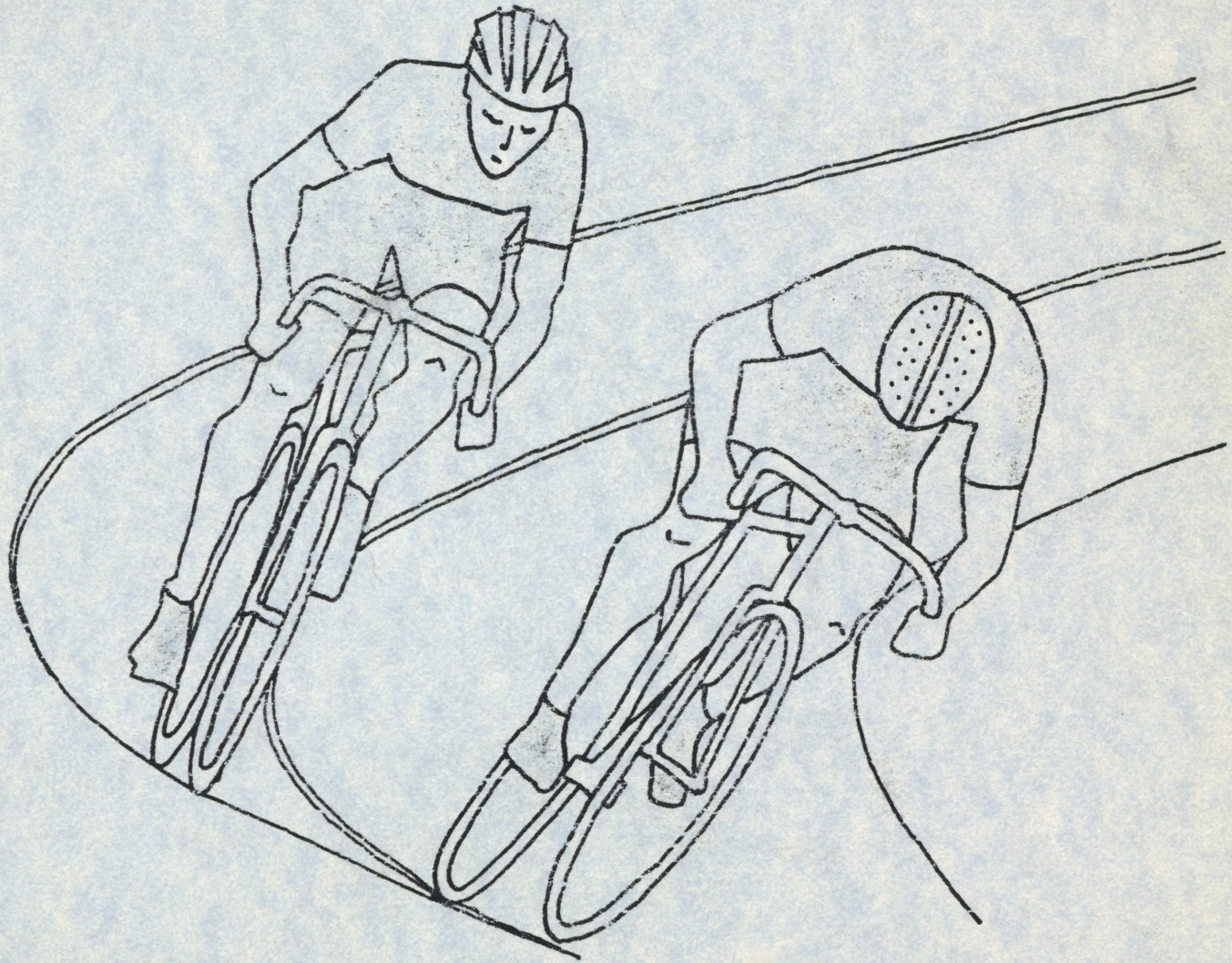
OLYMPIC TRAINING CENTER



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ADDENDUM #1

OLYMPIC TRAINING CENTER

by

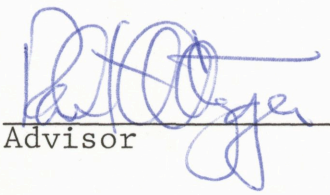
Michael Franzel MacDonald

A professional paper submitted in partial fulfillment
of the requirement of the degree

of

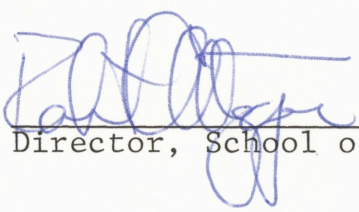
BACHELOR OF ARCHITECTURE

Approved:



Advisor

Chairman, Thesis Committee



Director, School of Architecture

MONTANA STATE UNIVERSITY
Bozeman, Montana

June 10, 1985

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INTRODUCTION

In bicycle racing and ski racing it is evident that each racer has strong and weak points. A cyclist, for example, may be a very fast sprinter but may lack endurance. A skier may be exceptionally strong on flat portions of a race course but may falter on steep uphill sections. Strong and weak points are due to many different factors. The type of muscle make-up (fast twitch or slow twitch) will indicate whether a racer will possess speed or endurance. Muscle mass, connection points of muscles (long or short muscles), age, and mental and physical conditioning are all factors relevent to an athlete's performance. Genetically imposed weak points may be overcome or offset through proper conditioning, training, and nutrition. I propose to provide a training center, a scientifically oriented facility dedicated to the improvement of the performances of high caliber cross-country ski racers and bicycle racers. Athlete's diets and training would be monitored and regulated in a controlled environment by a sports physician, nutritionist, and coaches. The resulting data would be recorded and evaluated to determine what diets and training techniques produce the best results for the sport involved and the particular athlete concerned.

An initial six week stay for each athlete would be required for primary data gathering to take place. From then on individual athletes or teams would return for periodic two to four week "tune-ups" before major races.

This facility would be privately owned with operating funds provided through the United States Olympic Committee, United States Cycling Federation, the various ski racing associations, donations, and proceeds for the sales of books written as a result of research done here. A minimal, nominal fee would be imposed on each athlete to insure his amateur status. In addition each athlete would be required to work part time in the laundry room, kitchen, equipment rooms, and custodial crew.

GOALS

GOALS:
FUNCTION

To provide an olympic quality training facility for cross country skiers and bicycle racers.

To provide a research facility dedicated to the scientific approach to improvement of athletic performances of ski racers and bicycle racers.

To provide a controlled environment in which to better our knowledge about muscles, nutrition, physical training and how they relate to athletic performances.

To increase our athletes' chances of winning in the Olympics and other international cycling and cross country ski races.

GOALS:
FORM

To take advantage of the site's climatic conditions.

To emphasize the inherently dominant form that a cycling velodrome possesses.

To take advantage of the site's topography and views.

To take advantage of the site's pristine seclusion.

To take advantage of the site's solar potential for passive solar heating and daylighting.

GOALS:
ECONOMY & TIME

To build this facility for $100/S.F.

To design and build-in energy efficiency for economical use of HVAC systems.

To provide a low maintenance facility.

To provide use of this facility at a reasonable cost to the athletes.

To provide flexibility for adding future new training machinery and techniques.

To provide flexibility for future expansion.

To be open for use by Fall, 1986.

CONCEPTS: FUNCTION

The cycle training and ski training activities may be grouped separately or together.

The cycle training and ski training support functions should be grouped together.

The dormitory may be integral with the training facility or may be segregated partially or completely.

Administrative, cycle training, ski training, bio feedback, dormitory, and support areas may be clustered or grouped together in a hierarchial oriented megastructure.

CONCEPTS:
FORM

Clusters of like-functions should produce a cluster effect of forms.

A hierarchial system of forms should be evident.

Utilize effectively the passive solar space heating and daylighting potential.

Orient spaces to views to south.

Utilize natural ventilation potential.

Take advantage of the site's natural, relatively level "benches" and earth berms to minimize exposed building surface area.

CONCEPTS:
ECONOMY & TIME

Provide an energy efficient facility.

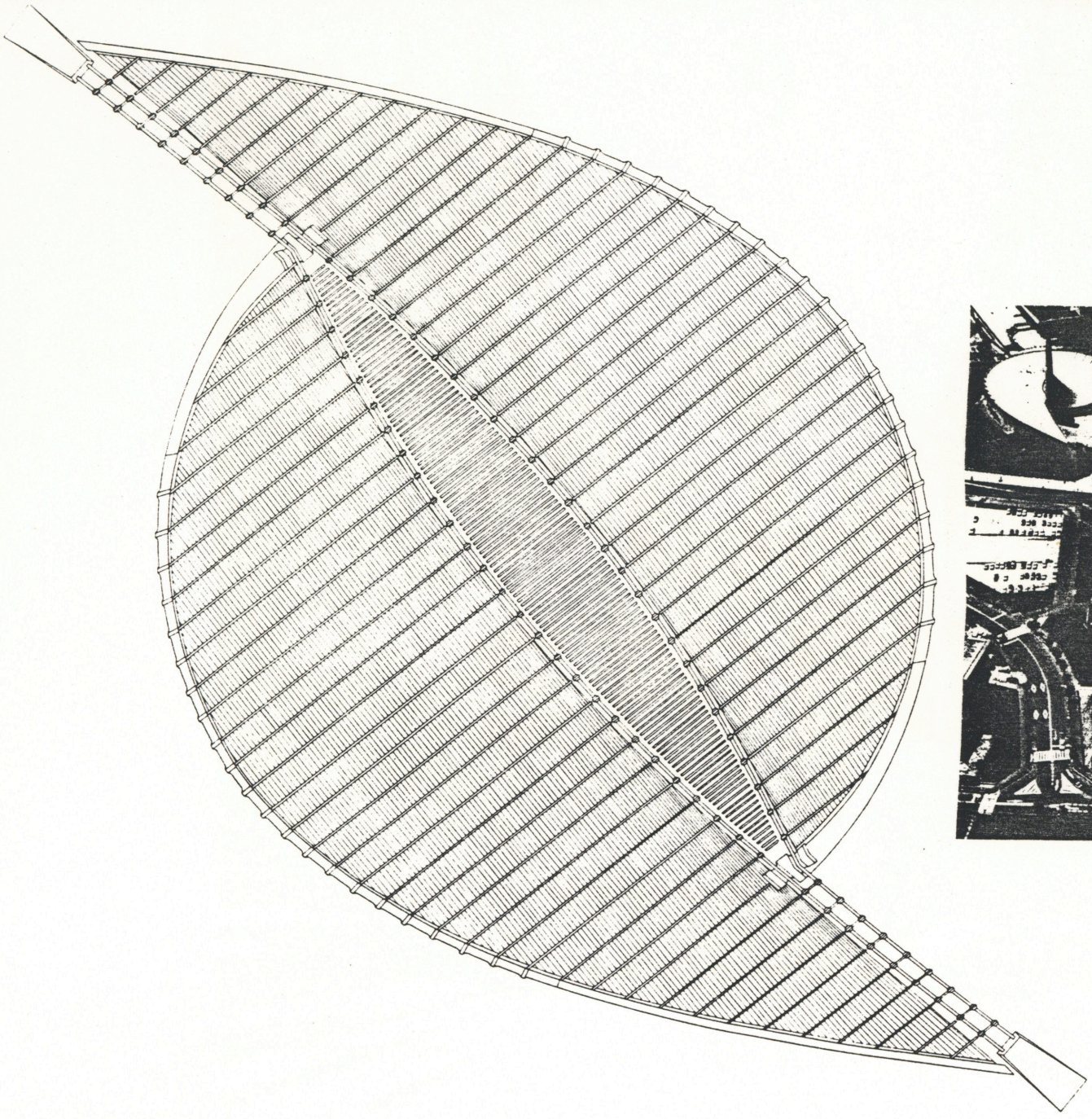
Provide a facility with reasonable initial costs, and low maintenance costs.

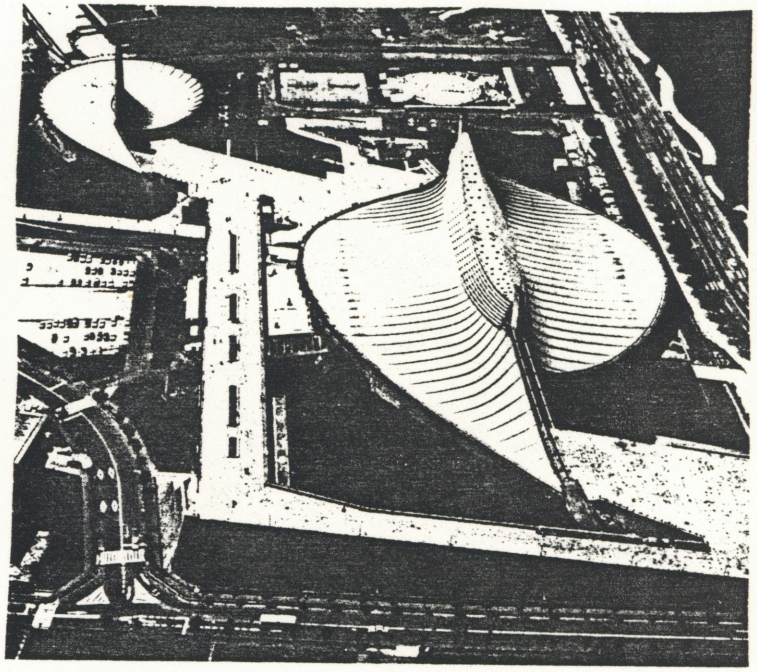
Utilize daylighting and natural ventilation potential.

Training and data collecting portion of the facility designed to be used from 8:00 A.M. to 8:00 P.M.

