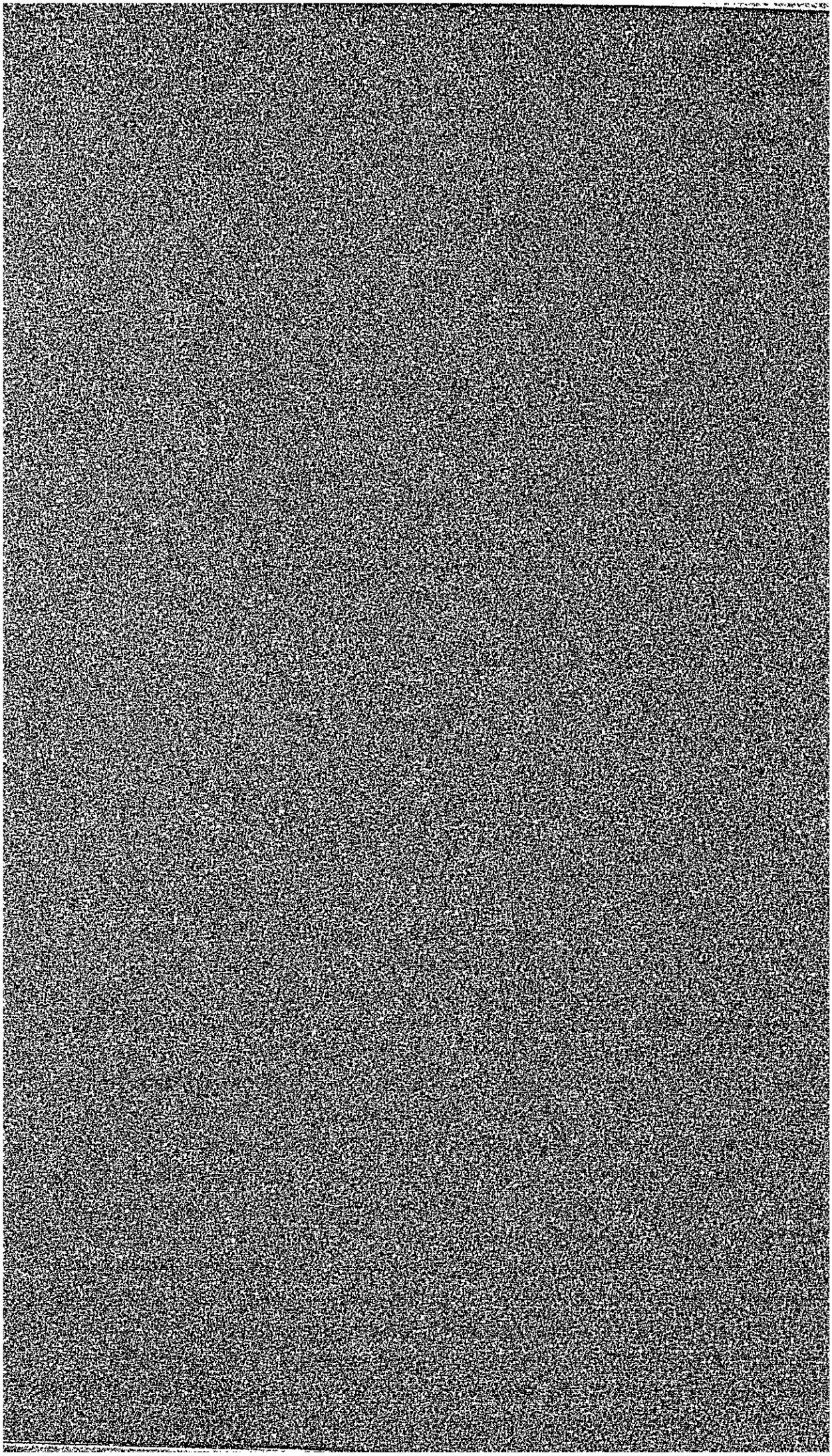
2. BASIC DESIGN SURVEY



2. BASIC DESIGN SURVEY

2-1 OBJECTIVES

In consequence of the conference held in October 1979 between the Japanese Preliminary Survey Mission and the Brazilian Representatives, the scope of Japan's technical cooperation relative to this Project was defined as follows:

1) Preparation of basic design of the facilities required for educational and training activities

2) Preparation of basic design of the facilities required for research facilities

3) Recommendation and advice for drawing up educational and training programs, and

4) Recommendation and advice for drawing up research programs

In addition to the foregoing, it was confirmed that the Japanese mission would bring with it the required equipment and materials and Brazilian fire officers visit Japan for practice study.

