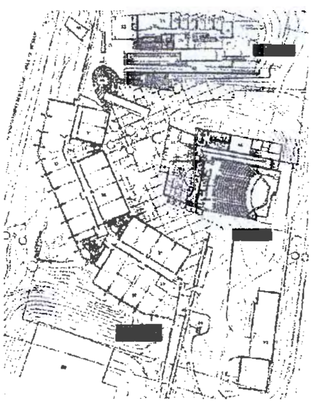
"MINDS DO NOT THINK ALIKE, BUT PERHAPS THIS ONCE THEY DID."

Edlman.

PREVIOUS EXAMPLES:

The choice and analysis of the following examples is based on thorough investigation, however the text will concentrate on some issues and aspects that might/should have impact on design due to technical, programmatic, site handling, design as well as personal prejudices.

The Neuroscience Institute — Ziva Freiman
Tod Williams Billie Tsien & Associates — Progressive Architecture, April 1995 p 76-85

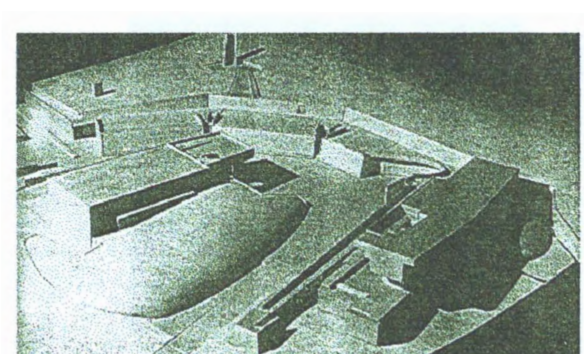


The Spirit of the Place :

The tenets guiding the formation of the institutes physical home were in keeping with its spirit. *"Because creativity necessarily begins with the self, we wanted to make a place for selfish individual creators, with no rules and no politics"* Edelman explains. He envisioned a venue small enough for unfettered exchange among scientists old and young, he wanted to make a *"monastery for science"*.

"The hillside was scooped out to make a none figural "cloister" shaped by three structures: a raised Theory Center an a bermed laboratory wing form a U-shaped line of buildings oriented east; an auditorium with a bermed mechanical wing in the center of the void screen out the near view and humanize the scale of the winding plaza. *"the true Neuroscience Institute is in the space between the buildings,"* asserts Williams"

The Nature of the Architecture :

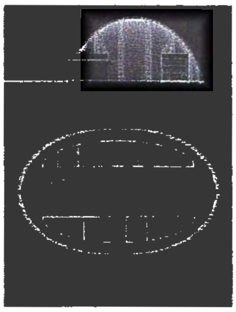


Monumental architecture was not the target, no overwhelming view, but "every vista, every salient characteristic or place must be beautiful or interesting." "There is no singular view, no one experience we construct for you," William explains , but rather diversions "into discovery" that render a wholly individual experience.
"Our whole thought about making places is that people can enter them without destroying the clarity of space." Says Tsien.
Going along with the same line of thinking, the designers got the details in but never lost sight of the global. Elderman's thinking inspired the architecture *"the brain of a conscious animal must relate perception to feeling and value which give direction to selection within the body and brain."*

Mass verses Void and the creation of Space/Place:
"The project's strongest programmatic requirement: the creation of public spaces conductive to chance encounters and cross-fertilization among scientists."
These spaces are created out if the junction of different masses, one is located at the juncture of the theory center and the labs, the other forms a forecourt to the auditorium.

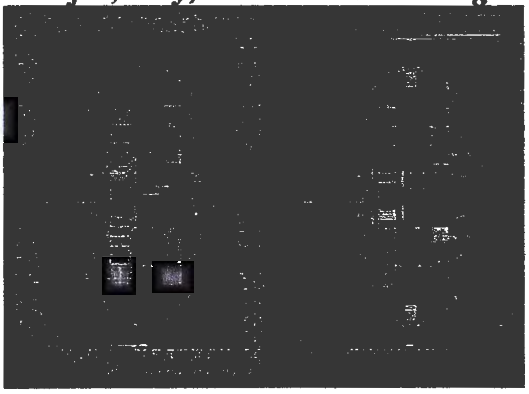
Walloon Branch of Reproduction Forestry Material
Marche-en-Famenne, Belgium,1992-1995

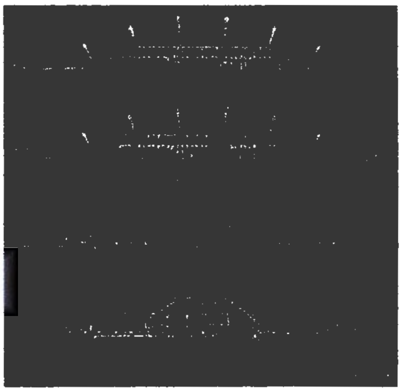
Philosophy of the Project:



"Geometry nourishes Beauty,...the notion of beauty is as eminently abstract as it is sensual" Philippe Samyn. Facts, figures and engineering are the coordinates of a process of "creation-invention-discovery" that leads to experimentation with new idioms closely tied to personal psychology.
Major Distributions:
"As a warehouse and storage place for the handling of precious seeds, the interaction between specific functional requirements, such as eco-friendliness and climatic comfort, together with the need to keep down construction and maintenance costs, accounts for the decision to create *one single unit housing the seed- drying machinery in the center aisle and the laboratories, cooling chambers and administration offices in two side constructions made of reinforced concrete."*

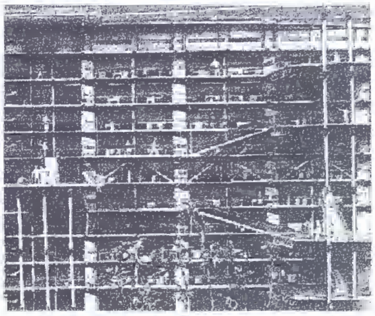
M&G Research Laboratory
Venafro, Italy, !989-1991/Sinco Engineering Group





The tensile structure, housing a longitudinal arrangement of offices, laboratories and service rooms, rises up vertically around a central area used for the prototypes and pilot units. *The huge covered structure, hermetically sealed for safety reasons, is mechanically ventilated by an extremely simple system of two fans (one for drawing in air and treating it, the other for extracting it out)placed at opposite ends of the tent. This system creates pleasant indoor air-conditioning and provides a cheaper means of controlling the micro-climates of the building inside the tent itself.*

Solvay Central Chemical Research Center
Neder-Over-Hembeek, Belgium, 1988



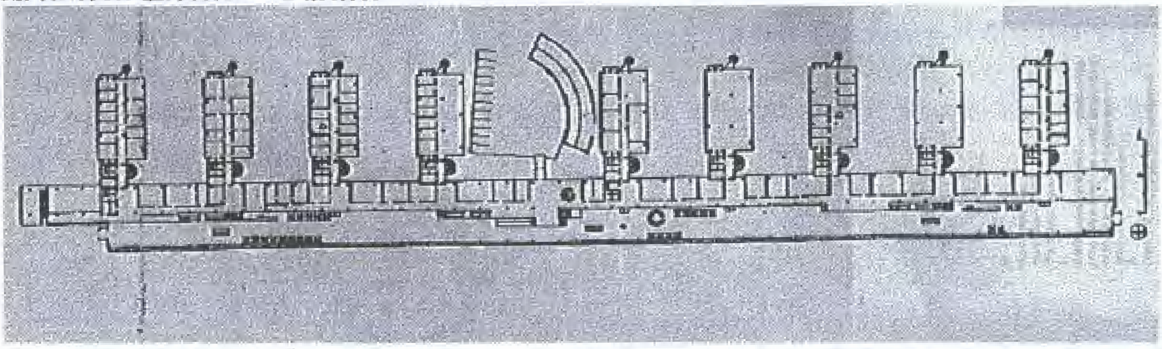
Enhancing the working environment, by challenging the existing idea that laboratories should be highly technical and functional, through creating and fostering interaction spaces and informal meeting areas, without compromising on the basics of a laboratory institute.