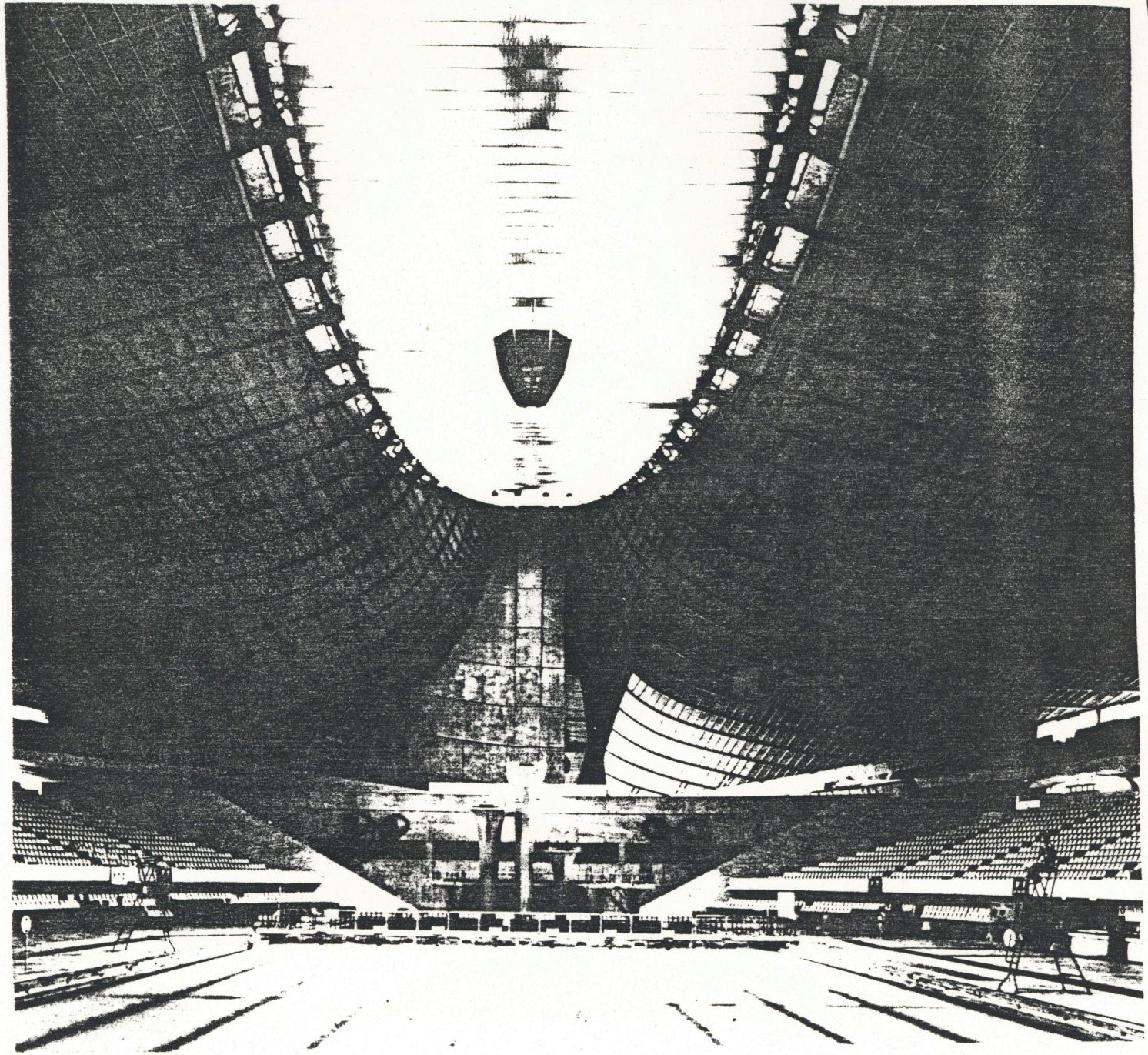
Support functions designed to be used 24 hours per day.