The Preliminary Study Mission agreed with the Brazilian authorities that a Japanese study mission should be dispatched three times to Brazil in order to effect the technical cooperation.

References: Minutes dated October 22, 1979 --- Appendix 2-1-b
Determination of Scope of Cooperation
--- Appendix 2-1-c

The primary objective of the technical cooperation is the preparation of Report on Basic Design. To achieve this objective, the background of the Project and the role to be played by the proposed Center were duly considered, the specific requirements of the Brazilian side as to the foregoing four items were ascertained, and actual conditions of the fire fighting services and buildings in Brazil were ascertained.

2-2 PROCEDURES

In November 1980, JICA sent its First Mission to Brasilia to investigate the local fire service and building conditions.

With full cooperation of the Brazilian counterpart, the Mission conducted investigations in detail as to the following subjects, and collected the data and information required for the basic design.

- o Organization and role of Brasilia's fire service
- o Fire fighting and rescue activities, and educational and training programs
- o Research activities
- o Site for Fire Fighting Training Center and local conditions of buildings
- o Fire fighting training centers existent in Brazil

The findings obtained by the investigations were analyzed, the requirements as to fire fighting by the Brazilian side were studied, and in consequence, it was agreed between the both parties that the Japanese side should provide Basic Design whereas the Brazilian side should carry out Detail Design, Implementation Planning and Construction for the following facilities:

a. Drill Tower
b. Auxiliary Drill Tower
c. Gymnasium
d. Oil Pan
e. Outdoor Fire Training Area
f. Water Reservoir
g. Diving Pool
h. Auditorium
i. Circuit Training Field
j. Research Laboratory

References: Minutes dated November 17, 1980 --- Appendix 2-2-b
Record of Meeting November 21, 1980
--- Appendix 2-2-c

After its return to Japan, the Mission worked out the Basic Design of these facilities.

In January 1981, the Second Mission was dispatched to Brasilia to make presentation of Basic Design of the facilities, Training Program and Research Program.

The Basic Design, which was fully accepted by the Brazilian side, was then explained to the Governor of Brasilia, D.F. and to the officers of Fire Department of Brasilia. Further, the technical aspect of Basic Design was described in detail to NOVACAP who was to take charge of the detail design. Through this series of explanatory meetings, the Brazilian counterparts became more knowledgeable about the proposed facilities, and with this deepened understanding, they would proceed to the project implementation which would start with the detail design.

As for the Training Program, the Japanese experts explained the fire fighting practice to the participating Brazilian fire officers by means of the text and the demonstration of practice. Through such explanation, the importance of protecting a fireman himself from a danger during fire fighting activities was well appreciated by the Brazilian participants.

With respect to the Training Program, it was fully understood by the Brazilian counterparts that the educational programs for research staff and the institutional organization should be established with top priority.

Apart from the foregoing three proposals, the materials and equipment for the survey including personal outfits and apparatuses to be used in fire fighting and rescue activities were presented to the Governor of Brasilia, D.F. by the Japanese Ambassador. On this

occasion, the functions of such materials and equipment and how to use them were explained in detail to all the Brazilian fire officers by the Japanese experts.

As all the Japanese proposals were accepted by the Brazilian side, it was agreed by the both parties that the documents, etc. submitted by the Second Mission would be regarded as the final documents.

References: Minutes of Meeting dated Feb. 5, 1981
--- Appendix 2-3-b

Minutes of Meeting with NOVACAP dated Feb. 4, 1981
--- Appendix 2-3-c

The Mission's activities in Brasilia were reported in local newspapers, etc., and the Mission members had an impression that the present technical cooperation contributed to further strengthening the friendly tie between Brazil and Japan.

In March 1981, the Third Mission was sent to Brasilia to submit the final report and to make explanation on the second portion of materials and equipment for the survey to be presented to the Brazilian side.

CORREIO BRASILIENSE
Jan. 30, 1981

Bombeiro ganha presente

Japão doa equipamento para combate ao fogo

O governador Aimé Lamaison esteve ontem pela manhã no Quartel General do Corpo de Bombeiros, quando recebeu do embaixador do Japão, Nobuo Okuchi, modernos equipamentos de combate ao fogo, produzidos naquele país, além de um projeto para construção de um centro de treinamento, a ser implantado em Brasília, dentro de dois anos, dependendo da liberação de recursos.