This is done by transforming inert technological structure into a bright environment in which it is pleasant to work, simplifying the actual work carried out and, at the same time, fostering interaction between workers themselves by providing informal meeting areas like wide walkways, lobbies, and naturally lit corridors.

The project hinges upon the idea of a *user-friendly environment* encouraging the circulation of ideas.

It features a tall slab-shaped structure placed parallel to the old building and *constructed around a 4.5 meter grid corresponding to the size of a basic office.*

Science Park,
Gelsenkirchen, Germany
Architect: Kiessler + Partner

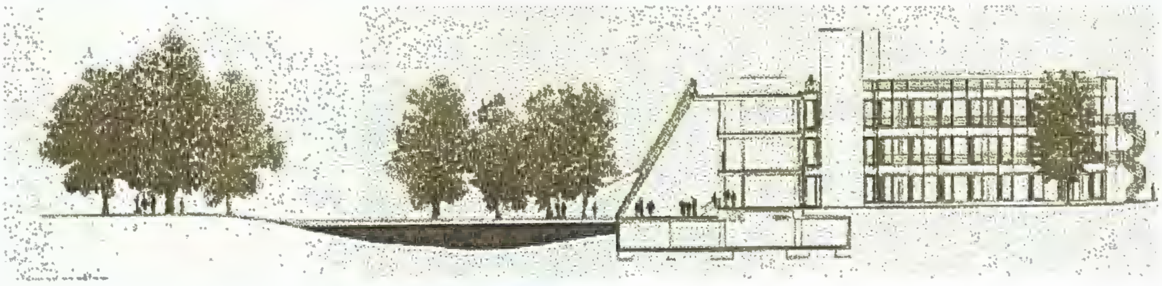


The most significant thing about this project is the treatment and design of its mechanical elements:

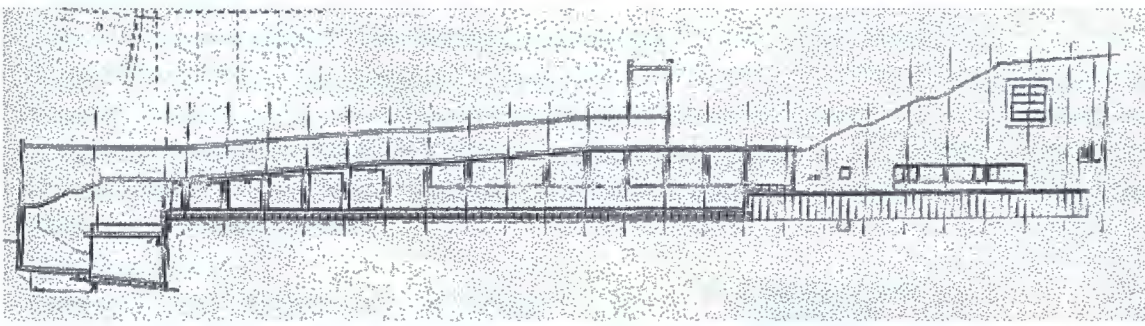
Elevations to the east use a 1.44m repetitive modular unit comprising fixed glass ventilation panel and French windows which open on to a continuous maintenance balcony.

The building management computer operates external blinds and natural ventilation through rainproof flaps,...

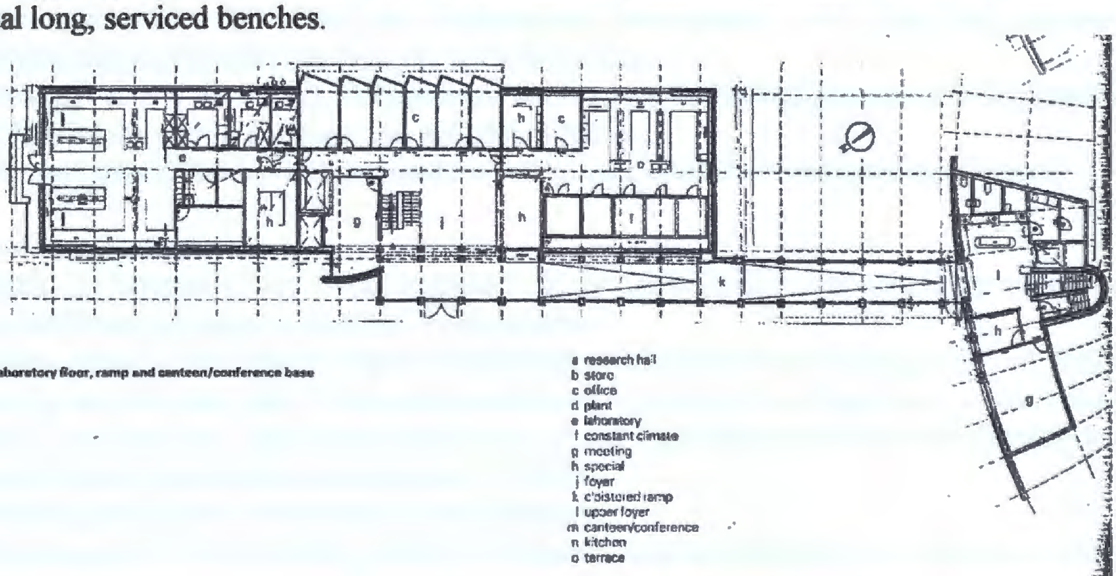
Though equipped with highly sophisticated and up to date technological systems the buildings life expectancy is 30 years.



***Marine Elf*,**
Randaberg, Norway
Architect Hoem Kloster Schjelderup Tonning and Haga Grov Sylten



Functional distribution/layout:
Accommodation has been divided into two parts. There is a rectangular three-storey laboratory block set on the lower part of the site. Above is the two-storey canteen and conference block, which is curved to take advantage of the panoramic views. Several kinds of environment have been created. The lower levels of the laboratory block are almost industrial, with a big double-height research hall that has means of conducting to the research rigs pure fjord water at constant temperature drawn from 80meters down. The upper part of this block is more conventional, with offices and laboratories with the usual long, serviced benches.



top laboratory floor, ramp and canteen/conference base

Analysis of similar examples is very lacking! & remained on a very general level!

- **SITE INVESTIGATION:**

The choice of site is determined through different elements that are necessitated by the project.

-Global Image:

A direct consequence to the new program adopted by ICARDA would be the location of its satellite center. The geographic mandate of this program "The Mediterranean Basin Program" includes all the countries on the basin, from European cost, Asian cost as well as African cost, this makes of Lebanon an ideal location due to its centrality, furthermore the proximity to the mother location of ICARDA, and the land quality as well as climate which are of utmost priority .

The location :

-Lebanon and Beirut as a point of interaction with Europe, Asia and Africa.

-The site being in the center zone of work of this research and development extension.(according to Vavilov's centers of diversity)(zone 5)

-Land type (soil) and weather related to Mediterranean climate, while the choice of the location of ICARDA (in Aleppo) was within the general program of Dry Areas.

-As a complementary function for the institute , through finance from the FAO, European Community, The US fund for Agricultural development will help the Lebanese government and farmers exploit the Agricultural land.

(30% of it now exploited). Help provide alternatives for hashish plantation in Lebanon as well as help preserve the plant and wild life diversity.

-The fact that ICARDA's administration had in mind a satellite extension in Lebanon.

-Locale image

Where in Lebanon? First of all the project should derive its logic of formal approach from its conditions given and subscribed to its context.