CASE STUDIES

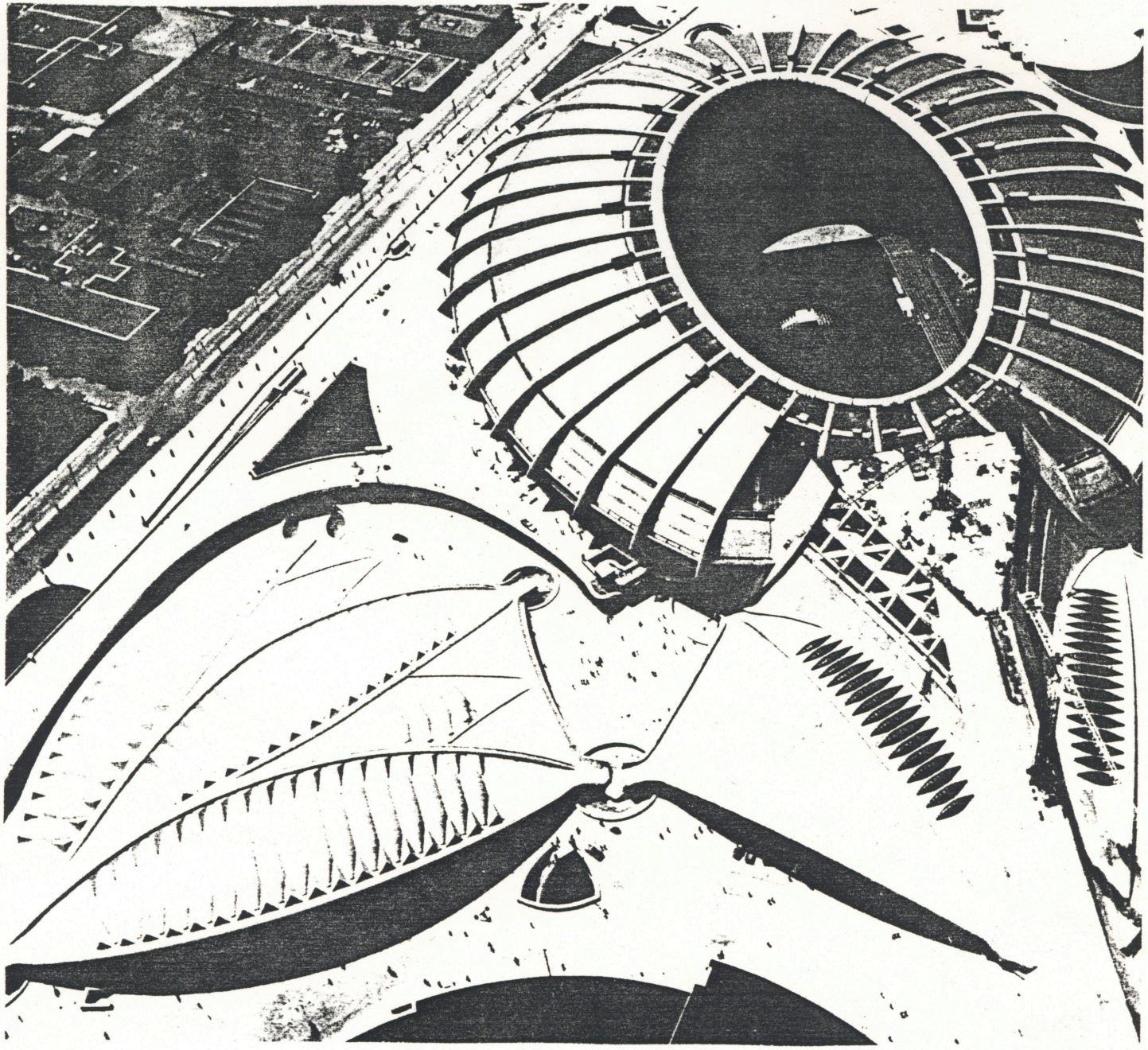




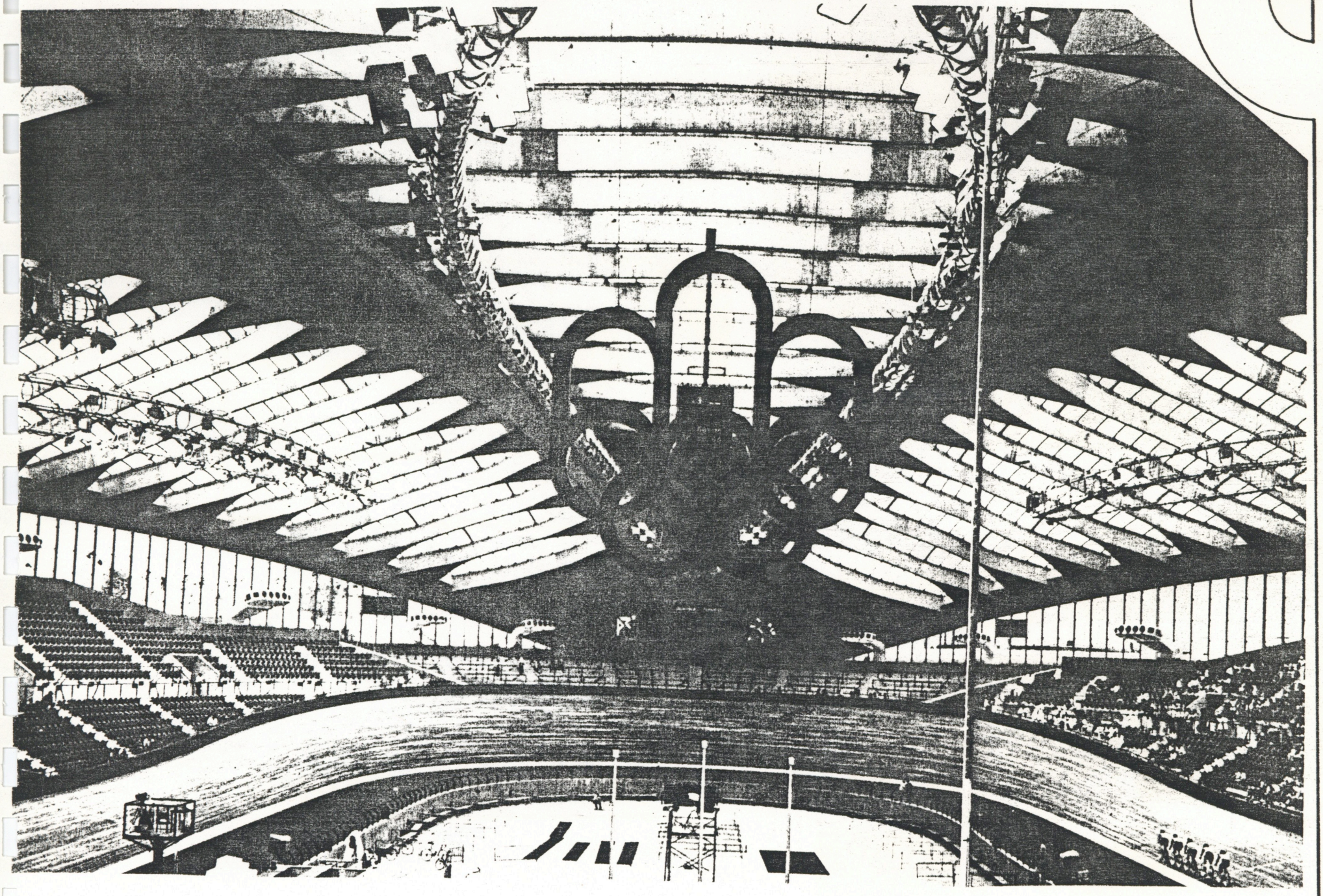
TOKYO 1964



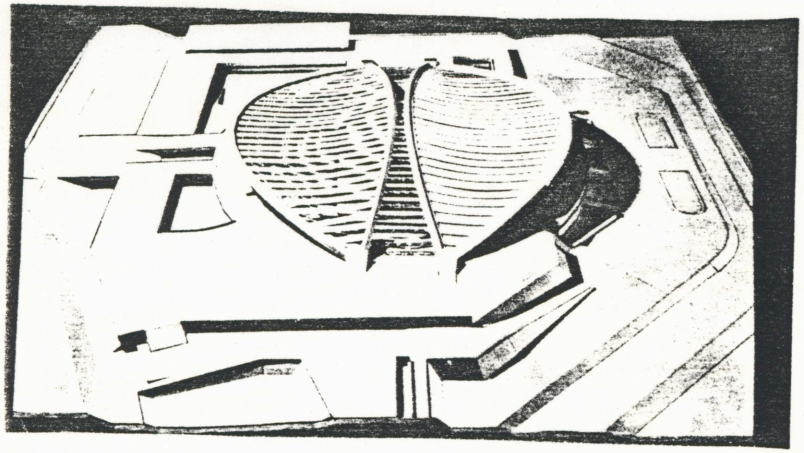
TOKYO 1964

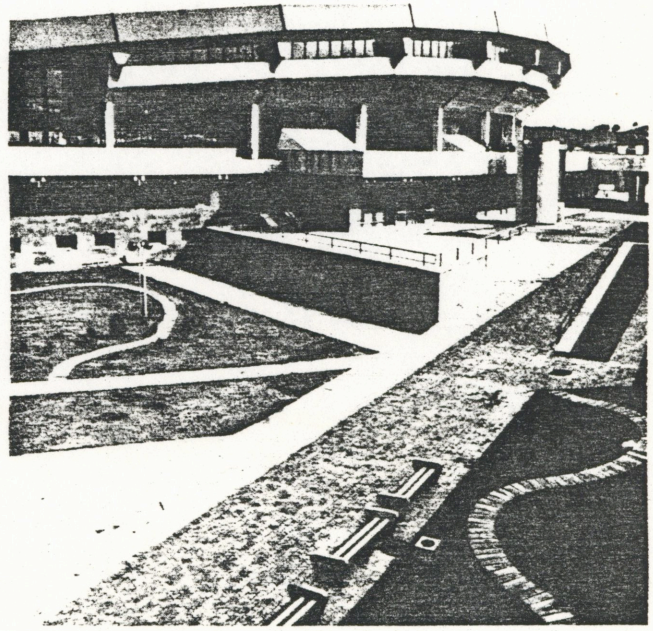


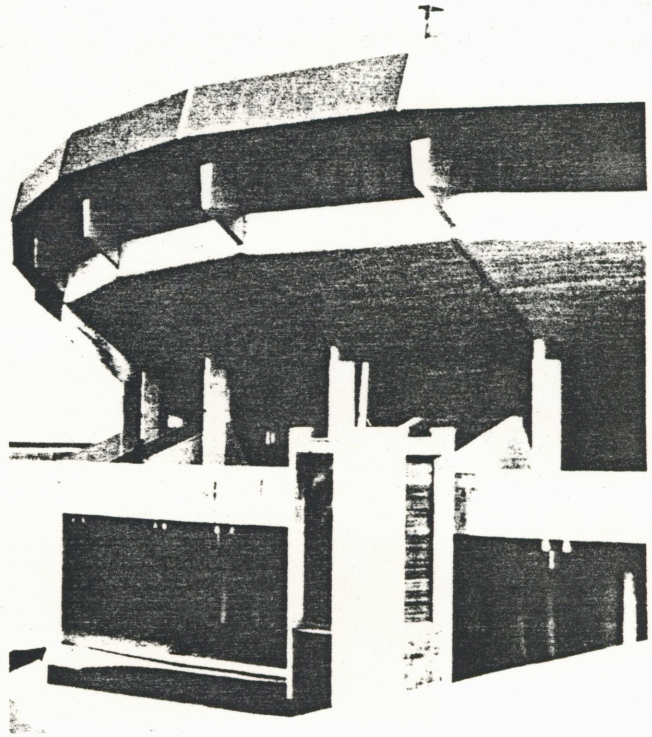
MONTREAL 1976



MONTREAL 1976

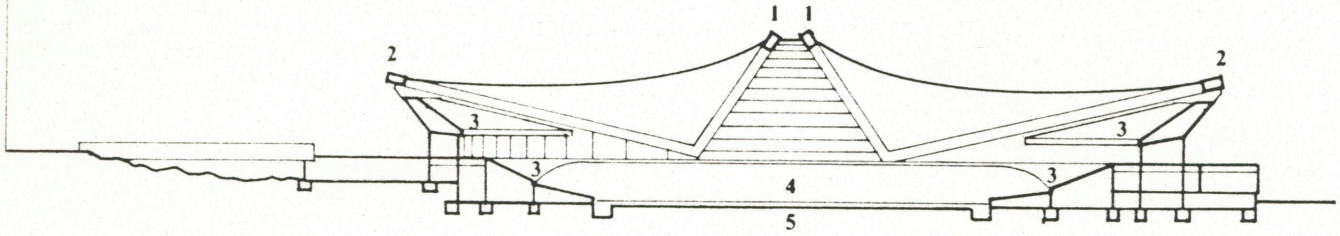


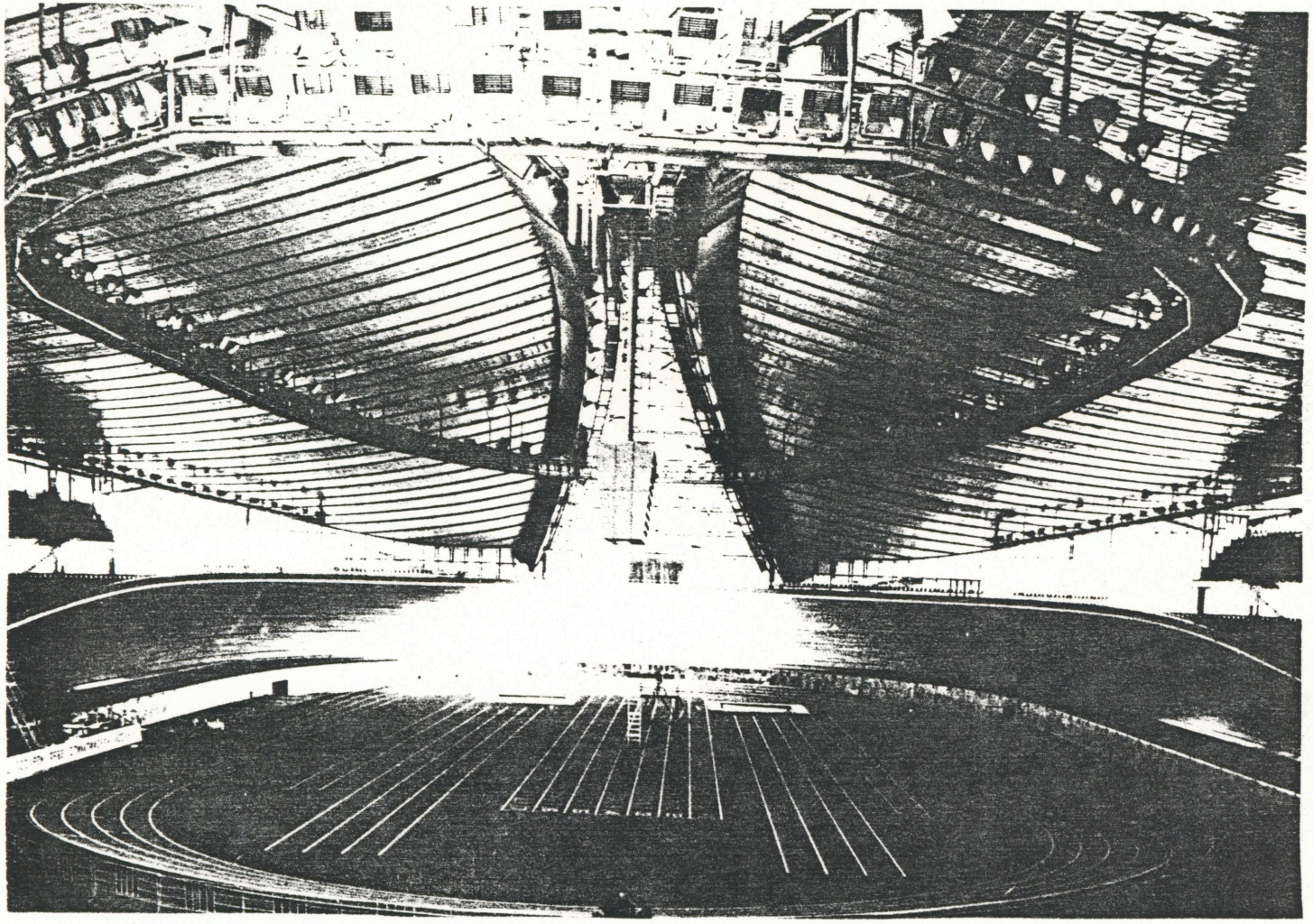




MOSCOW 1980

Section through Velodrome
1. Inner arches 2. Outer arches 3. Grandstands
4. Cycling track 5. Infield





MOSCOW 1980

DESIGN PROCESS

DESIGN PROCESS

Identify problem.

Identify site characteristics.

Initial programming and research

Produce quick schematic sketches.

Modify and develop program.

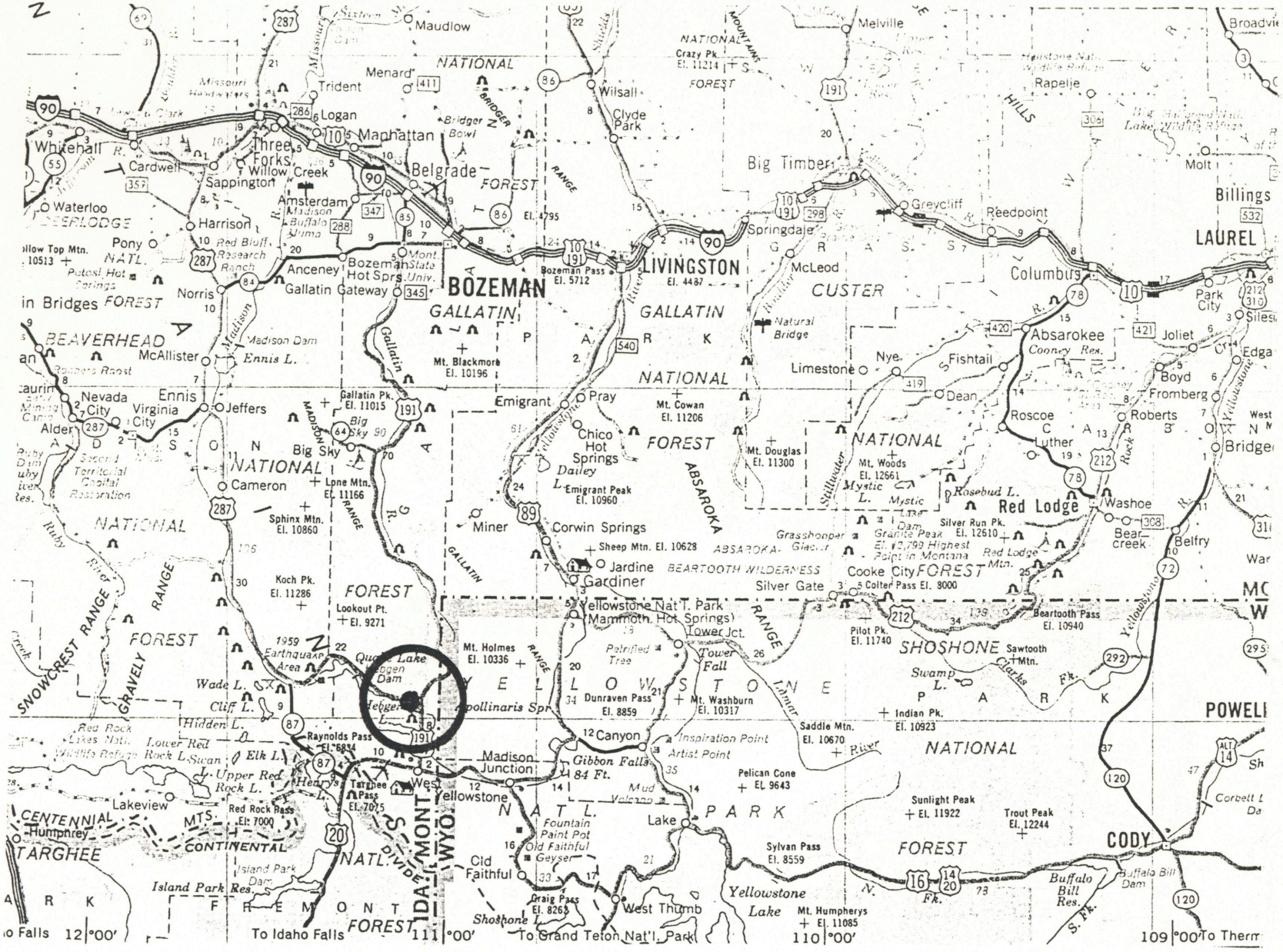
Basic scheme emerges.

Create and judge broad range of alternatives

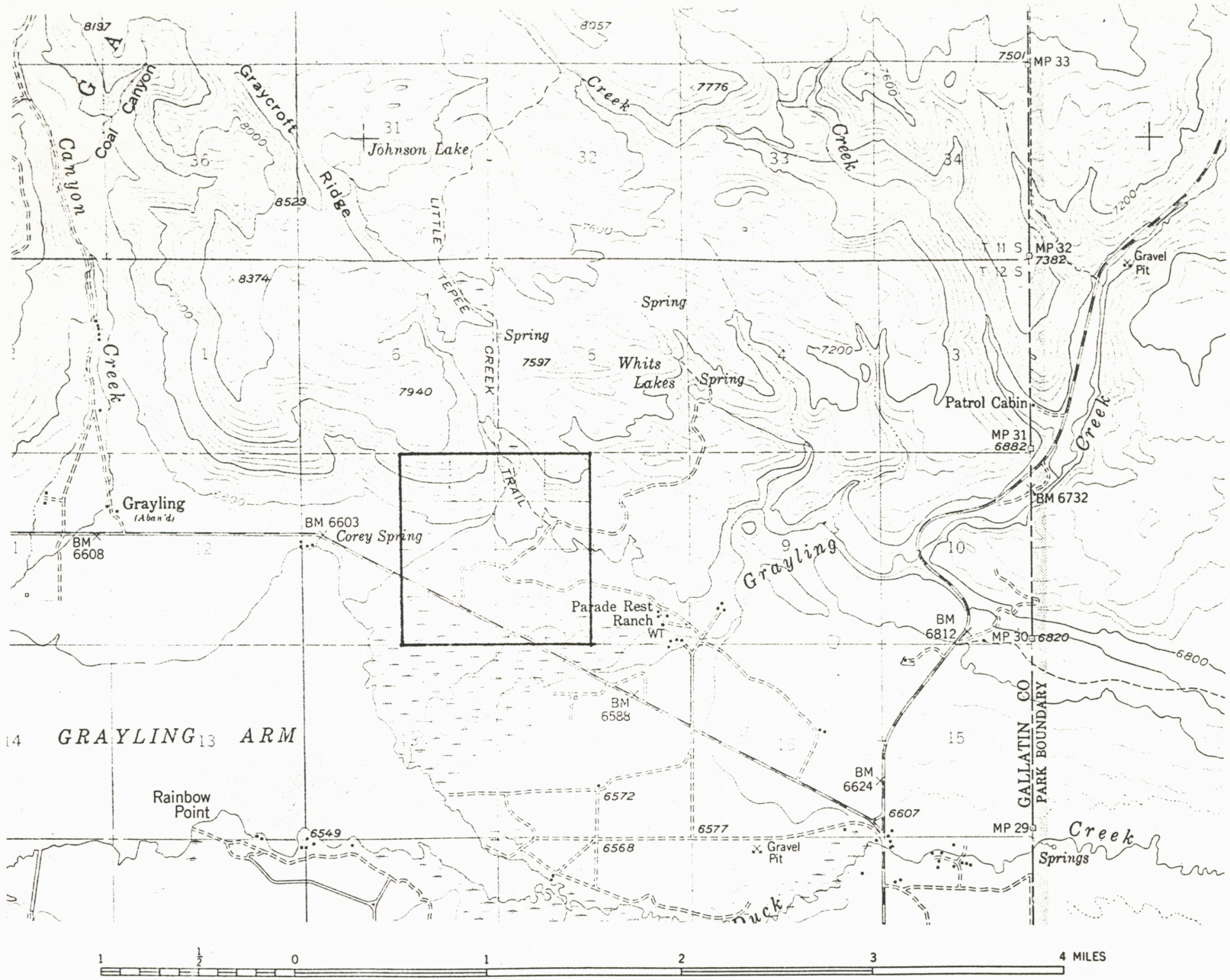
Modify and develop program further.

Carry design forward in plan, elevation, section, and perspective.

SITE ANALYSIS



VICINITY MAP



VICINITY MAP

SITE ANALYSIS

The site is located 10½ miles to the north of West Yellowstone, Montana. It's latitude is 44°80'. U.S. Highway 287 borders the south property line of the privately owned land (Parade Rest Ranch property). One quarter mile to the south of U.S. Highway 287 is the Grayling Arm of Hebgen Lake. One and one half miles to the west, following U.S. Highway 287, is Red Canyon, the proposed site for Ski Yellowstone, an alpine ski area. U.S. Forest Service land extends north from the northern property line of the Parade Rest Ranch.

The soil in my proposed building site is sandy loam, layers of shale, and limestone bedrock. The south-west portion of the property, proposed for my lower loop cross country ski course, is composed of sand and silt. It is essentially an alluvial plain for Little Teepee Creek from Johnson Lake, two miles to the north.

My proposed building site is an undulating, south facing slope. Spring runoff drains to the southwest and collects in Teepee Creek. The existing Forest Service access road to Whits Lake cuts through the property, taking advantage of the natural "benches" for easy traversing of the slopes. My building site is on one of the natural "benches" just to the north of the Forest Service road. This site is relatively level, with higher ground to the north, east and west.

There is an existing earthquake fault line formed in 1959, that is 1½ miles to the west, running directly through the proposed Ski Yellowstone area and extending north through Red Canyon.

Vegetation in the southern portion of my proposed building site consists mainly of sagebrush and native grasses. The areas directly bordering my building site to the east, west, and north are overgrown with dense thickets of quaking aspen. Further to the north, on Forest Service land, are lodgepole pine trees, fir and spruce trees.

A steep mountain range, Graycroft Ridge, is directly to the north of my site, providing protection from northwest winter winds.

The climatic conditions, together with the natural environment, are ideal for the development of this training center. The winters are tolerably cold with the average January daytime temperature of 13°. The average snowfall is 300 inches, and is skiable from late September or early October to May.

The number of degree days for this area is 10,385, compared to Bozeman's 8,230.

The potential for active and passive solar space and water heating is excellent. The south facing building site is completely unobscured from the low angle winter sun.

Number of clear days = 324 per/year average

BTU's/S.F. of vertical, south facing double glazing in Jan = 923

Noon sun angle on December 21 = 22½°

Summers in this area are short but very pleasant. The average daytime temperature for the month of July, is 63°. This temperature is ideal for rollerskiing, running, cyclocross and bicycle road race training outdoors.

The prevailing summer breezes come from the southwest (Hebgen Lake) providing excellent natural ventilation potential for my building.

The annual average precipitation is only 30.0", most of which falls in the month of June.