Estiveram presentes o comandante do CBDF, coronel Manoelito Barreto, o comandante da Polícia Militar, coronel Egeu, e um grupo de oficiais e engenheiros do Corpo de Bombeiros do Japão, que estão na cidade em cumprimento ao convênio de cooperação mútua assinado entre os governos do Japão e do Distrito Federal. Ao final da solenidade, os bombeiros de Brasília fizeram algumas demonstrações com os novos equipamentos.

CENTRO

O que mais impressionou o governador foi o projeto do Centro de Treinamento de Bombeiros Militares, que será erguido no Setor Policial Sul, onde já funciona o centro de formação e aperfeiçoamento especializado. Idealizada por uma firma japonesa, a obra garantirá o treinamento sob todas as condições adversas encontradas pelos bombeiros em prédios, reservatórios de combustíveis e locais de difícil acesso.

Lamaison assegurou que o avanço da tecnologia deve ser colocado sempre a serviço da humanidade, relacionando o convênio entre seu governo e o do Japão, "a transferência de know-how que virá capacitar esta nobre instituição que é o Corpo de Bombeiros do DF a, cada vez mais, bem-servir à nossa querida comunidade". O Centro de Treinamento, na opinião do governador, é uma entidade que nasce "fadada ao sucesso", referindo-se aos objetivos coincidentes do Japão e do Brasil.

EQUIPAMENTO

Os engenheiros e bombeiros japoneses, com a ajuda de um intérprete da Embaixada, explicaram cada detalhe dos equipamentos doados, ao governador, em determinado momento, em tom de brincadeira, observou que uma vidente havia previsto um grande incêndio em Brasília neste ano. São os seguintes os equipamentos recebidos ontem pelo CBDF:

"Cinco aparelhos para salvamento por correias; cinco reservatórios bolsa d' água com bomba e esguicho; uma máscara contra gases; cinco trajes especiais para combate a incêndio com proteção contra calor, capacete e roupa em cores fosforescentes; um aparelho ressuscitador; 15 cintos ginásticos para carga máxima de 1.500 quilos; equipamentos detectores de gases, roupa anti-radiação, maca dobrável, luvas e material de escalação de grandes prédios".

A missão japonesa permanece na cidade até o dia seis de fevereiro, trocando informações e experiências com os bombeiros brasilienses, que, por sua vez, visitarão instalações similares naquele país. Integram a comitiv o diretor assistente da Divisão de Prevenção e Desastre da Agência de Defesa contra Incêndios, Mitsuhiro Hosono; o chefe da Divisão de Administração da Academia de Bombeiros de Tôquio, Tsuneo Ehashi, chefe do Centro de Treinamento de Yokohama, Toshio Kato, além de arquitetos e projetistas da Nikken Sekkei Co. Ltd, empresa responsável pelo projeto do Centro de Treinamento a ser construído em Brasília.

Foto: J. França

O governador Lamaison recebeu a doação

CORREIO BRASILIENSE
Feb. 6, 1981

Bombeiro vai ganhar centro de formação

Missão japonesa trouxe a tecnologia para Brasília

O Governo do Distrito Federal já tem o projeto acabado e pronto, para entrar em fase de construção pela Secretaria de Viação e Obras, do Centro de Formação, Aperfeiçoamento e Especialização do Corpo de Bombeiros do Distrito Federal. A missão japonesa que encerra, hoje pela manhã, sua visita à Capital Federal, estuda, há dois anos, as necessidades de aperfeiçoamento e a introdução de novas técnicas no processo de combate ao fogo.

"O CBDF sentiu a necessidade de construir um centro de treinamento que não fugisse às linhas arquitetônicas de Brasília," afirma o capitão Ângelo, "mas, para se desenvolver uma construção com essa finalidade - treinamento de bombeiros - era preciso que o projeto fosse executado por um pessoal que entendesse do assunto e que fosse evoluído no combate ao fogo. Depois de pesquisar, o CBDF chegou à conclusão que essa tecnologia deveria vir do Japão."

Segundo o prepresentante da JICA -, Agência de Cooperação Internacional, ros em Tóquio, o orçamento do Corpo de Bombeiano para este é de 37 trilhões de cruzeiros. Embora os japoneses tenham alta tecnologia contra o fogo, o número de funcionários efetivos do Corpo de Bombeiros de Tóquio é apenas 1,5% da população total da cidade."