Falling back to the fact that this center serves the Mediterranean basin as well as the fact that it has to deal with the conditions(climatic, geological and agrarian…) within such areas, this leads to limit the choice to the coastal region(the inner land, Bekaa valley are part of the dry areas-directly related to ICARDA).

Three major factors of survival of such institutes.

The location of the satellite center of research and development in Beirut-or in its outskirts- becomes an asset for **recruiting people**-since such institutes develop cultures that serve to attract new recruits.

On a different level there is the exact site (milieu) within which it is located -here the role of its proximity to different universities, other regional and international organizations, governmental departments as well as major transportation systems (airports, highways, ports…)

Along with this, there is **the culture developed** within the institute itself, the hierarchies and relations between the different projects and systems(power distance, uncertainty avoidance, individualism/collectivism, masculinity/femininity)

-Previous sites:

Two sites were to precede the final choice one in southern Lebanon, near Zahrani, at a lot facing the Tapline, the other in Shoueifat, Next to the Lebanese university. They both lagged in some respect, the first its location, its distance from institutes and its distance from transportation facilities.(totally within a rural area). The Shoueifat site was flat, and dry, and was limited in area (in case of later expansion, which is a must provision in such institutes).

-Current site:

-The site Description:

The site lies at the extreme periphery of Beirut towards the south, in the area of Damour. The North/South highway passes below the site and is an essential element linking the institute to Beirut and the airport(5minutes),on the southern side the site is bound by the river Damour, which acts as a separator between two types of soil red to the north/white soil to the south, as mentioned the highway acts as the western edge where the site is flat, then as we go east the site slopes up ,and is limited by an old train bridge, north the site has the potential to expand till the road leading to Mishref. The area within which the site lies is characterized by its rural character though at the outskirts of Beirut, the main urban fabric that exist is residential (low rise maximum 4stories high)and commercial. Mainly banana plantation occur there, some citrus plots, and as we go up there is olive plots, there are a wide range of green houses there for vegetables. The area of the plot of land amounts to around 15000m2, out of which a minimum of 2500 m2 are needed for green house facilities.(depending on the research and the item being researched)

-geology

The soil formation of the sub-strata of the R&D section at Damour has two main components: red soil, and white soil. The white soil is due to the proximity to the rocky areas in Kharoub sector(Aklim El Kharoub), while the red soil is a characteristic of the Damour plain. The erection of the facility would take into consideration the wet slippery soil next to the river and the river as a source of water(sadimentation).

-topography

The first stretch of land next to the river and to the highway is flat, then the site starts sloping up towards the hills of Mishref. At first the slope is smooth, then it rises up, allowing the formation of stepping on site, a characteristic of Mediterranean land. However the natural extension of this site is along the flat land bordering the highway to the north.

-climate(wind, temperatures, precipitation...)

This proximity of hills and sea, has a strong effect on the ground winds prevailing on the site. In addition there is the valley of the river which acts as a wind tunnel. The wind magnitude ranges from 0km/hr on a calm day till 75km/hr on stormy days. The temperature varies between 14C to 28 C throughout the year, with minor daily temperature changes.

-neighborhood

As previously mentioned the site lies at the boarder of greater Beirut, it is on middle grounds between rural and urban concentrations. However the immediate surrounding is mainly an agrarian milieu, with flat plains along the sea shore and terraced hills. Never the less the Damour village is characterized with its low rise structures, ranging from single floor housing to 4 floors maximum height, mainly these structures are residential with commercial facilities at ground levels as well as storage spaces.

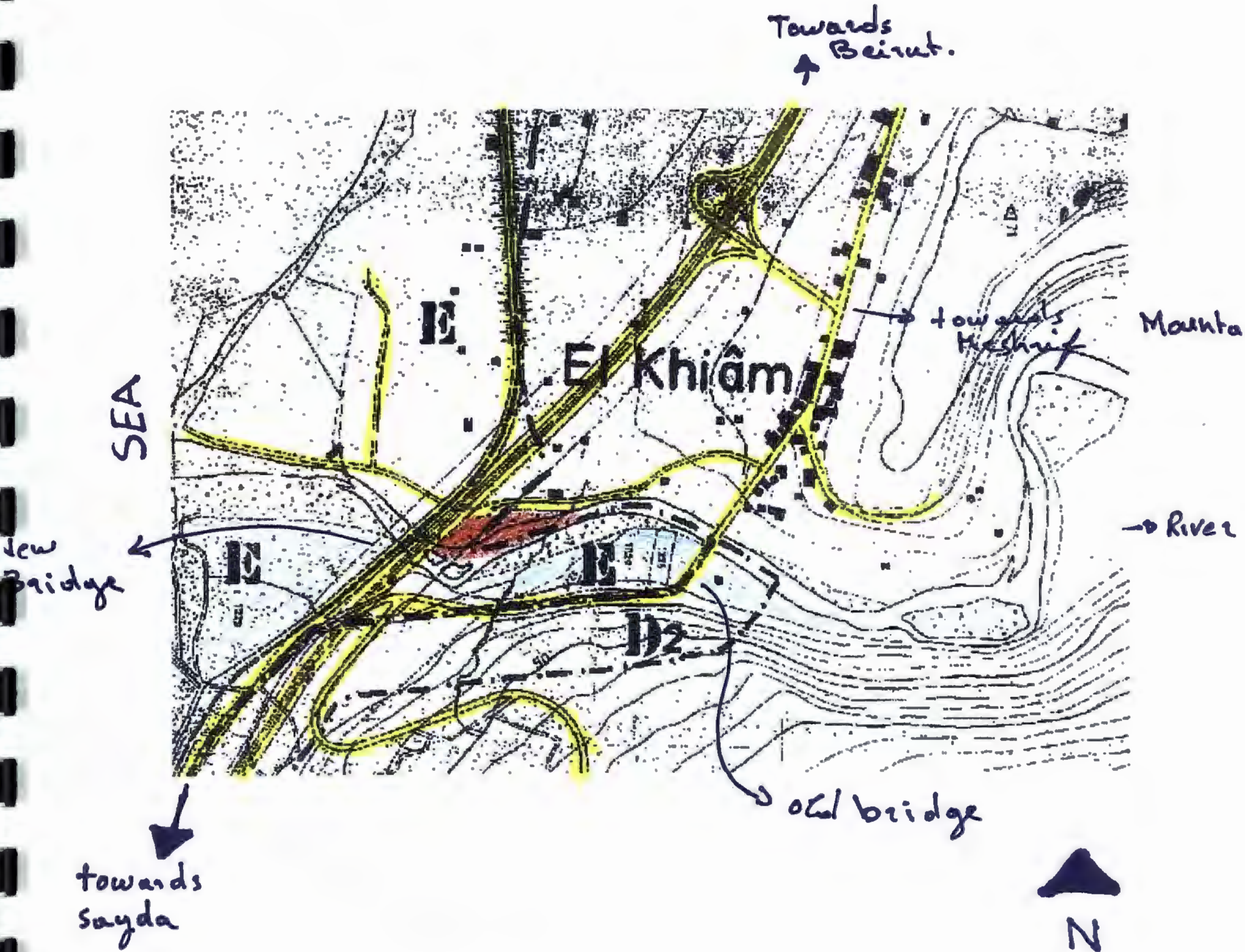
-building law

The law states that:		
the minimum area 1000m2	minimum facade 40m	minimum depth 40m
back setback 8m side setback 8m	exploitation factor 15	F.A.R. .3 maximum building height 13.5