The views in this area are extraordinary, ranging from the Continental Divide to the southwest to Hebgen Lake and Yellowstone Park to the south and southeast. To the northwest is Mount Hebgen and Graycroft Ridge of the Gallatin National Forest is directly to the north. Views as beautiful as these provide a beautiful backdrop and environment in which to train.

In summary, since the site is characterized by a beautiful natural environment of varied topography, vegetation, and views, my plan must work together with it, complimenting its features and being complimented and strengthened in return.

SPACE ANALYSIS

SPACE

Velodrome, inside circumference is 333.3 meters, 20' wide at all points, infield is 240' x 480' oval shape
straightaways banked at 16°
corners banked at 33°

ACTIVITY DESCRIPTION

Bicycle racing and training
Running
Spectator observation
Warming-up in infield
Indoor soccer and volleyball

NO. OF USERS

Maximum of 30 cyclists at one time

USER REQ'MENTS

Clear vision across velodrome infield

AREA REQ'D

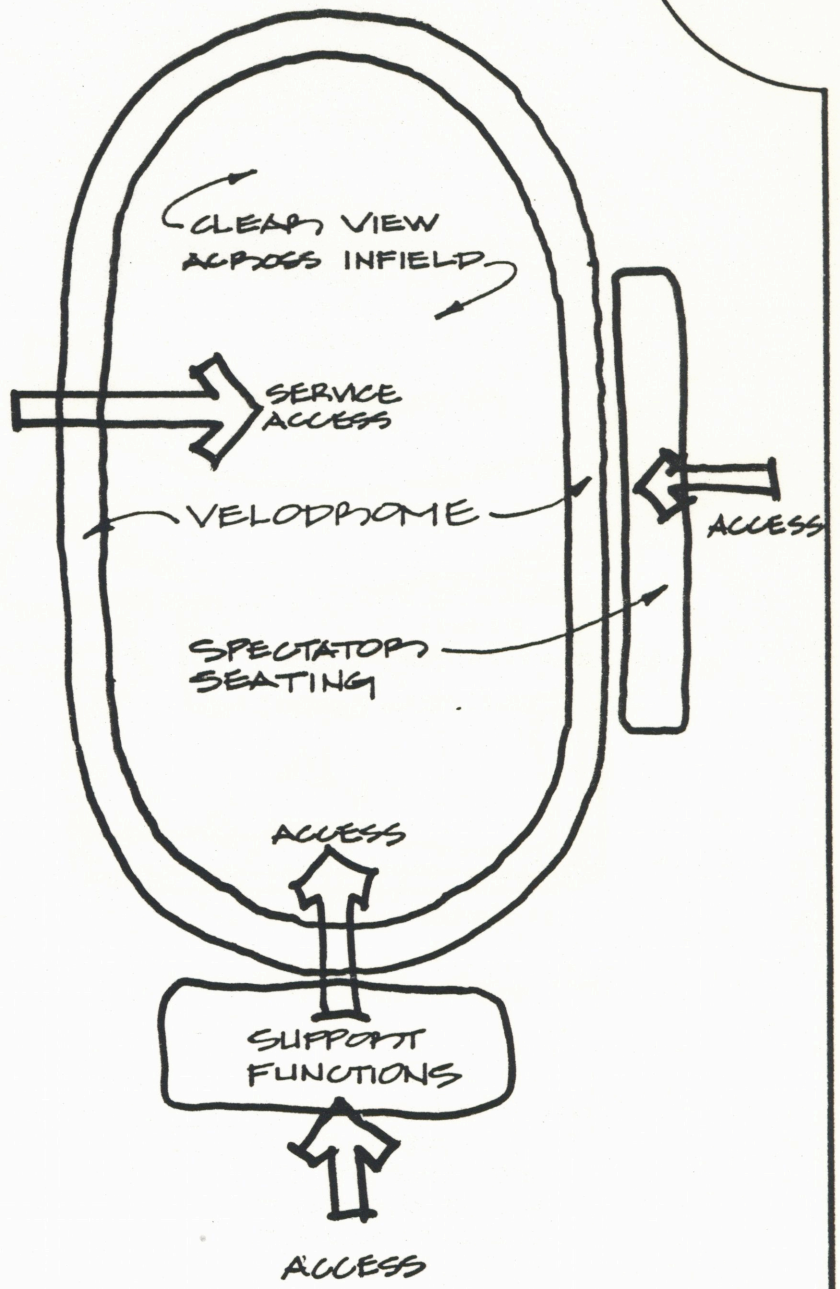
145,000 S.F. including infield

ADJACENCY REQ'MENTS

Cycling equipment room
Locker rooms
Bio. feedback room
Weight lifting room
Physician's office

THERMAL, VISUAL REQ'MENTS

Radiant heating, mechanical ventilating system, daylighting
Auxiliary lighting



SPACE Cycling equipment room

ACTIVITY DESCRIPTION Bicycle storage and maintenance

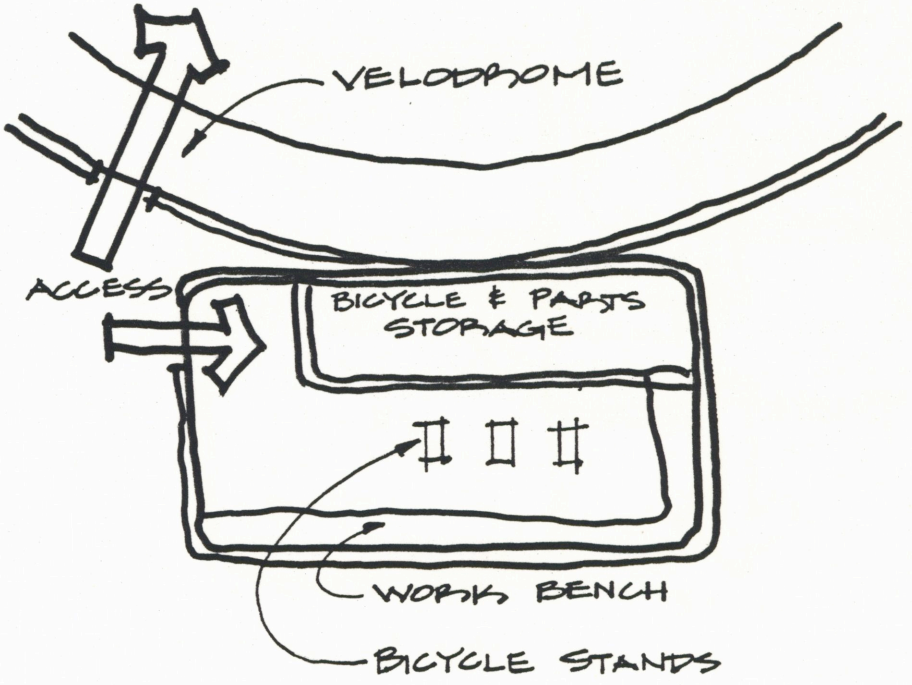
NO. OF USERS Each cyclist maintains his own bicycle

USER REQ'MENTS
Bicycle stands and workbenches
Bicycle racks
Maintenance tools
Parts storage shelves

AREA REQ'D 1,200 S.F.

ADJACENCY REQ'MENTS Velodrome

THERMAL, VISUAL REQ'MENTS Radiant heating



SPACE Skiing equipment room

ACTIVITY DESCRIPTION Ski storage and maintenance

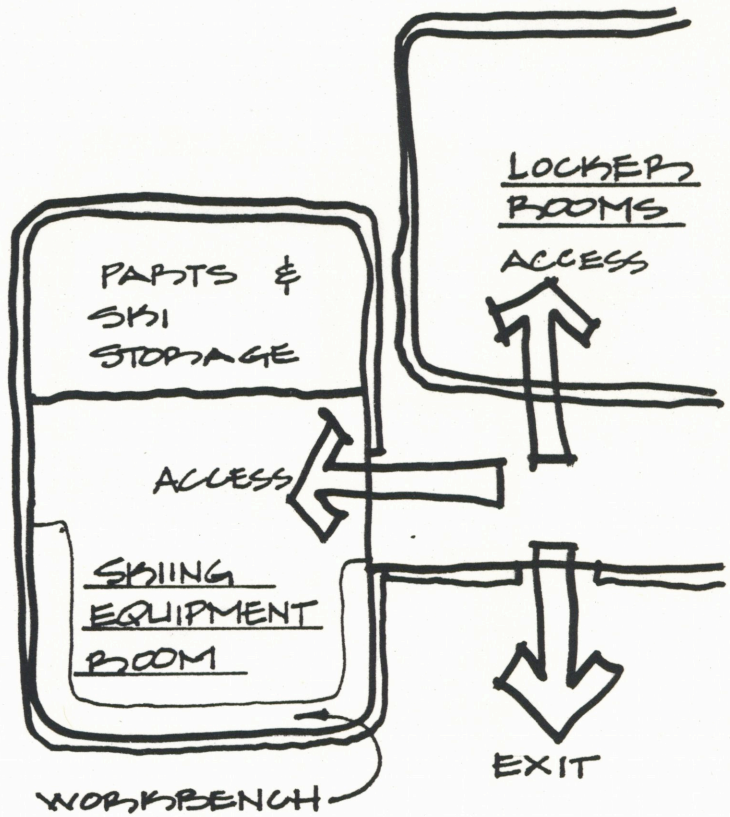
NO. OF USERS Each skier maintains his own equipment

USER REQ'MENTS
Workbenches
Maintenance tools
Ski storage racks
Parts storage shelves

AREA REQ'D 1,200 S.F.

ADJACENCY REQ'MENTS Exterior exit

THERMAL, VISUAL REQ'MENTS Radiant heating



SPACE

Locker rooms (2) w/
Showers (2)
Toilet/lavatory rooms (2)

ACTIVITY DESCRIPTION

Changing of clothes
Showering
Using the toilet room (reading?)

NO. OF USERS

30 athletes maximum at a time

USER REQ'MENTS

One locker per athlete

AREA REQ'D

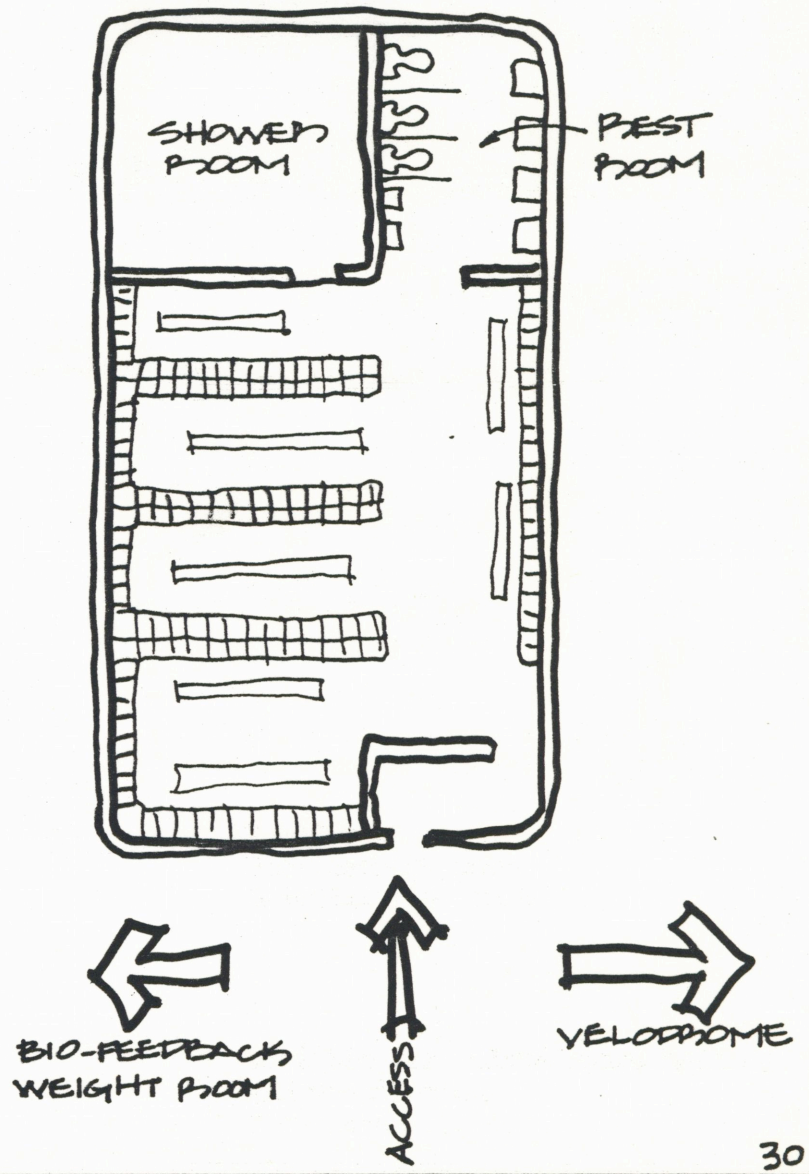
1,500 S.F. each

ADJACENCY REQ'MENTS

Velodrome
Bio-feedback room
Weightlifting room

THERMAL, VISUAL REQ'MENTS

Variable air volume space heating and ventilation
Flourescent lighting



SPACE

Bio-feedback room

ACTIVITY DESCRIPTION

Blood chemistry profiles
Muscle biopsies
Heart and oxygen consumption monitoring

NO. OF USERS

10 athletes maximum at one time

USERS REQ'MENTS

Stationary bicycle and skiing machines
Pulse and oxygen consumption monitoring machines
Muscle biopsy equipment
Blood sampling equipment

AREA REQ'D

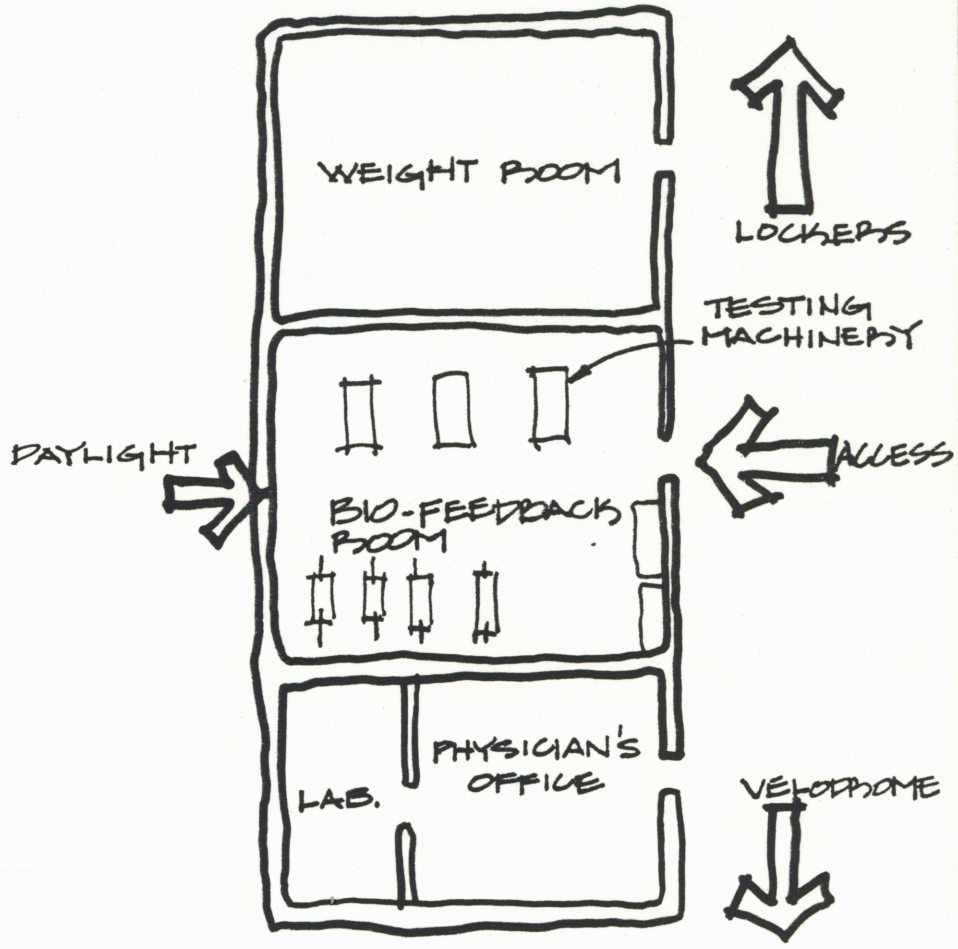
1,000 S.F.