Junto com o projeto e a maquete do Centro de Treinamento, o CBDF recebeu da missão japonesa, o seguinte material: 5 aparelhos para salvamento com correias, 5 reservatórios - bolsa d'água com bomba e esguicho, uma máscara contra gases, 5 trajes especiais para combater incêndio com proteção contra o calor, capacete e roupa em cores fosforescentes, um aparelho ressuscitador, 15 cintos ginásticos para carga máxima de 1.500 quilos, equipamentos detectores de gases, roupa anti-radiação, uma maca dobrável, luvas e material de escalação de grandes edifícios. Mais uma remessa de material está previs para março.

SOLENIDADE

Ontem, às 15h30min., a missão japonesa, depois de passar 10 dias no DF, despediu-se oficialmente do govenador Aimé Lamaison. A comitiva foi recebida no salão nobre do Palácio do Buriti

Num ambiente bastante descontraído, os seis integrantes da comitiva japonesa estavam acompanhados do intérprete (que foi pago pela Embaixada do Japão, assim como toda a viagem da comissão) que veio de São Paulo exclusivamente para fazer este trabalho.

Os japoneses foram recebidos primeiramente pelo chefe do gabinete civil do Governador, Paulo José Martins, que fez seu cumprimento em Japonês. Logo em seguida, o governador travou rápido diálogo com os membros da comitiva e foi enfático ao dizer que "no Brasil, os bombeiros não cuidam só dos incêndios, mas fazem uma série de outras coisas, como tirar macaquinhos que sobem em fio de alta tensão, socorrem esquecidas donas-de-casa que fecham as portas de seus apartamentos deixando a chave do lado de dentro e o mais importante de tudo isso è que os bombeiros fazem todo este trabalho com boa vontade."

Os japoneses, por sua vez, estranharam o modo como todo o projeto foi aceito sem restrições Mas, segundo o comandante do CBDF, coronel Manuelito Lemos, os resultados foram muito além do esperado.

Os japoneses embarcam hoje, às 9 horas, num DC-10 da Varig rumo ao Japão, prometendo voltar em breve para continuar o intercâmbio tecnológico dos dois países.

Com este Centro de Treinamento, provavelmente serão evitados acidentes como o ocorrido há aproximadamente 10 anos, quando uma equipe do CBDF simulou um incêndio chamado posteriormente de "minuto longo". Um cabo se vestiu de mulher e um sargento, como seu acompanhante, subiram em uma casa feita de papelão, onde foi ateado fogo. O tempo em que demorariam para os bombeiros chegarem até este incêndio simulado deveria ser de um minuto, mas, no caminho, o carro-pipa foi interrompido no seu percurso, por uma banda que estava passando e o resultado do atraso foi a morte do cabo que estava em cima da casa de papelão.

O governador Aimé Lamaison despede-se da equipe de bombeiros japoneses que veio a Brasília

2-3 MEMBERS

For implementing the Project services, a total of four missions were dispatched with the following members.

2-3-1 PRELIMINARY SURVEY MISSION

(Period: Oct. 12 to Oct. 25, 1979)

The mission investigated the feasibility of technical cooperation by the Japanese side to develop programs for establishing the fire fighting training facilities and substantiating an associated research facilities. The resulted cooperation scope was defined as four subjects of training program and pertinent facilities, and research program and pertinent facilities. (The record of events in this survey will be described in Appendix, Para. 2-1-a.)

ASSIGNMENT	NAME	ORGANIZATION
Administration (Team Leader)	Shigeharu KAGOSHIMA	Deputy Director-General Fire Defence Agency Ministry of Home Affairs
Disaster protection	Tadanori TAKIZAWA	Assistant Director Fire Defence Division Fire Defence Agency Ministry of Home Affairs
Equipment & apparatus	Kenichi FUKUMOTO	Director Fire Protection Division Tokyo Fire Department
Training	Junzo OHKUMA	Chief Fire Prevention Division Tokyo Fire Department
Buildings	Yoshihisa TAHARA	Director Rescue Division, Bureau of Fire Defence Yokohama Fire Department
Coordinator	Katsuhiko BIYAJIMA	Japan International Cooperation Agency (JICA)

2-3-2 FIRST MISSION

(Period: Nov. 7 to Dec. 6, 1980)

The mission examined the overall status and conditions of fire services and buildings in Brazil to ascertain project requirements for the fire fighting training center, and subsequently determined each training facility to be designed. (The record of events in this study will be described in Appendix, Para. 2-2-a.)