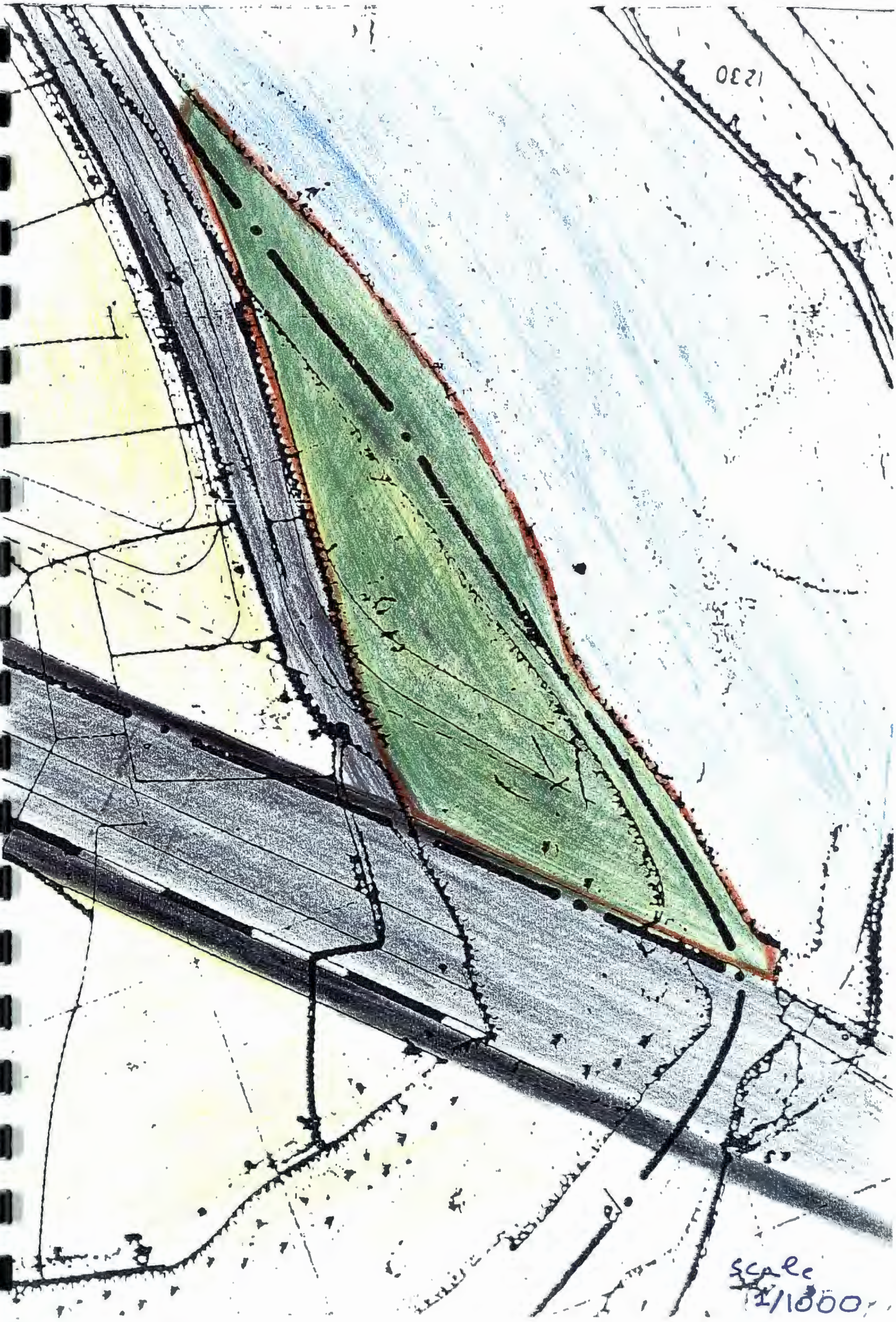
-site forces (personal remarks)

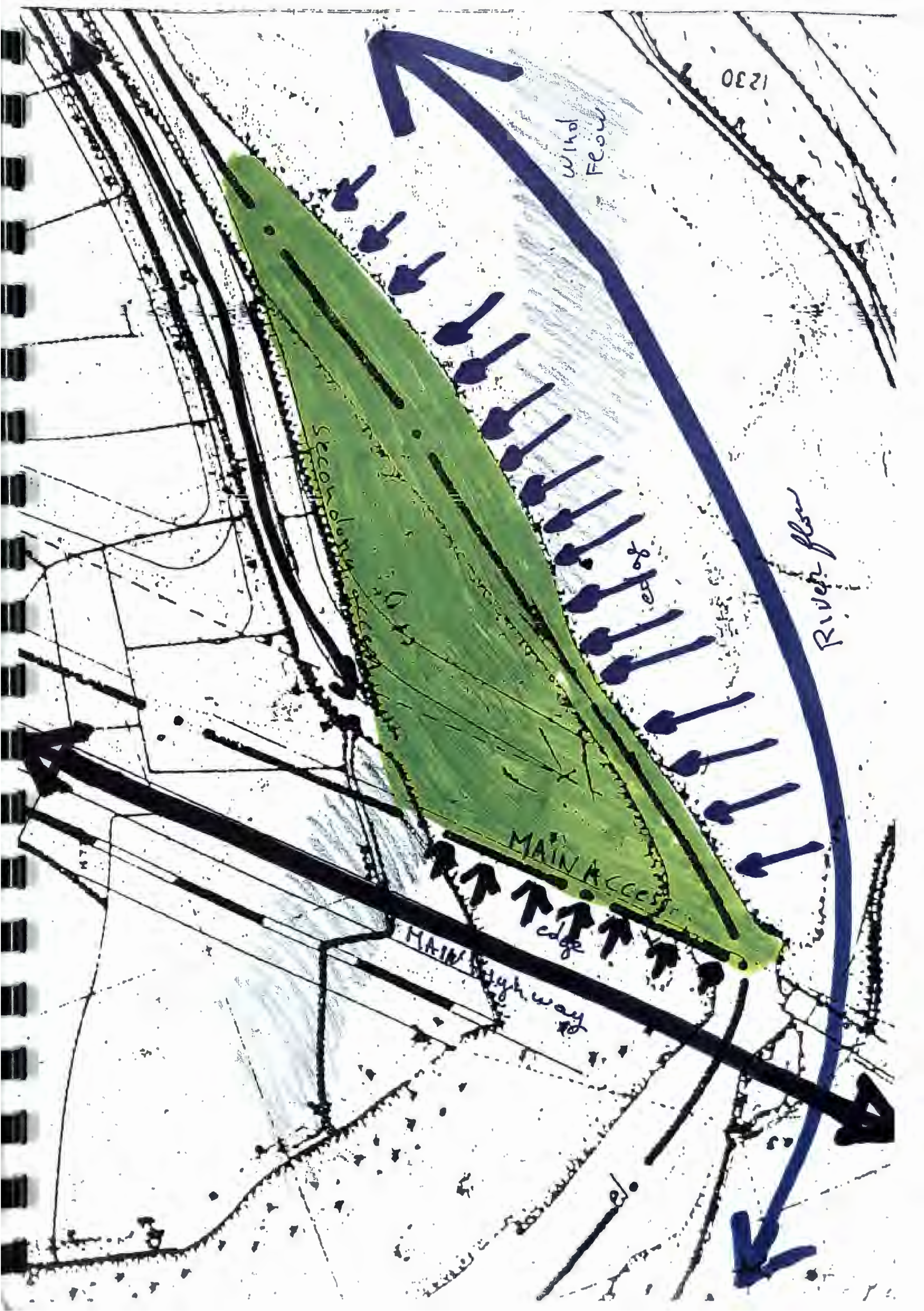
The site is a melting pot of different static and dynamic forces which bound it :
first of all there are the two bridges that act as edges at both ends of the site(one is old the other is new)these as well as their extensions(the road and highway) create dynamic physical boundaries which limit the institutes expansion in that way and define secondary and primary accessibility points. This is further emphasized by the direction of the slop and the flat land right next to the main highway. On the other hand the river act as a natural dynamic edge , complemented by the flow of wind within the river valley(the flow of air can act in determining the fume hoods direction and layout, as well as the wind channeling within the building/campus layout). This edge though it is physical yet it determines a functional accessibility point to the water resource which serves both laboratory functions on the one hand and green houses on the other, and demands a proximity to the mechanical system distribution zone. As for the fourth site boundary it consists the natural expansion of the site, since it is a soft edge formed of agriculture land.