ADJACENCY REQ'MENTS

Physician's office
Weightlifting room
Velodrome

THERMAL, VISUAL REQ'MENTS

Radiant heating
Mechanical ventilation
Daylighting, flourescent lighting



SPACE Weightlifting room

ACTIVITY DESCRIPTION Weightlifting

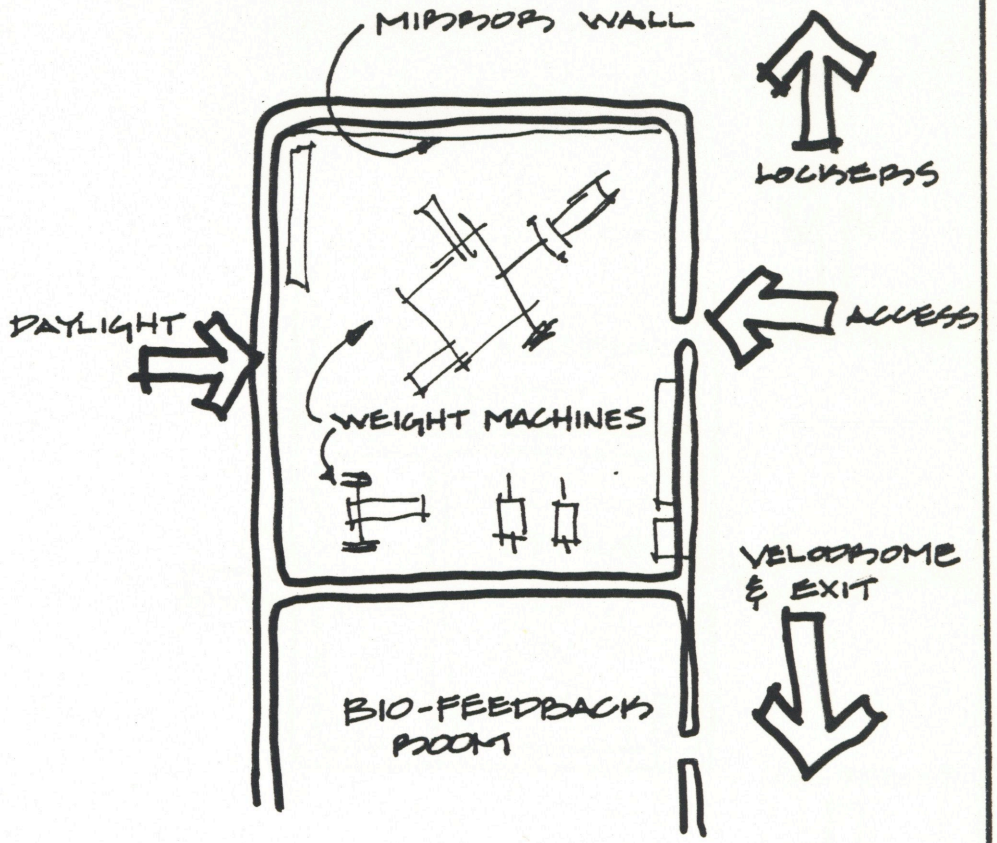
NO. OF USERS 10 athletes maximum at one time

USER REQ'MENTS Nautilus weightlifting machines

AREA REQ'D 1,000 S.F.

ADJACENCY REQ'MENTS
Bio-feedback room
Locker rooms
Velodrome

THERMAL, VISUAL REQ'MENTS
Radiant heating
Mechanical ventilation
Daylighting, flourescent lighting



SPACE

Physician/Nutritionist office

ACTIVITY DESCRIPTION

Athletes' files
Analysis of muscle biopsies, blood chemistry profiles, pulse and oxygen consumption analysis, diet analysis

NO. OF USERS

One physician/nutritionist in consultation w/one coach and one athlete

USER REQ'MENTS

Office type desk, chairs, filing cabinets
Laboratory equipment
Exam table

AREA REQ'D

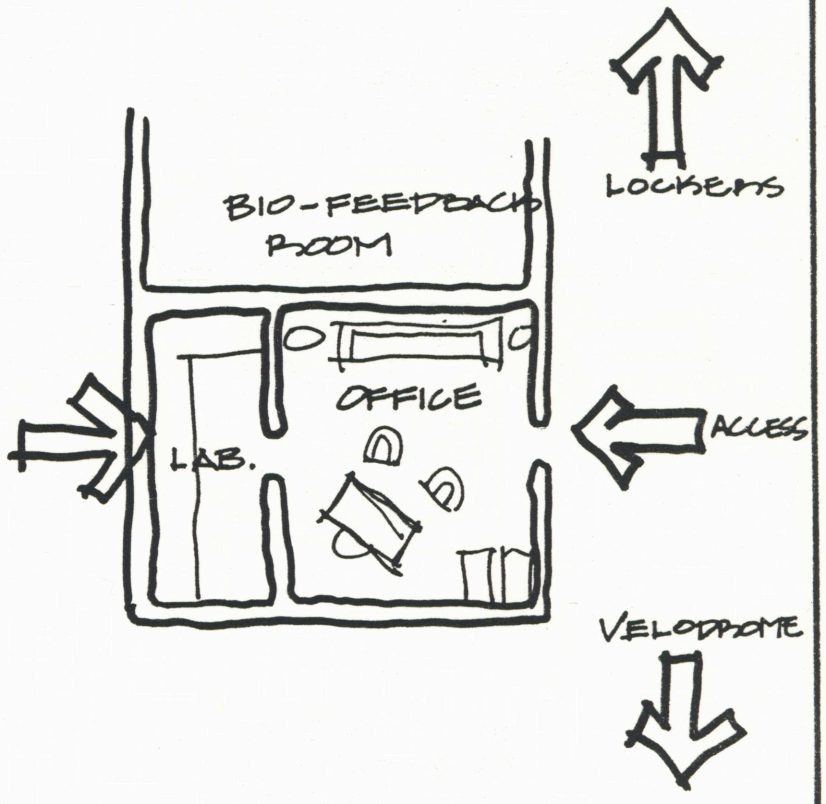
500 S.F.

ADJACENCY REQ'MENTS

Bio-feedback room
Weightlifting room
Velodrome

THERMAL, VISUAL REQ'MENTS

Radiant heating
Daylighting and flourescent lighting
Task lighting



SPACE Foyer

ACTIVITY DESCRIPTION
Transition space into velodrome complex
Social gathering space for visitors/ athletes

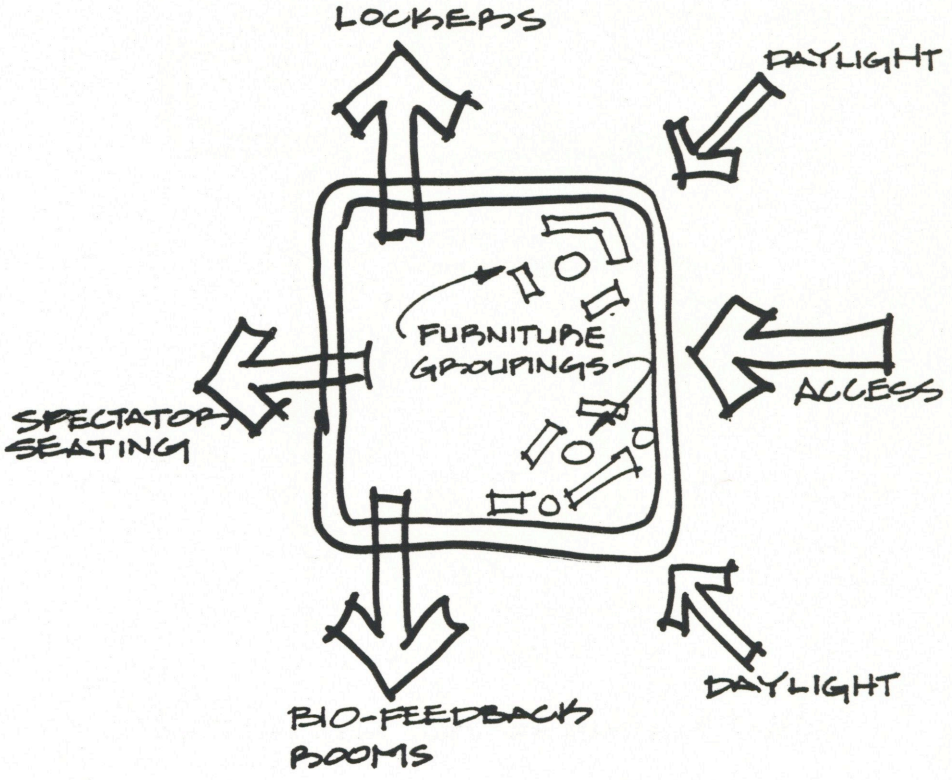
NO. OF USERS 100 people

USER REQ'MENTS Lounge-type seating

AREA REQ'D 3,000 S.F.

ADJACENCY REQ'MENTS Velodrome spectator seating

THERMAL, VISUAL REQ'MENTS
Radiant heating
Mechanical ventilation
Daylighting, flourescent lighting



SPACE Mechanical room

ACTIVITY DESCRIPTION Space and water heating equipment and storage tanks

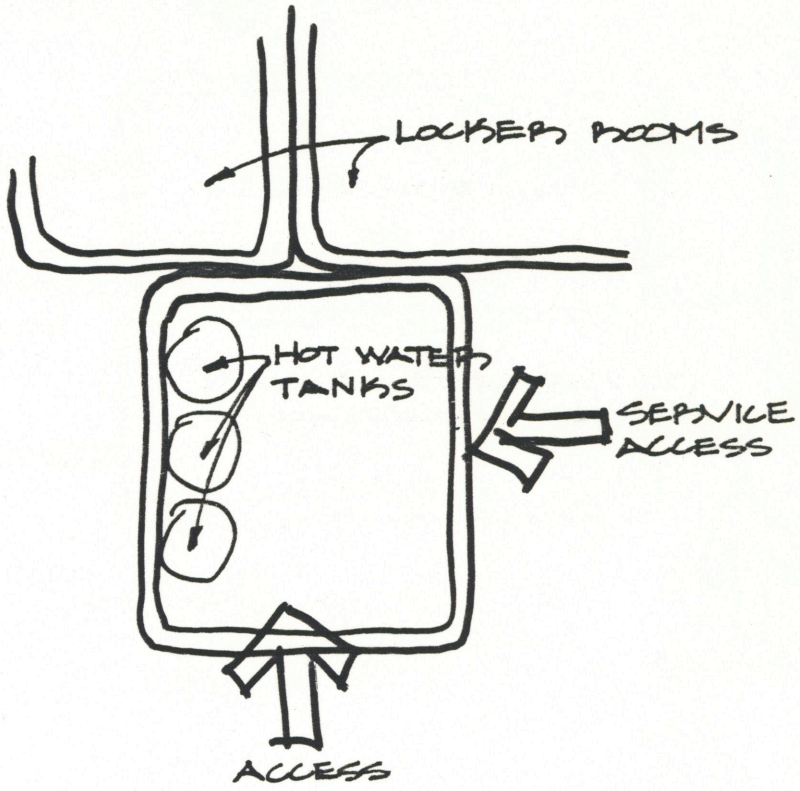
NO. OF USERS One facilities manager

USER REQ'MENTS Access to the equipment for maintenance and repair

AREA REQ'D 300 S.F.

ADJACENCY REQ'MENTS Locker rooms

THERMAL, VISUAL REQ'MENTS Mechanical ventilation
Flourescent lighting



SPACE Administrators Offices

ACTIVITY DESCRIPTION
Business management
Facility management
(maintenance and repair)

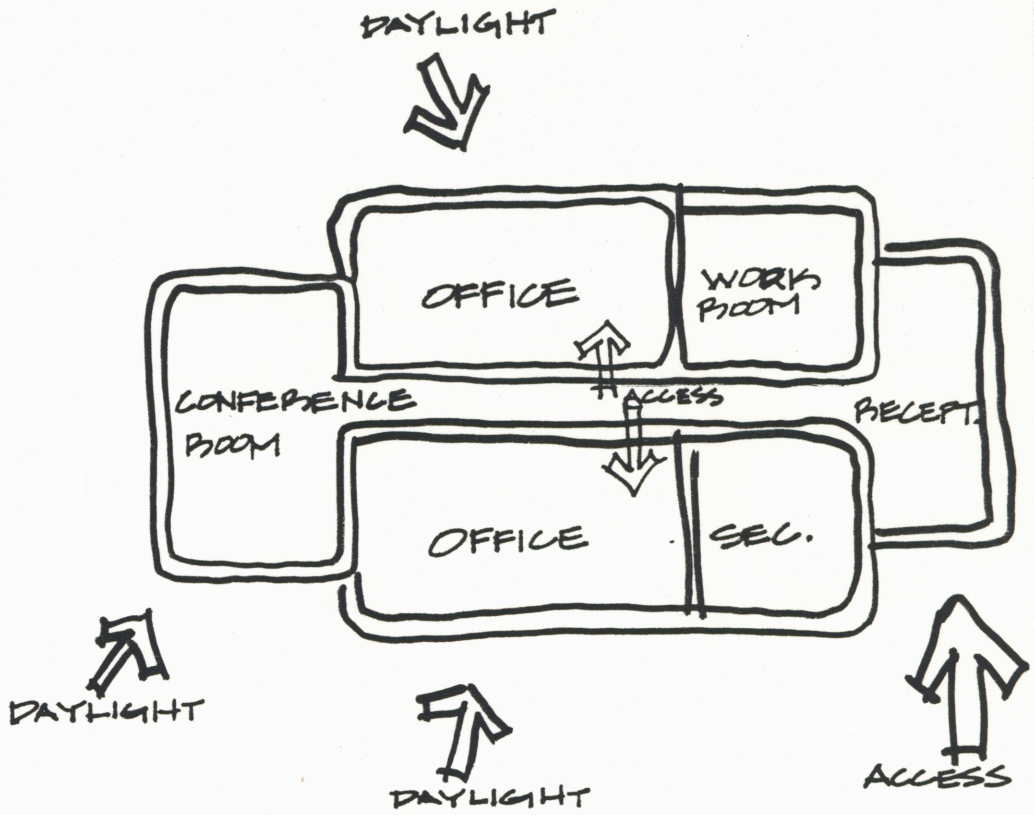
NO. OF USERS 2

USER REQ'MENTS Office furniture

AREA REQ'D 200 S.F. each

ADJACENCY REQ'MENTS
Reception area
Lobby
Conference room
Work rooms

THERMAL, VISUAL REQ'MENTS
Radiant heating
Daylighting
Flourescent lighting, task lighting