ASSIGNMENT	NAME	ORGANIZATION
Administration (Team Leader)	Toshikazu KOIKE	Fire Defence Division Fire Defence Agency Ministry of Home Affairs
Special Adviser	Kenji AJIOKA	Former Fire Chief Fire Superintendent-General Tokyo Fire Department
Research Planning	Kenichi FUKUMOTO	Director Fire Protection Division Tokyo Fire Department
Training Facilities	Sukemitsu SUGANO	Director Planning Division Yokohama Fire Department
Training Planning	Morishi SASAKI	Chief Training Section Yokohama Fire Fighting Center Yokohama Fire Department
Project Coordinator	Katsuhiko OSHIMA	Japan International Cooperation Agency (JICA)
Project Manager	Motoaki KONO	Mechanical Engineer Nikken Sekkei Ltd
Project Architect	Takashi OTSUKA	Architect Nikken Sekkei Ltd
Cost Estimator	Hitoshi BORI	Architect Nikken Sekkei Ltd
Structural Engineer	Hideaki KIRIHARA	Structural Engineer Nikken Sekkei Ltd

2-3-3 SECOND MISSION

(Period: Jan. 26 to Feb. 8, 1981)

The mission submitted a proposal of basic design, training program and research program, and the Brazilian authorities acknowledged it to be acceptable in the entire extent as a final solution. Since then, the mission explained it to the governer of Federal District and concerned fire officials.

Grant equipment and materials (1st delivery portion) for the survey were demonstrated and handed over by this mission. (The record of events in this study will be described in Appendix, Para. 2-3-a.)

ASSIGNMENT	NAME	ORGANIZATION
Administration (Team Leader)	Mitsuhiro HOSONO	Disaster Prevention Division Fire Defence Agency Ministry of Home Affairs
Research Planning	Tsuneo EBASHI	Administration Section Fire Academy Tokyo Fire Department
Training Planning	Toshio KATO	Training Section Yokohama Fire Fighting Center Yokohama Fire Department
Project Coordinator	Katsuhiko OSHIMA	Japan International Cooperation Agency (JICA)
Project Manager	Motoaki KONO	Mechanical Engineer Nikken Sekkei Ltd
Project Architect	Takashi OTSUKA	Architect Nikken Sekkei Ltd

2-3-4 THIRD MISSION

(Period: Mar. 21, 1981 to Mar. 29, 1981)

The mission submitted the final report of basic design and handed over the materials and equipment for the survey (2nd portion), demonstrating the operation and usage.

ASSIGNMENT	NAME	ORGANIZATION
Administration (Team Leader)	Mizuo NAKAMURA	President Fire Defence College Fire Defence Agency Ministry of Home Affairs
Research planning	Tsuneo EBASHI	Administration Section Fire Academy Tokyo Fire Department
Training planning	Toshio TANABE	Training Section Yokohama Fire Fighting Center Yokohama Fire Department
Project coordinator	Yutaka SASAKI	Japan International Cooperation Agency (JICA)
Project Manager	Motoaki KONO	Mechanical Engineer Nikken Sekkei Ltd

2-4 MATERIALS AND EQUIPMENT FOR SURVEY

The Second Mission and the Third Mission brought with them the materials and equipment for fire fighting and rescue activities and for research activities. After the survey, those materials and equipment listed below were granted to the Brasilia Fire Department by its request, explanation and advice being given on their operation and handling at the time of delivery.

THE SECOND MISSION	THE THIRD MISSION
Descending lifeline	Geiger-Müller counter
Jet shooter	Radiation proof clothing
Air breathing apparatus	Apparatus radio
Breathing apparatus (Oxygen generation type)	Walking-talkie
Gas indicator	Air saw
Mouth-to-mouth apparatus	Suction hose
Fire coat	Automatic electric power distribution tester
Rescue clothes	Portable indicating thermometer
Heat protective clothing	Circuit gauge
Life belt	Neon leakage detector
Stretcher	
Rescue sling	
Carabiner	
Leather gloves, etc.	

Books:

Fire Equipment Guide Book ("Shobo-KiKi-Binran") in two volumes

Modern Fire Fighting Technics ("Kindai-Shobo-Senjyutsu") in ten volumes

2-5 INVITING BRAZILIAN TRAINEES

With an effort to facilitate smooth, effectual technical cooperation, the Japanese Government invited on its own programs Brazilian fire officers four times since 1979, either individually or in group, to offer them the opportunities to study various kinds of Japanese fire defence and rescue training as part of the present project services.

The record of programs is as given below.