Site Plan:



Towards Beirut.
E
El Khiâm
Mounta
SEA
River
New bridge
E
E
D2
old bridge
towards Sayda
N


scale
1/1000



Wind Flow
River flow
edge of
MAIN ACCESS
edge
MAIN Highway
secondary access

Low hills bound the site from the east , flat land , plain of Damour, is to the south and north. Its immediate context is agrarian

The north south highway passes right next to the site, creating a strong dynamic edge.
The old bridge acts as another edge from the east, old road.

The distance between the location and Beirut (center)15km and it is even closer to the airport (5 minutes by car), Lebanese University, and other institutions. Its assets other than its agrarian characteristics are its being on a major connector, and on the boarder of greater Beirut and the south.

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The distance between the location and Beirut (center)20km and it is even closer to the airport (5 minutes by car), Lebanese University, and other institutions. Its assets other than its agrarian characteristics are its being on a major connector, and on the boarder of greater Beirut and the south.

DESIGN METHODOLOGY:

The Functional dynamics of each of the project components appropriates the site in a certain way. The complexity of the context reveals other implications of the components in their application. Other project components are inserted, technical needs govern construction, orientation aspects as well as circulation within the complex proper and even within the building envelope. Entry/Exit points act as punctures within the site edges. In this manner each component is acknowledged in its formal implications on the context and thus as a context in itself.

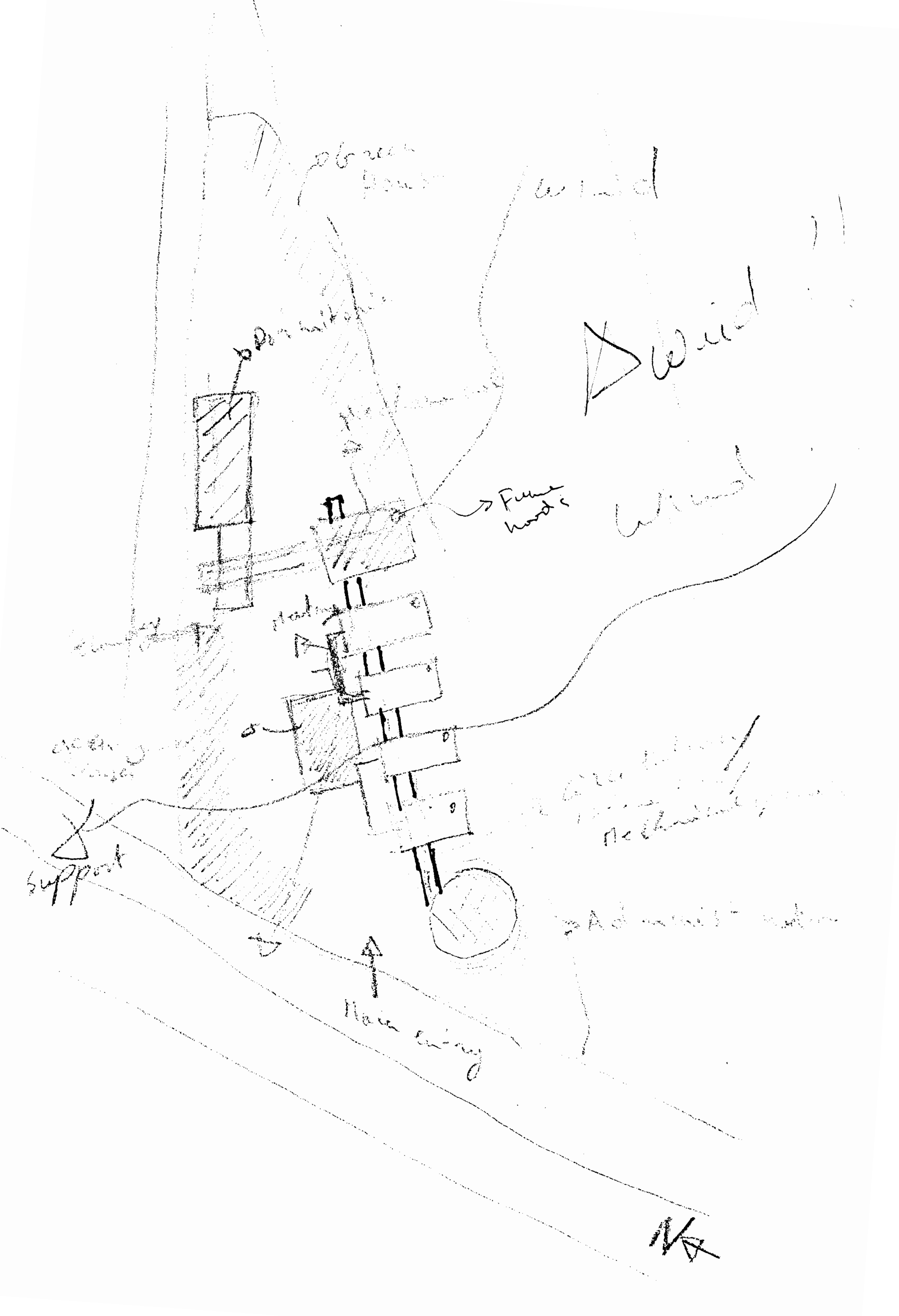
The materialization of a certain component in a form contains within it the margin of improvisation in which another space finds for itself a context, further the relation of different components create places as well as spaces which are defined by their creators or by an inherent element within. The form is more critical in its larger awareness of the issue it addresses. Structure and construction impact the space by influencing the form. The interaction of disciplines is an important factor in the production of space.