SPACE

Secretary area

ACTIVITY DESCRIPTION

Typing, xeroxing
Coffee making
Filing data, correspondence

NO. OF USERS

1

USER REQ'MENTS

Secretarial desk and chair
File cabinets
Counter with sink

AREA REQ'D

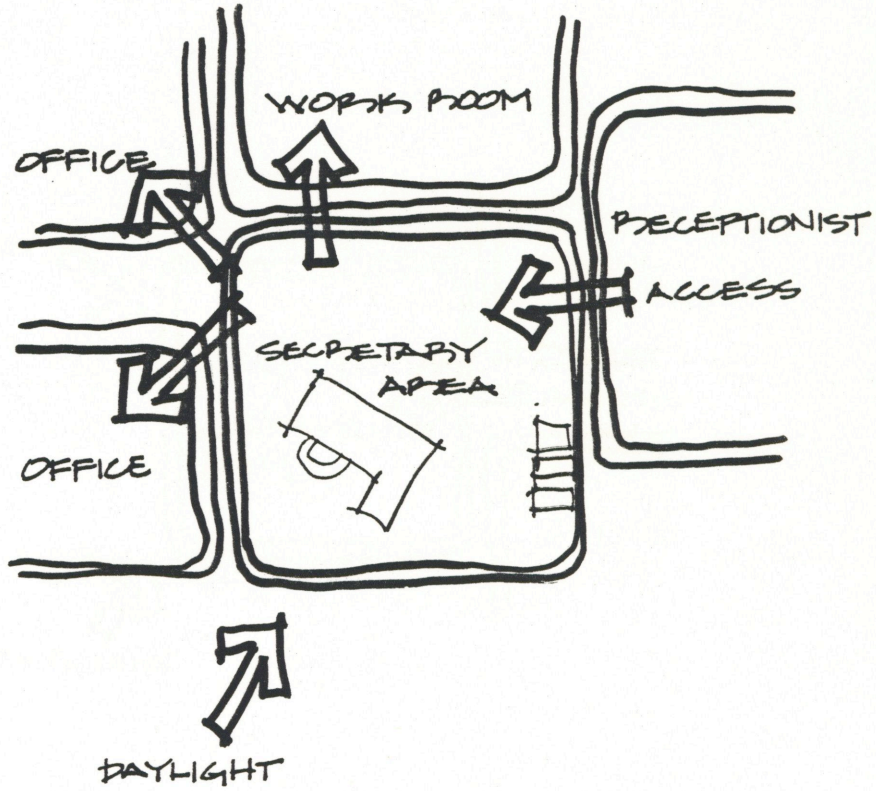
160 S.F.

ADJACENCY REQ'MENTS

Administrators' offices
Reception area
Conference room

THERMAL, VISUAL REQ'MENTS

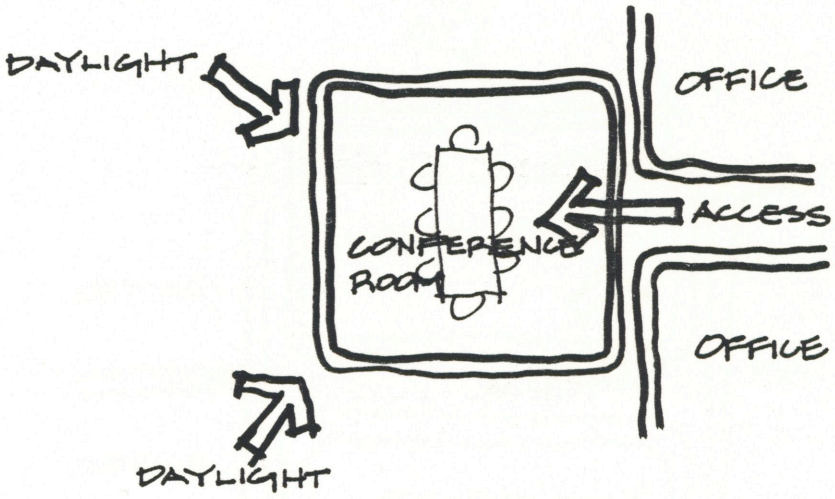
Flourescent lighting
Task lighting
Daylighting



SPACE — Conference room

ACTIVITY DESCRIPTION — Conferences with visitors, salesmen, athletes

NO. OF USERS — Six maximum



USER REQ'MENTS — Conference table and chairs

AREA REQ'D — 200 S.F.

ADJACENCY REQ'MENTS
Administrators' offices
Work room
Reception area

THERMAL, VISUAL REQ'MENTS
Radiant heating
Daylighting
Flourescent lighting

SPACE — Work area

ACTIVITY DESCRIPTION
Coffee preparation area
File cabinets
Zerox machine

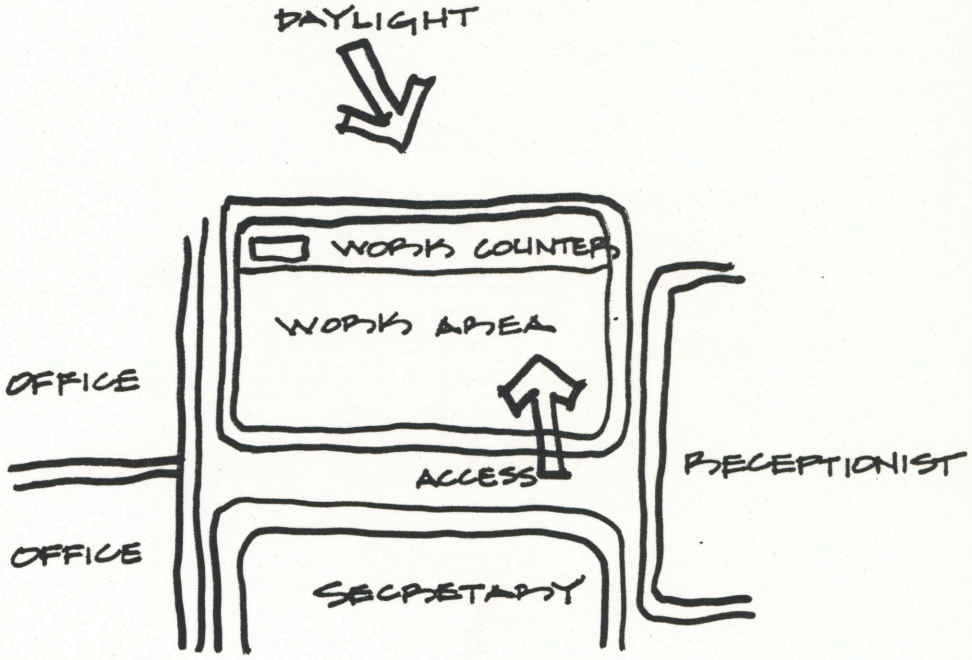
NO. OF USERS — 3

USER REQ'MENTS
Cabinets
Small sink
Closet
File cabinets
Zerox machine

AREA REQ'D — 160 S.F.

ADJACENCY REQ'MENTS
Administrators' offices
Conference room
Reception area

THERMAL, VISUAL REQ'MENTS
Radiant heating
Flourescent lighting



SPACE

Secretary/Receptionist area

ACTIVITY DESCRIPTION

Receiving of visitors
Normal secretarial activities

NO. OF USERS

1

USER REQ'MENTS

Secretarial desk and chair
File cabinets
Reception counter

AREA REQ'D

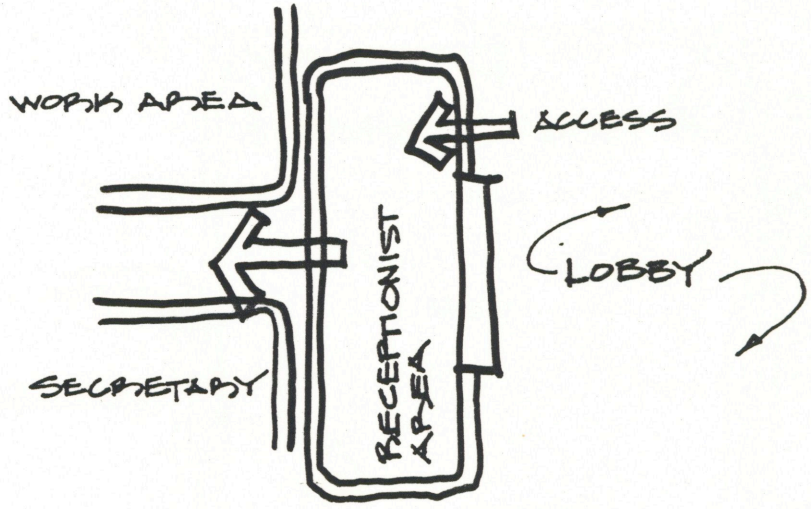
160 S.F.

ADJACENCY REQ'MENTS

Administrators' offices
Lobby
Work area
Conference room

THERMAL, VISUAL REQ'MENTS

Clear view of entire lobby & entrance
Daylighting, flourescent lighting,
Task lighting
Radiant heating



SPACE — Lobby

ACTIVITY DESCRIPTION — Receiving of visitors
Social interaction area
Lounging area

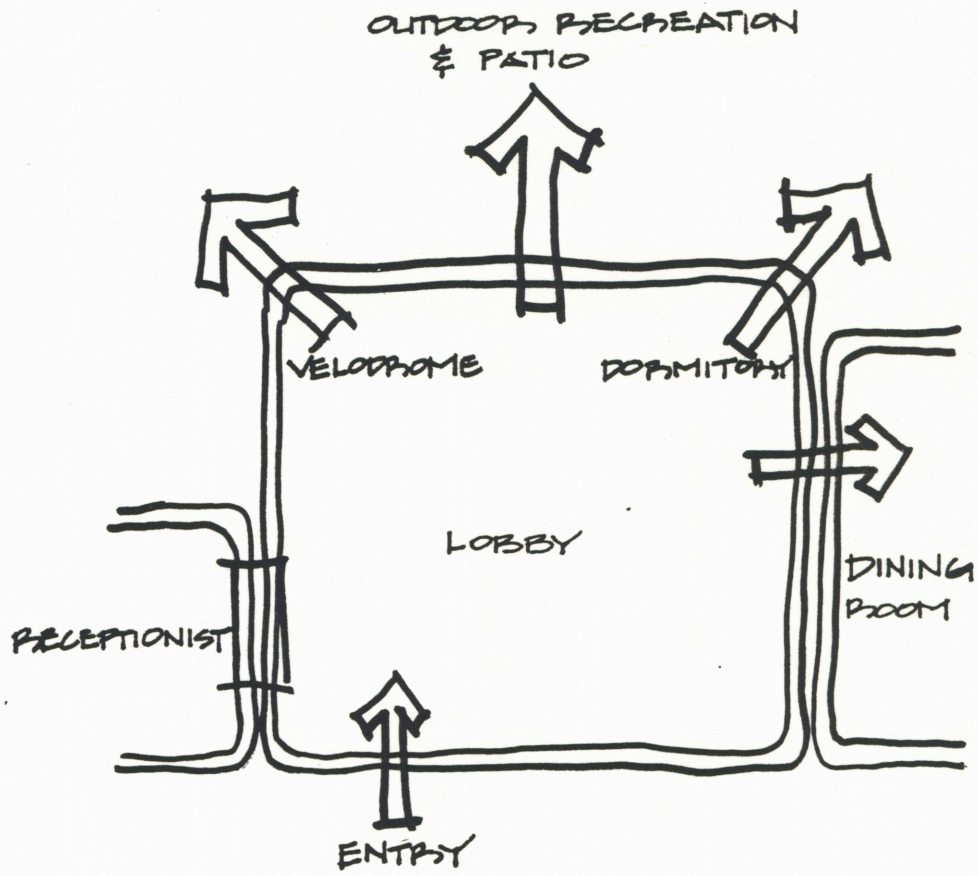
NO. OF USERS — Maximum of 60 people

USER REQ'MENTS — Comfortable seating

AREA REQ'D — 3,000 S.F.

ADJACENCY REQ'MENTS — Men's and women's restrooms
Reception area
Administrators' offices
Entry

THERMAL, VISUAL REQ'MENTS — Flourescent lighting
Daylighting
Radiant heating



SPACE Restrooms

ACTIVITY DESCRIPTION Powder one's nose

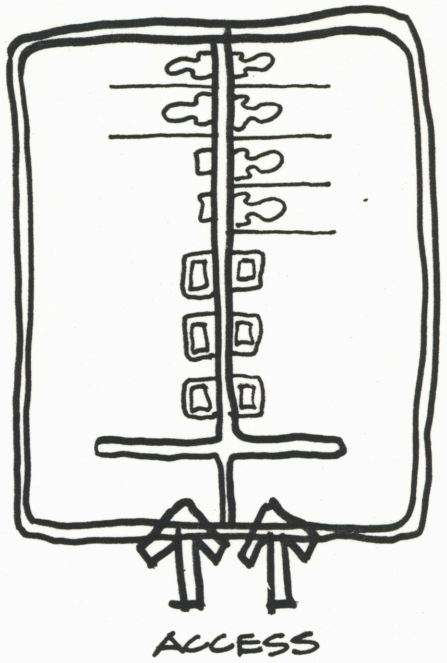
NO. OF USERS 6 maximum at a time

USER REQ'MENTS Toilets, lavatories, urinals

AREA REQ'D 160 S.F. each

ADJACENCY REQ'MENTS
Lobby
Dining Room
Offices

THERMAL, VISUAL REQ'MENTS
Radiant heating
Mechanical ventilation
Flourescent lighting



SPACE Mechanical Room

ACTIVITY DESCRIPTION Contains ventilating equipment and water heating equipment

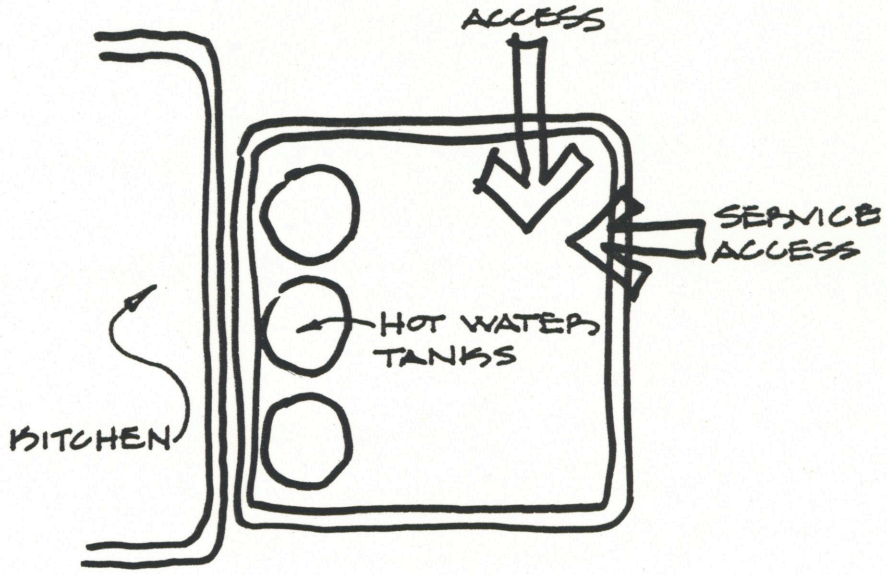
NO. OF USERS ---

USER REQ'MENTS Access to equipment for adjustment and repair

AREA REQ'D 300 S.F.

ADJACENCY REQ'MENTS

THERMAL, VISUAL REQ'MENTS



SPACE
Kitchen

ACTIVITY DESCRIPTION
Food storage, preparation, and distribution

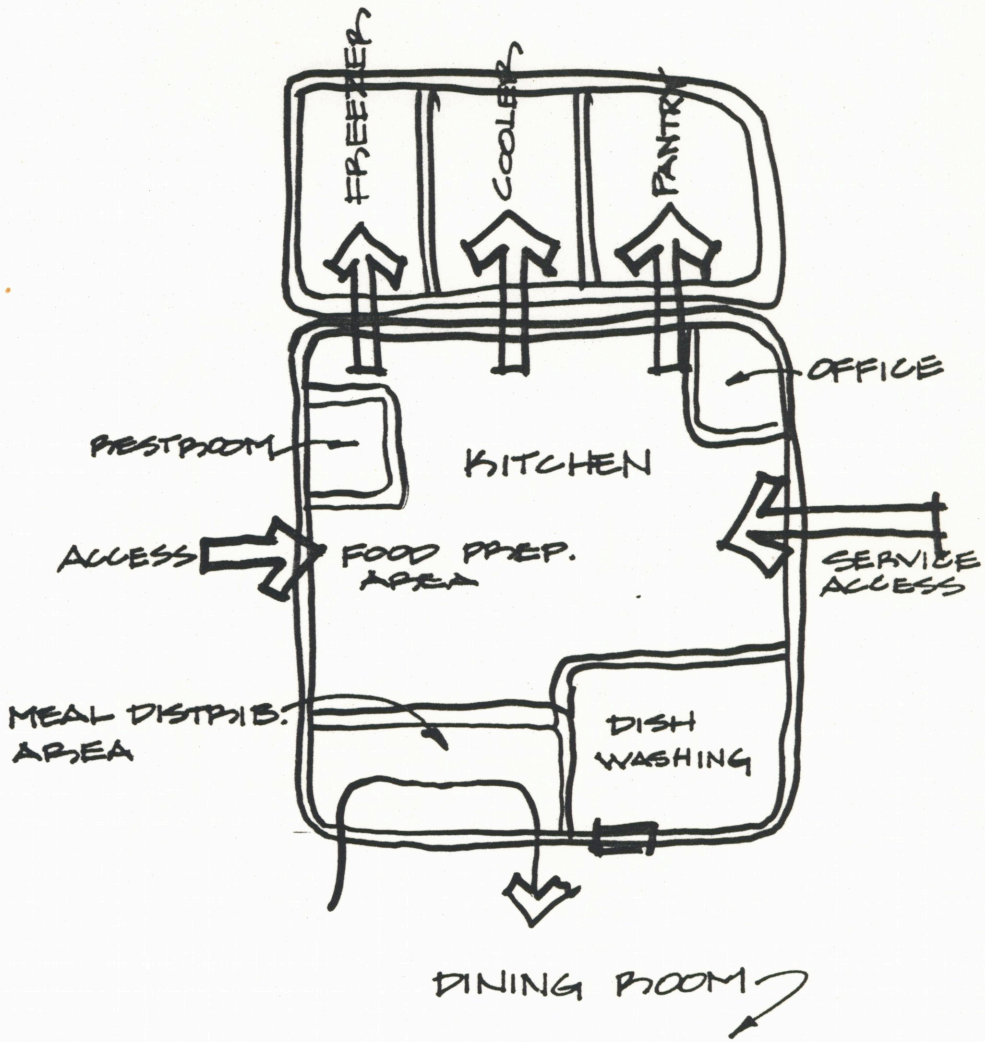
NO. OF USERS
3 full time
6 athlete part-time helpers

USER REQ'MENTS
Large pantry and cooler, and freezer

AREA REQ'D
2,000 S.F. kitchen
150 S.F. pantry
150 S.F. cooler
150 S.F. freezer

ADJACENCY REQ'MENTS
Dining room
Service access

THERMAL, VISUAL REQ'MENTS
Flourescent lighting
Mechanical ventilation
Radiant heating



SPACE Kitchen office

ACTIVITY DESCRIPTION Ordering of supplies
Filing of paperwork

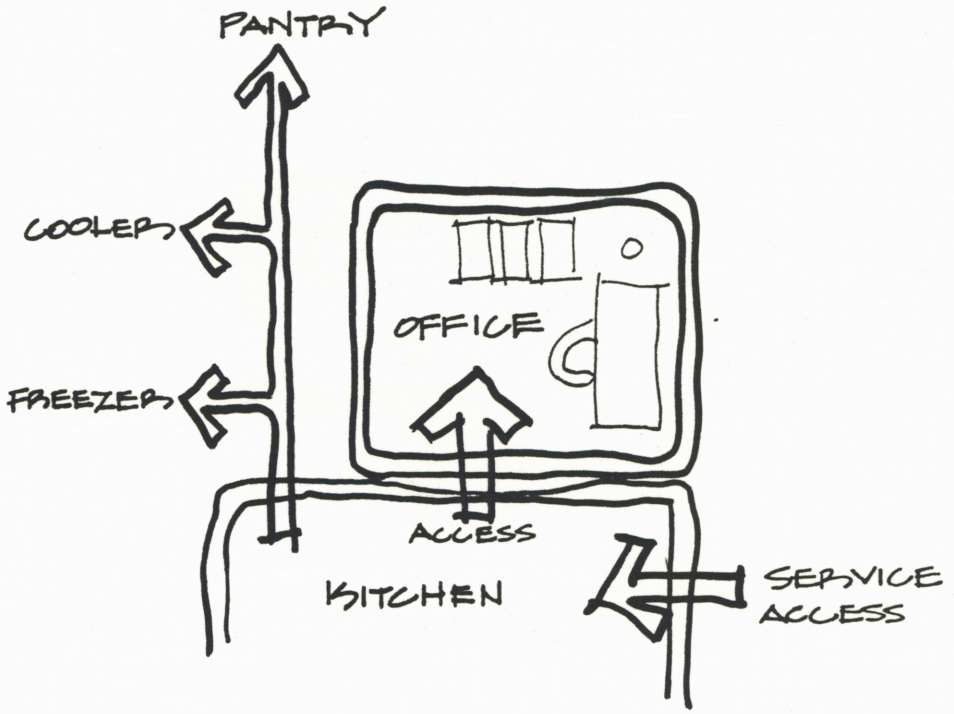
NO. OF USERS 1

USER REQ'MENTS Office desk and chair
File cabinet

AREA REQ'D 80 S.F.

ADJACENCY REQ'MENTS Kitchen

THERMAL, VISUAL REQ'MENTS Radiant heating
Task lighting
Flourescent lighting



SPACE Kitchen restroom

ACTIVITY DESCRIPTION

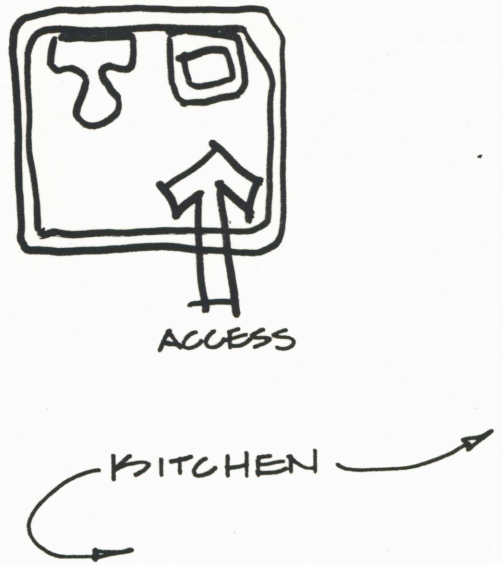
NO. OF USERS 1

USER REQ'MENTS Lavatory
Toilet

AREA REQ'D 30 S.F.

ADJACENCY REQ'MENTS Kitchen

THERMAL, VISUAL REQ'MENTS Flourescent lighting
Mechanical ventilation



SPACE — Dining room

ACTIVITY DESCRIPTION — Dining

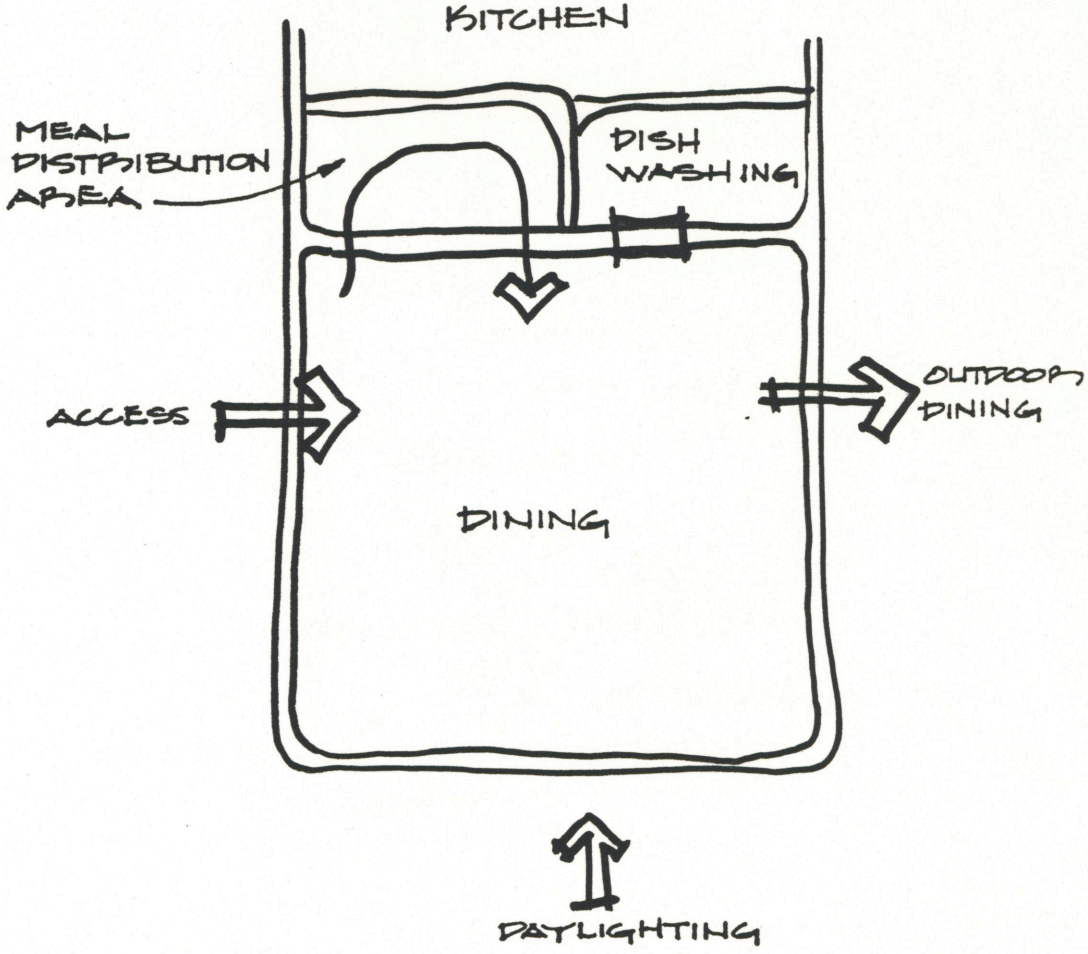
NO. OF USERS — 90 maximum

USER REQ'MENTS — Dining tables and chairs

AREA REQ'D — 2,000 S.F.

ADJACENCY REQ'MENTS — Kitchen

THERMAL, VISUAL REQ'MENTS
Panoramic views
Flourescent lighting
Daylighting
Radiant heating, Mechanical ventilation



SPACE

Bedroom with bathroom

ACTIVITY DESCRIPTION

Sleeping
Bathing

NO. OF USERS

Maximum of 4 persons in each bedroom
12 bedrooms

USER REQ'MENTS

2 bunkbeds
2 large dressers
2 large closets

AREA REQ'D

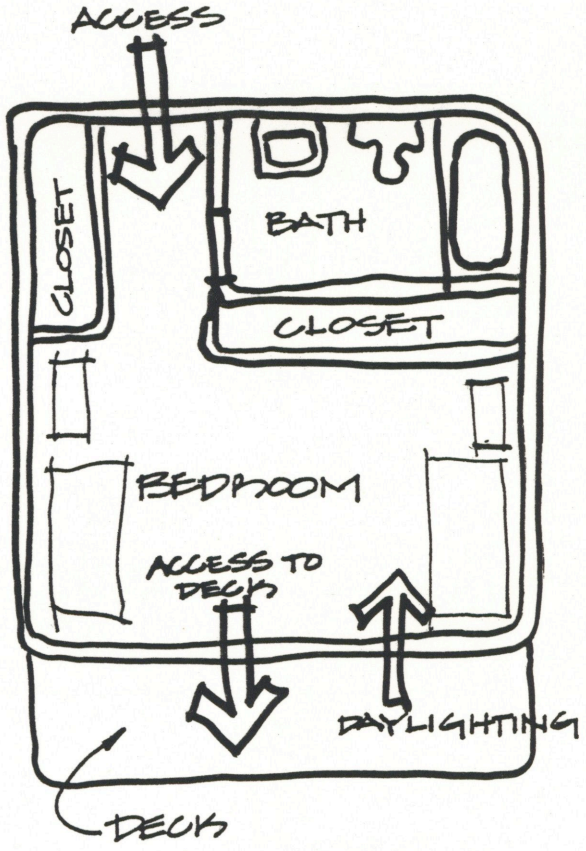
150 S.F.