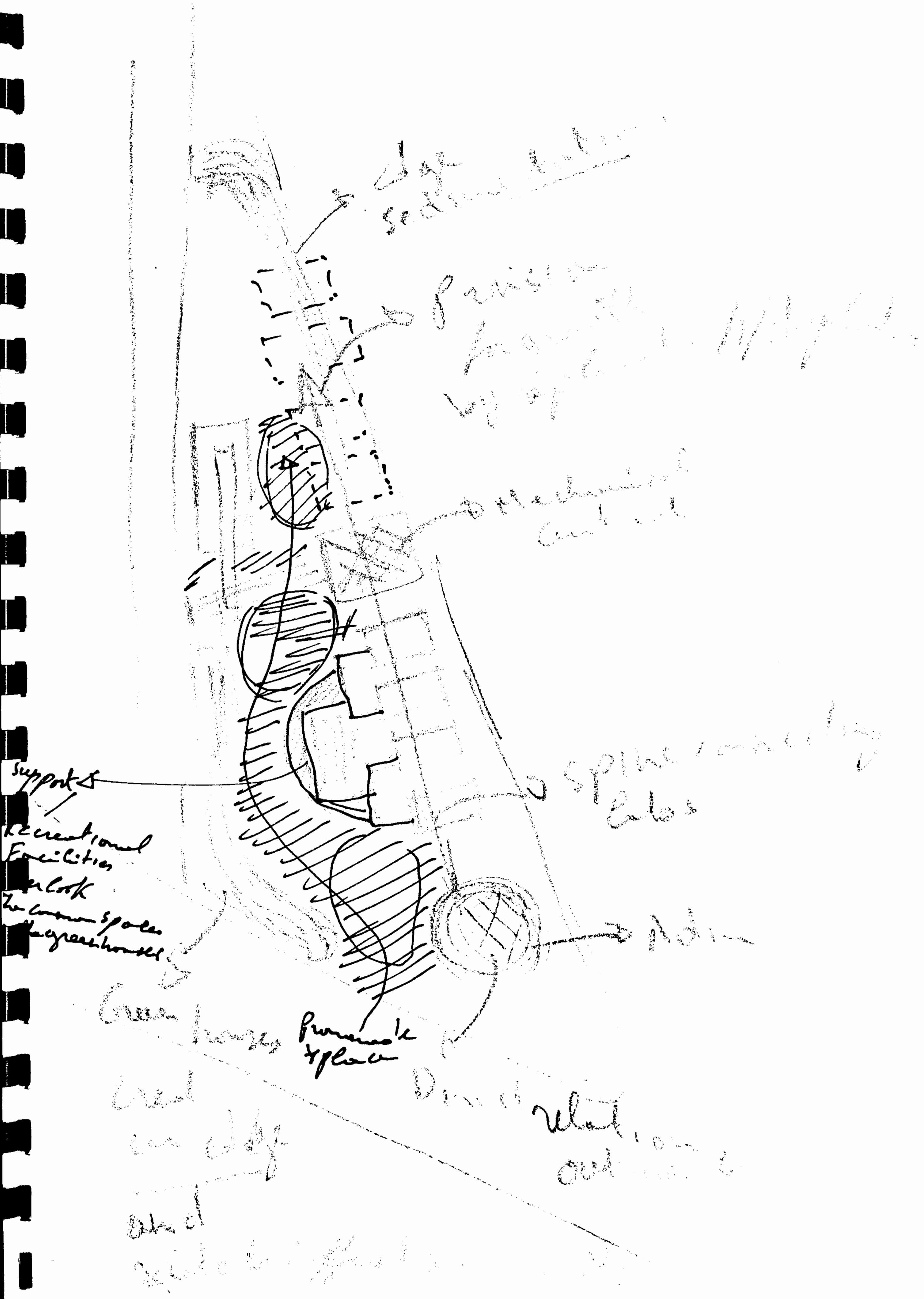
The planning of the human space has a large degree of improvisation due to complexity present in a person's usage of space, let alone psychological issues. This makes it hard to map the human being's usage of space or experiential promenade onto the space in its formation. The nature of the relation between the main components is broken down to a relation between different elements that through their fusion create a certain hierarchy. The design strategy focuses on these elements and devises a general system that guides the formation of the space of interaction. The most private (as in highly secluded and professional) would house the specific and the most public (as in common dialogue and interaction spaces) would house the most flexible.

Where there is a potential overlap of functions the integrity of each function should be maintained.

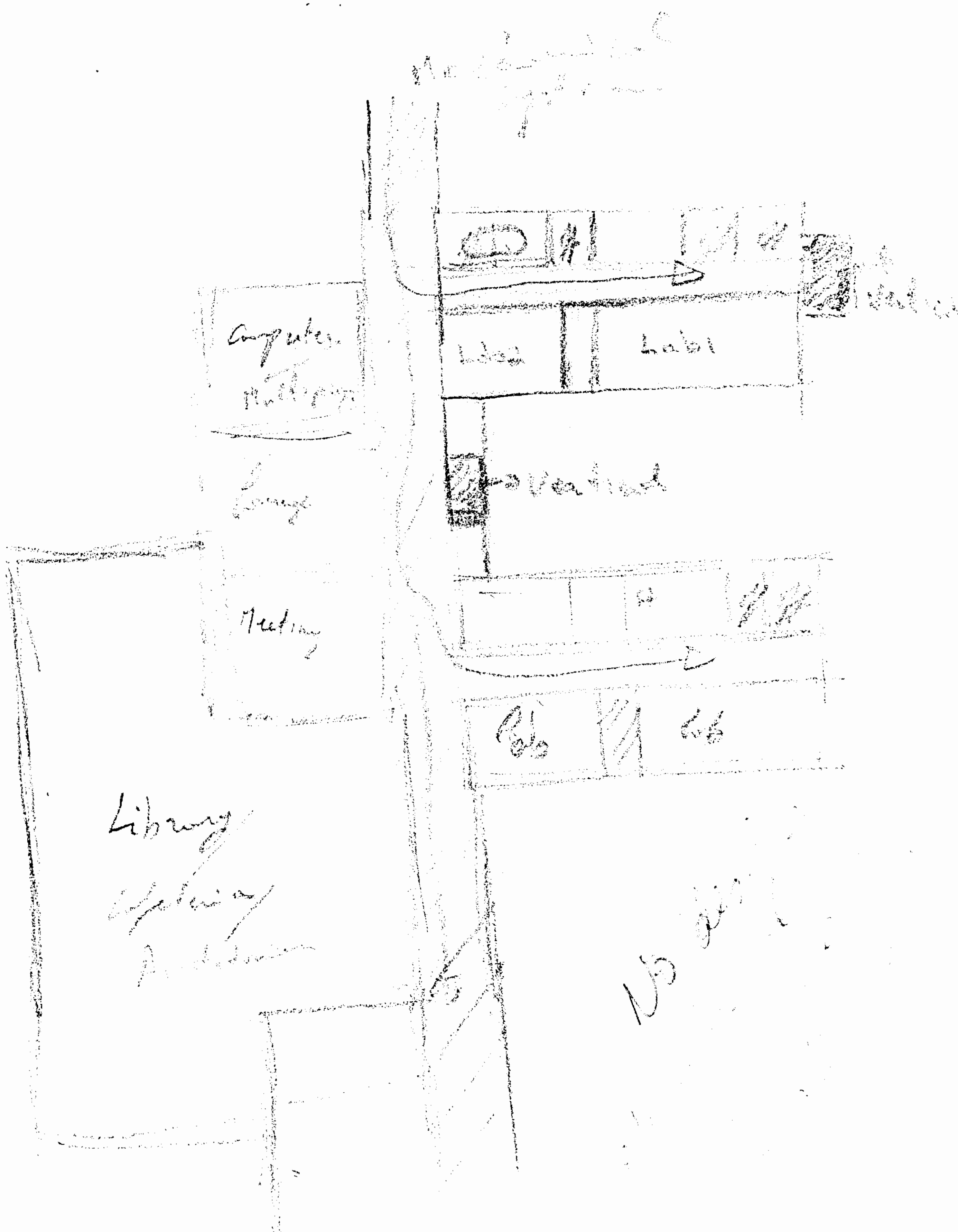
Functional diagrams have the tendency to become formal typologies as public and private are situated in space. The difference in nature of the programmatic components of the project gives the possibility of public and private to occur at the same point in space. If we take the case of creating a dialogue space(public) between different laboratory space(private) and the relation between those and highly individualized labs, then the chain of hierarchy starts to get fragmented to the components. However, here the notion of hierarchy is much more complex , beyond vertical and horizontal relations, it is to govern systems in relation.