ADJACENCY REQ'MENTS

Recreation room
Lounge
Outdoor recreation area
Laundry room

THERMAL, VISUAL REQ'MENTS

Radiant heating
Daylighting
Flourescent lighting, task lighting
Outdoor views



SPACE Facility Manager's apartment

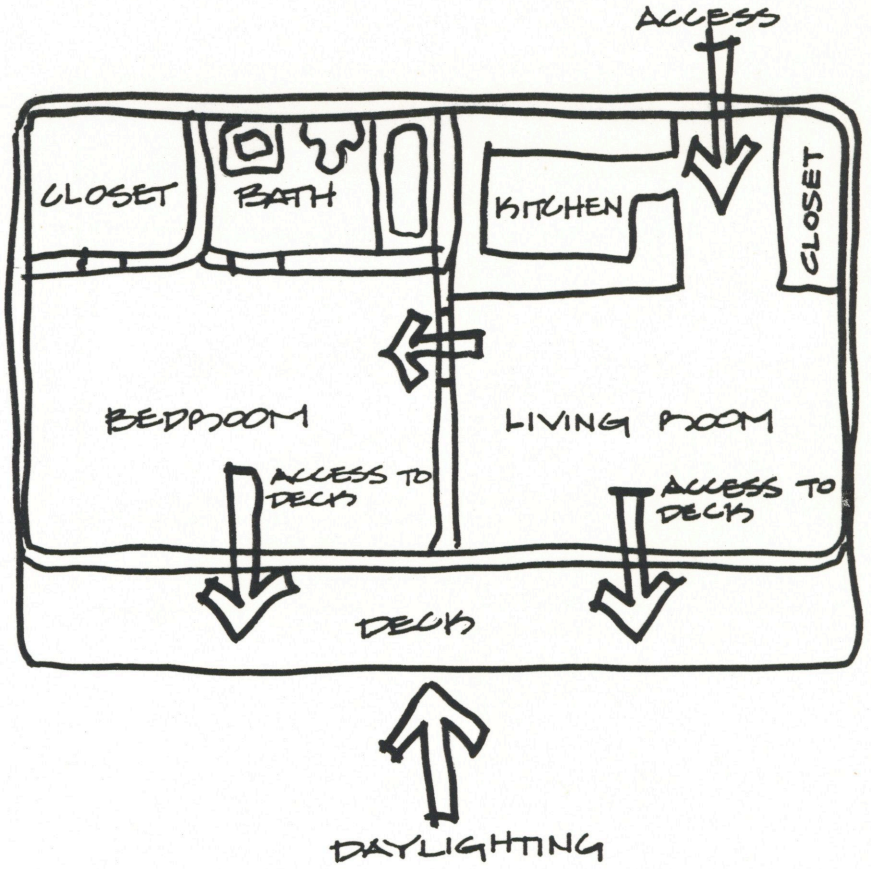
ACTIVITY DESCRIPTION Living quarters

NO. OF USERS 1

USER REQ'MENTS
Kitchen
Living Room
Bedroom
Bathroom

AREA REQ'D 600 S.F.

ADJACENCY REQ'MENTS



THERMAL, VISUAL REQ'MENTS
Radiant heating
Daylighting
Flourescent lighting, task lighting
Outdoor Views

SPACE Cook's Apartment

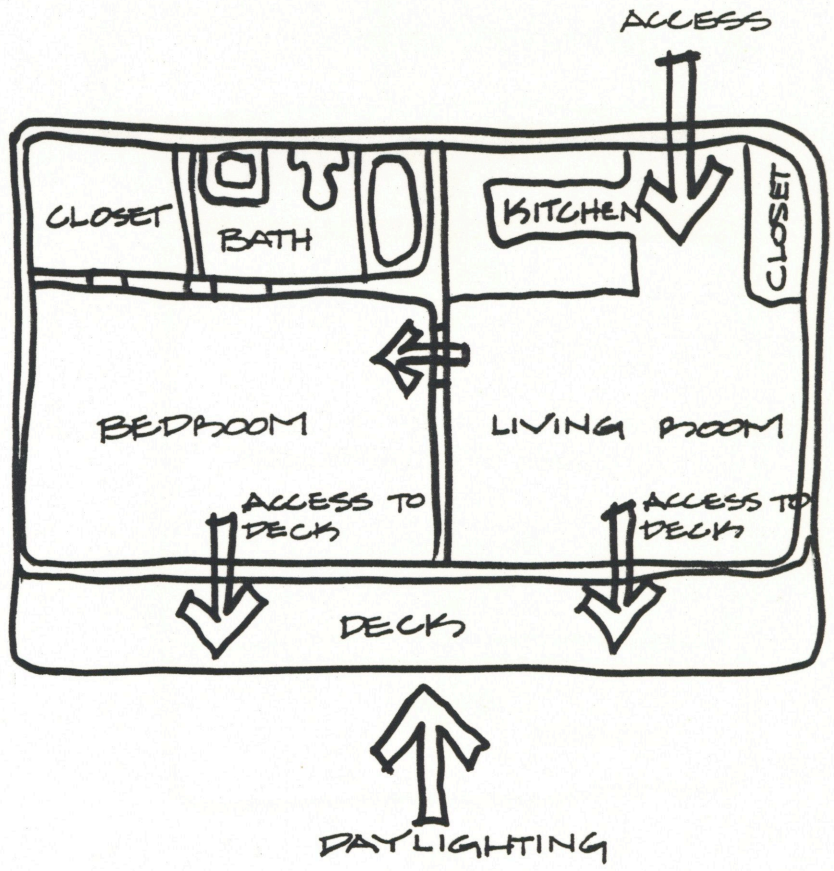
ACTIVITY DESCRIPTION Living Quarters

NO. OF USERS 1

USER REQ'MENTS
Kitchen
Living Room
Bedroom
Bathroom

AREA REQ'D 600 S.F.

ADJACENCY REQ'MENTS



THERMAL, VISUAL REQ'MENTS
Radiant heating
Daylighting
Flourescent lighting, task lighting
Outdoor Views

SPACE Recreation room

ACTIVITY DESCRIPTION
Watching television
Playing video games, pool, ping pong

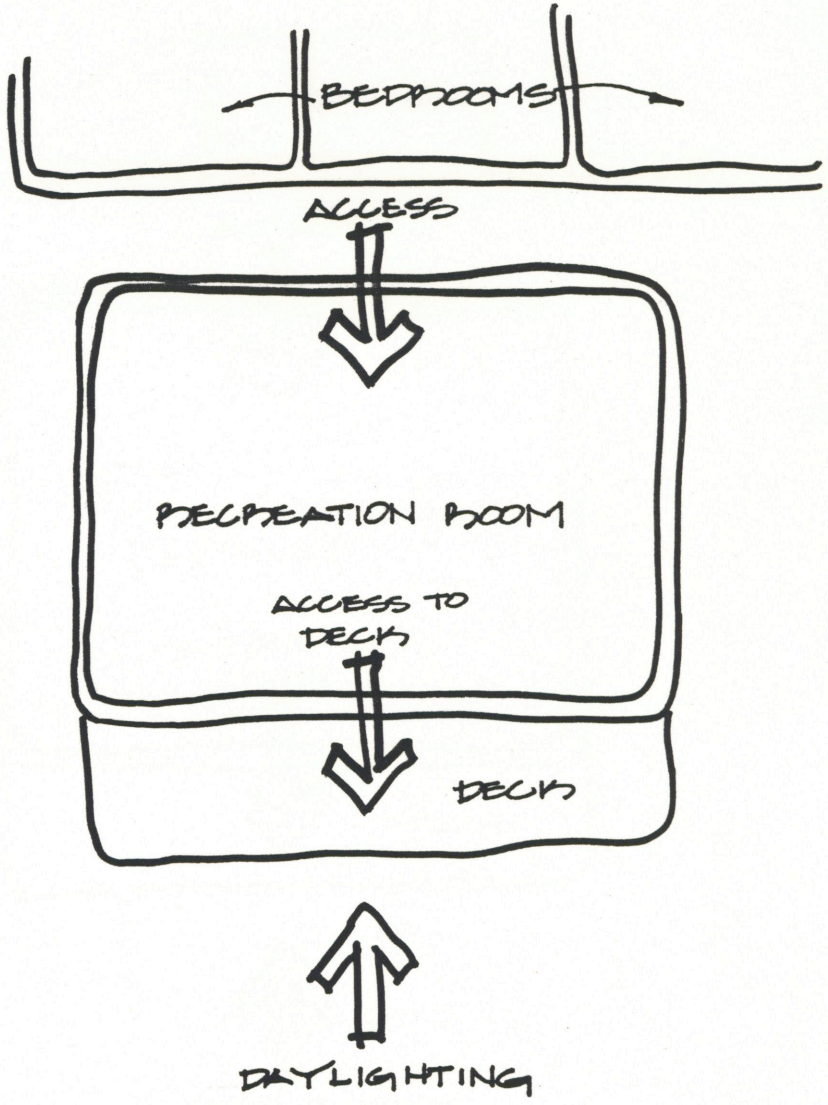
NO. OF USERS 10 maximum

USER REQ'MENTS
Television, easy chairs
Video games
Ping pong table
Pool table

AREA REQ'D 600 S.F.

ADJACENCY REQ'MENTS Bedrooms

THERMAL, VISUAL REQ'MENTS
Radiant heating
Outdoor views
Mechanical ventilation
Flourescent lighting



SPACE Lounge

ACTIVITY DESCRIPTION Listening to music
Reading

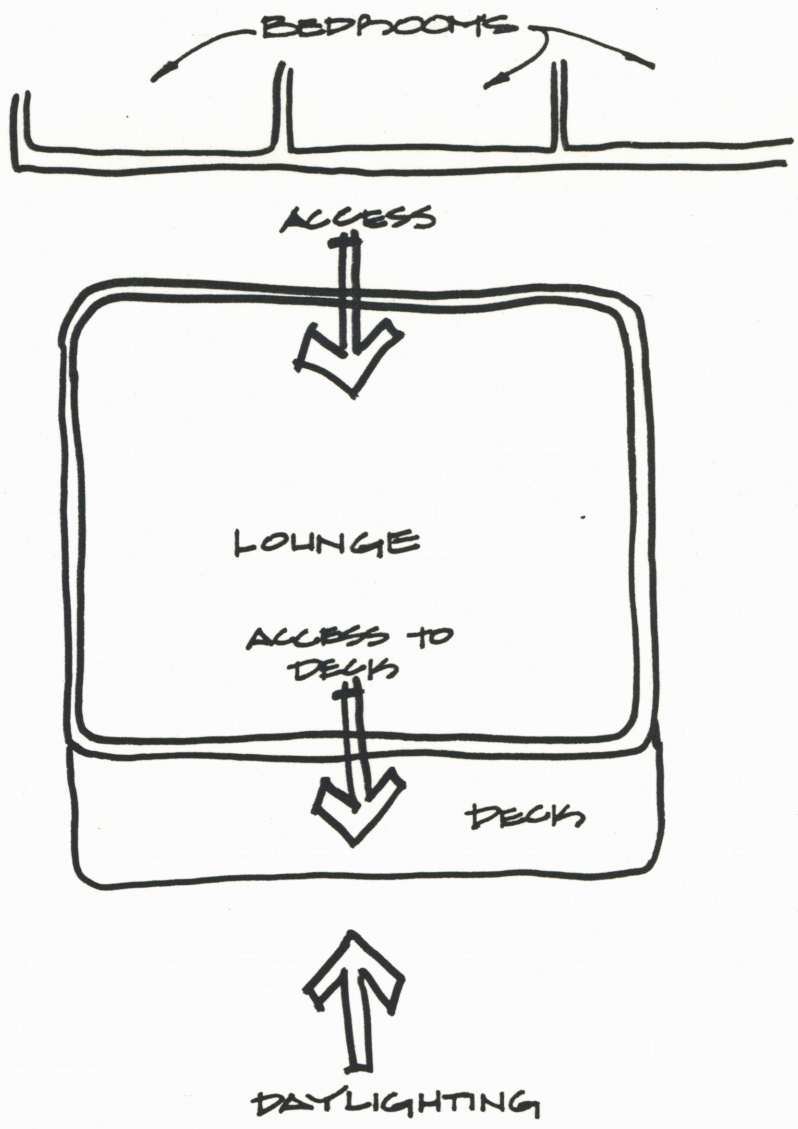
NO. OF USERS 25 people maximum

USER REQ'MENTS Stereo equipment

AREA REQ'D 1,500 S.F.

ADJACENCY REQ'MENTS

THERMAL, VISUAL REQ'MENTS



SPACE ANALYSIS SUMMARY

SPACE	SQUARE FOOTAGE REQ'D.
1. Velodrome	145,000
2. Cycling Equipment Room	1,200
3. Sking Equipment Room	1,200
4. Locker Rooms (2)	3,000
5. Bio-feedback Room	1,000
6. Weightlifting Room	1,000
7. Sports Physician's Office	500
8. Foyer	3,000
9. Mechanical Room (velodrome)	300
10. Administrators' Offices (2)	400
11. Secretary Area	200
12. Conference Room	200
13. Work Room	160
14. Reception Area	160

15.	Lobby	3,000
16.	Restrooms (2)	300
17.	Mechanical Room (kitchen)	300
18.	Kitchen	2,500
19.	Kitchen Office	80
20.	Kitchen Restroom	30
21.	Dining Room	2,000
22.	Bedrooms (12)	150
23.	Recreation Room	600
24.	Lounge	1,500
25.	Laundry	120
26.	Mechanical Room (Dormitory)	300
27.	Facility Manager's Apartment	600
28.	Cook's Apartment	600
	Total Square Footage	169,400

PROBLEM STATEMENT

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The project I have undertaken, to design an olympic training center for bicycle and cross country ski racers, is one basically generated from need. Our country desperately needs a high altitude, scientifically oriented, all season training center for cyclists and ski racers. The East Germans and the Russians have, for the past ten years, been training their olympic athletes in such facilities. Their results are conclusive: if our athletes are to compete successfully in future olympics and other international events, we must alter our training techniques and programs and more fully support our athletes.

Currently, the national training center for cross country skiers is West Yellowstone due to its altitude, climatic conditions, and terrain. Various areas surrounding West Yellowstone are ideal for cross ski training but there is not a facility there where controlled testing may take place. Athletes who train there must live in motels and eat at local restaurants for four to six weeks at a time; not the best conditions for concentrated training programs. There is also the problem of entertainment. Athletes undertaking a rigorous training program need a pressure release or entertainment when they are not exercising. Local West Yellowstone bars again do not provide what the athletes need.

Bicycle racing is beginning to take hold in the United States. A lot of raw athletic talent has been shown in recent international cycling events but we need to develop it.

There are currently eleven velodromes (cycling tracks) throughout the United States. Each of these velodromes is an open-air facility subject to seasonal and climatic conditions. Cyclists using these facilities cannot keep steady training programs due to weather related interruptions.

Inter-related, controlled testing areas are needed in addition to the velodromes to provide complete training programs and feedback to athletes and coaches.

I will provide, for both cycling and cross country ski racers, a facility that is a total training, data gathering, testing, and living center that will upgrade their performances on an olympic level, further our understanding of performance training, and make this information available to athletes and coaches in other athletic events.

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