Given a brief Idea that almost all of the above components have independence of there own , they create entities in space. The treatment of the void between these entities, as well as the joints that relate them together(could be a void), in addition to the hierarchies mentioned earlier will set the strategy of the sketch design .


wind
wind
wind
Fume hoods
support
Main entry

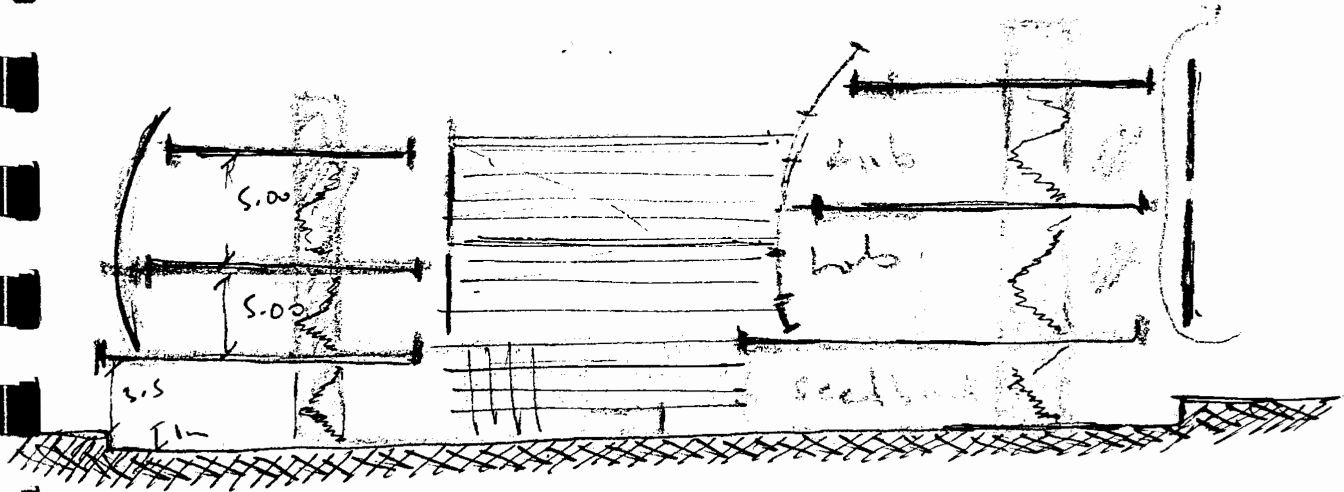


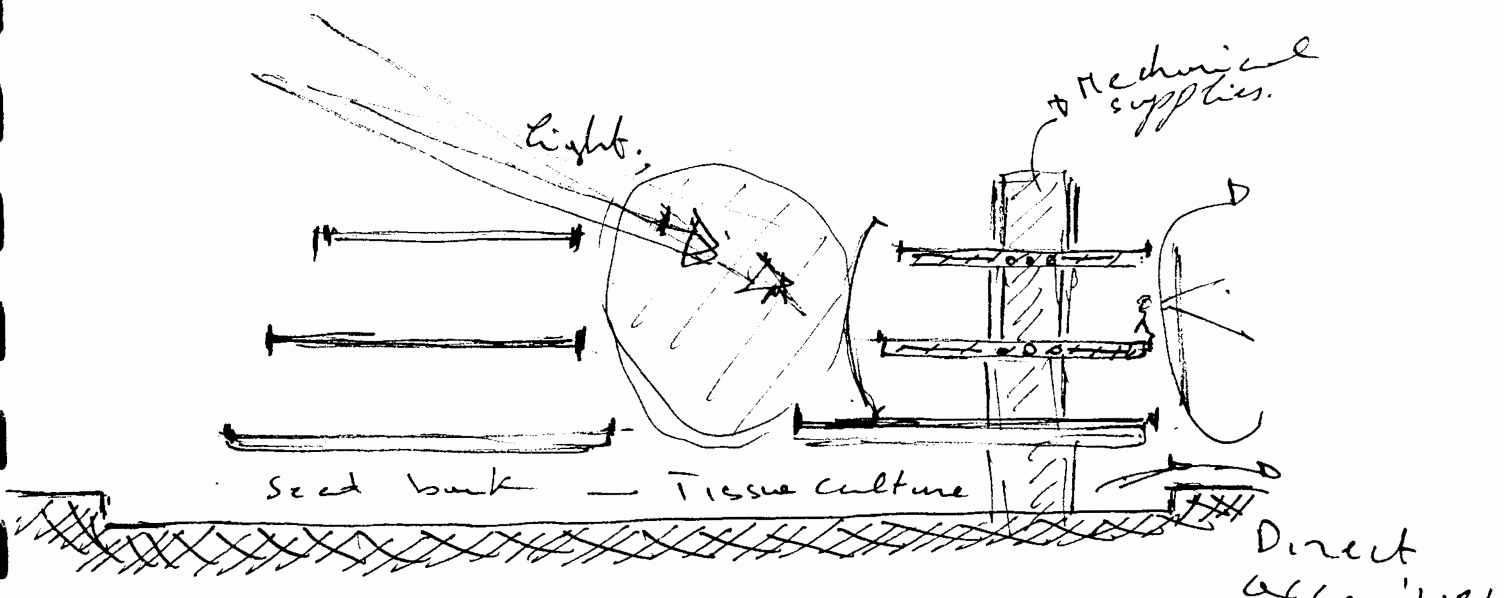
Support &
/
Recreational Facilities
Cook
common spaces
greenhouses
Promenade + place
Admin

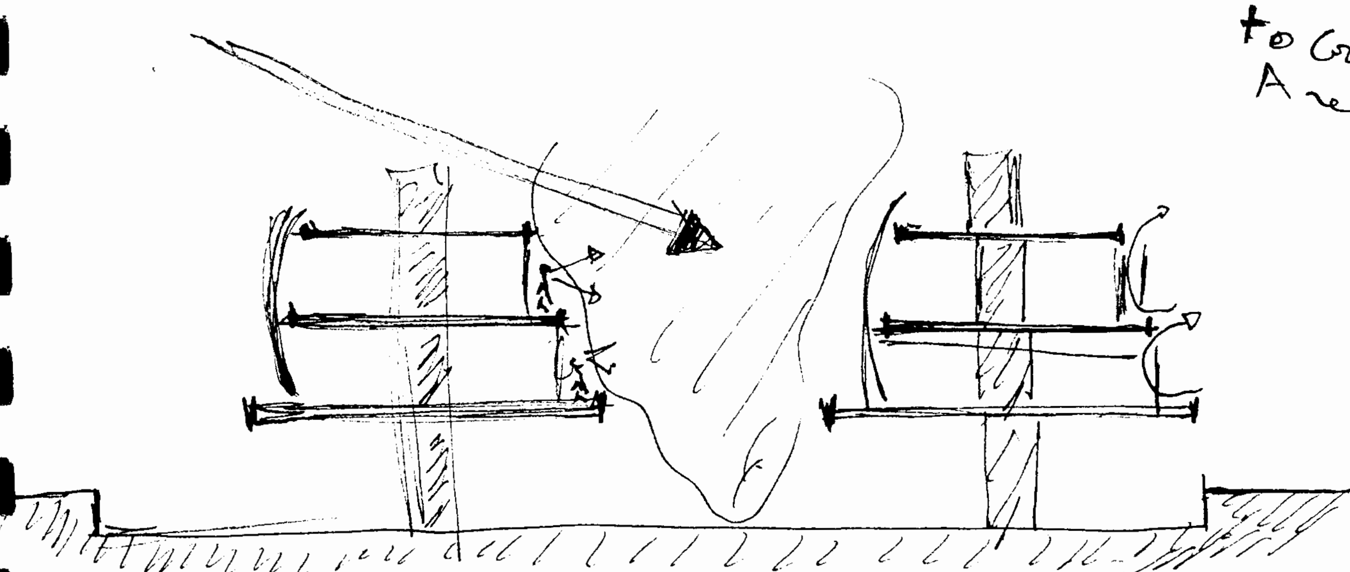

Computer
Vertical
Meeting
Library

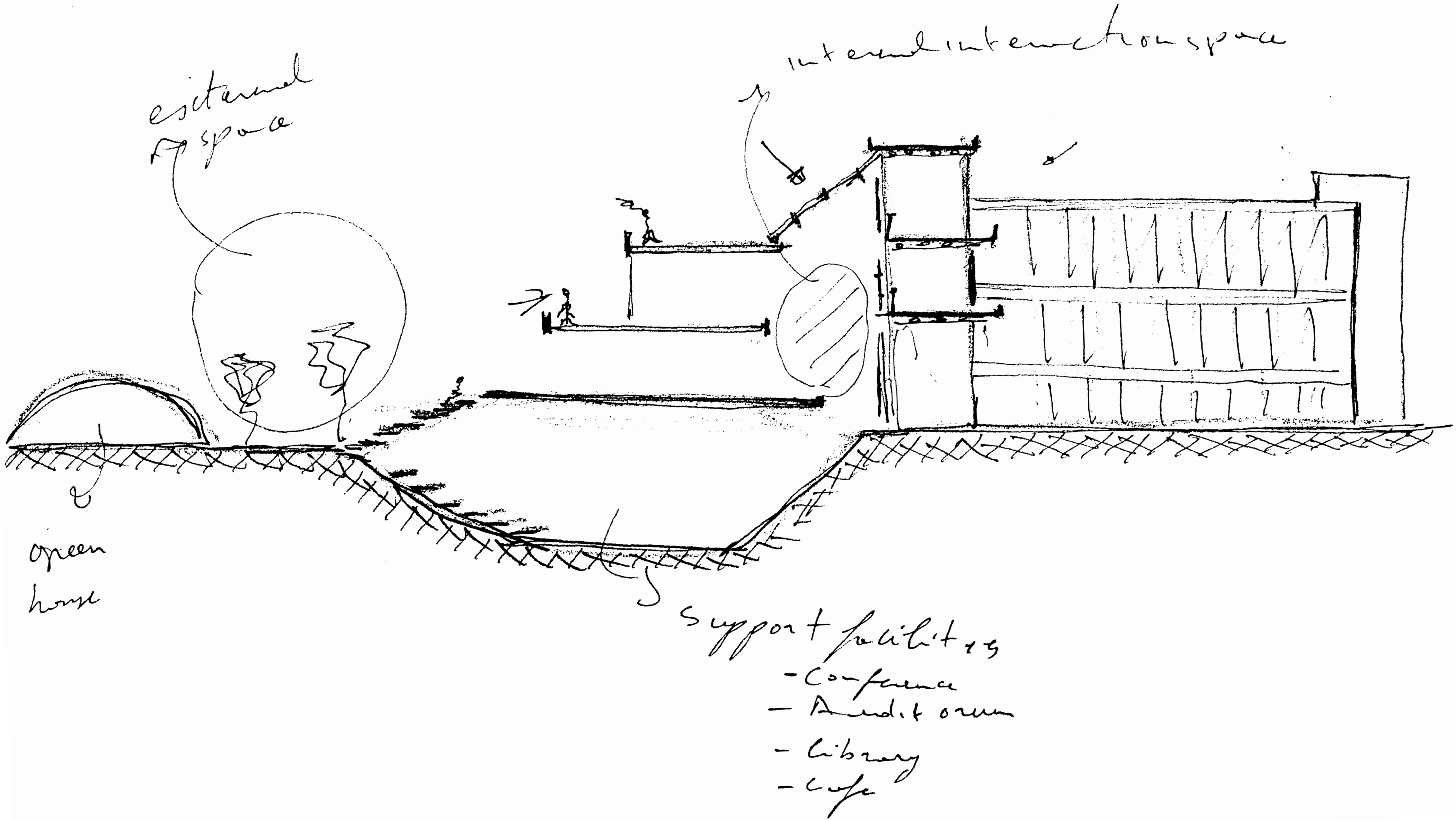
Design study sections:

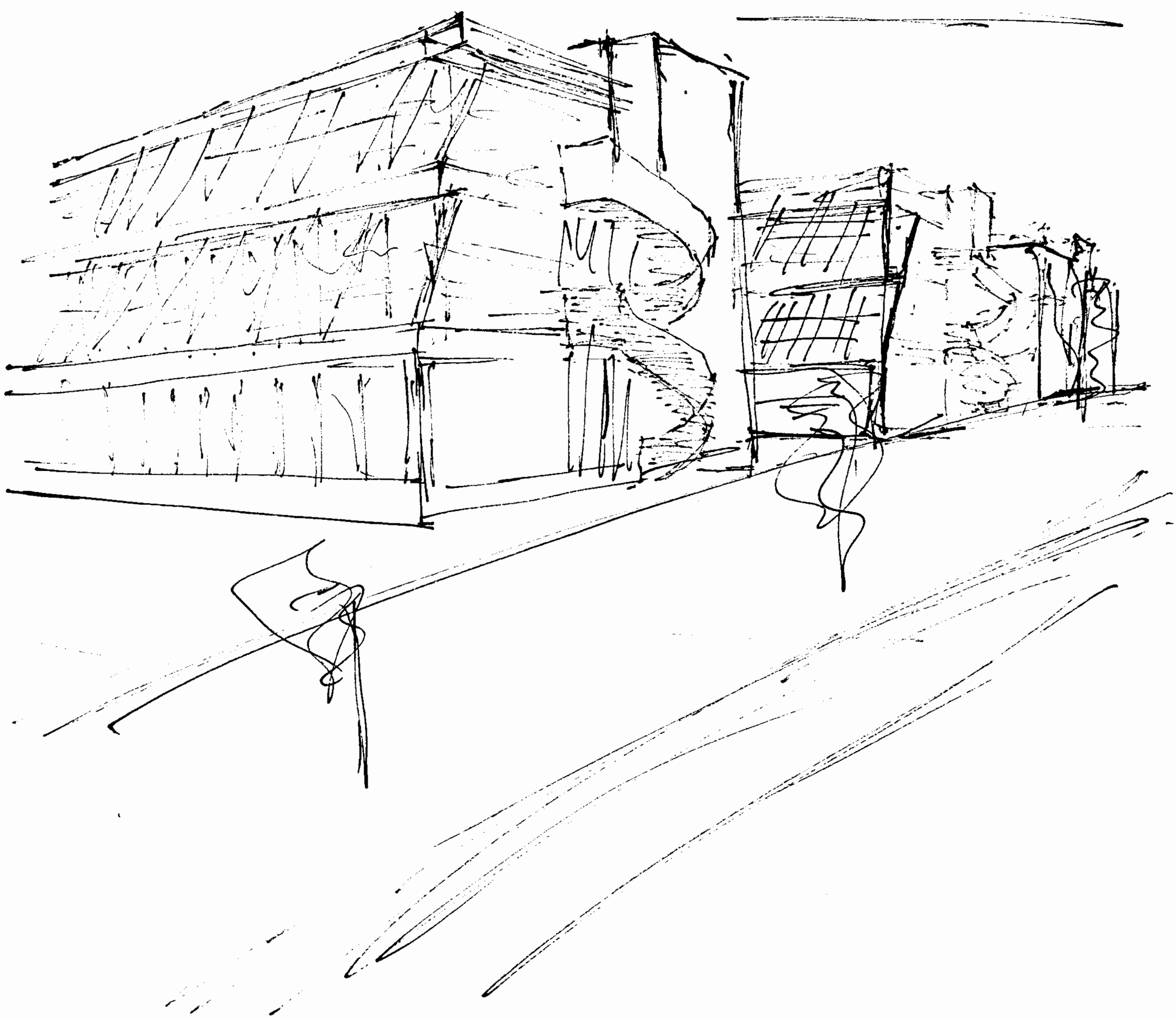
Through labs:








external space
internal interaction space
green house
Support facilities
- Conference
- Auditorium
- Library
- Cafe



Choir composition
of lab units.

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