(Group program)

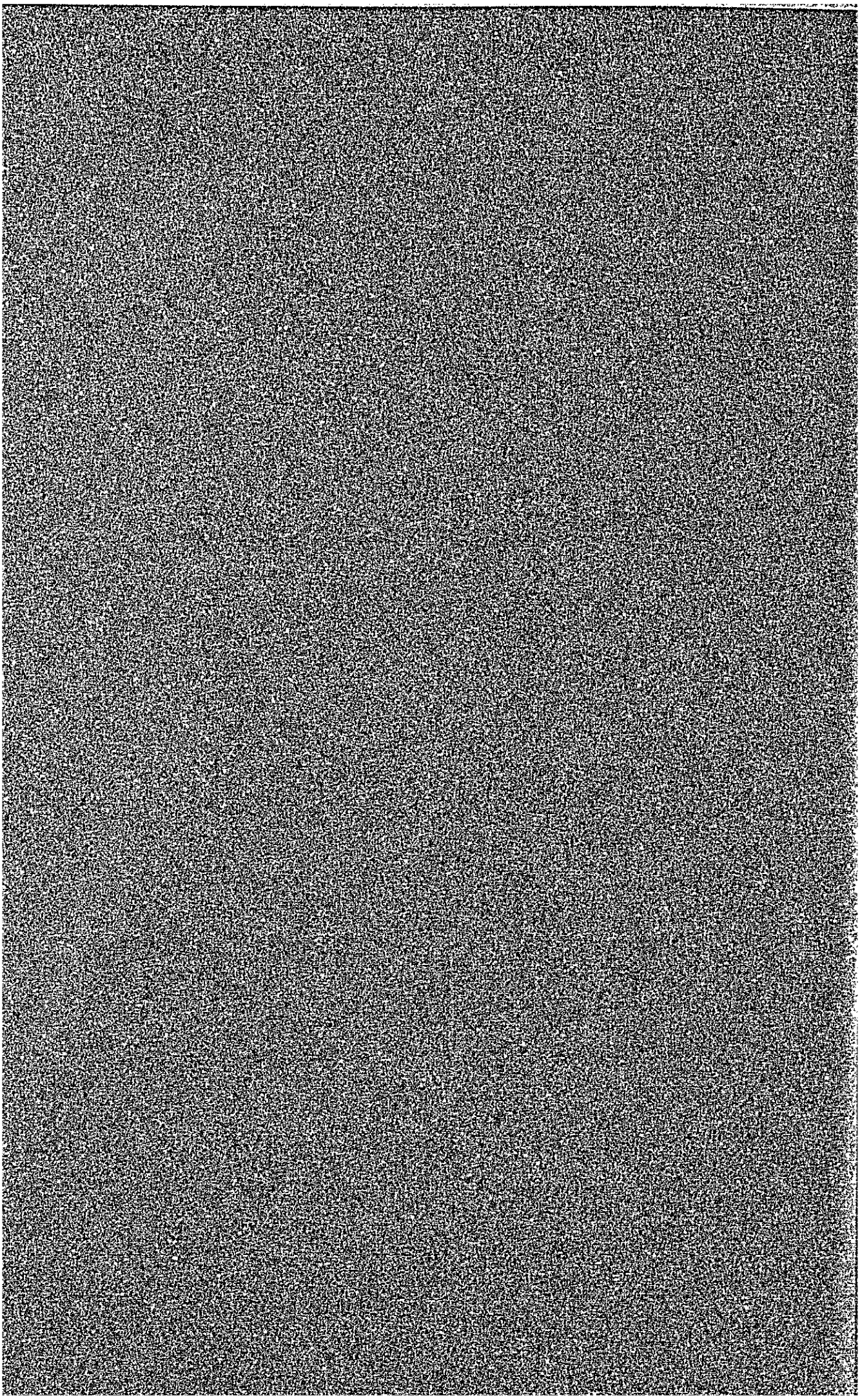
Year	Period	Name	Age	Remark
1979	Oct. 4/Dec. 10	Cicero Valmir Lima	32	CAP.BM
1980	Oct. 4/Dec. 19	Sergio Angelo de Araiūjo	31	CAP.BM
		João Alecy Alves do Prado	33	CAP.BM

(Individual program)

Year	Period	Name	Age	Remark
1979	Jul. 9/Jul. 22	Paulo Jose Martins dos Santos	39	TEN. COLONEL BM
		Jose Batista da Costa Filho		Planning Bureau
1981	Feb. 20/Mar. 10	Nestor Puga Wanderley	42	COLONEL BM
		Lauro Saback da Hora	46	MAJOR BM

Those programs included the visits to the Tokyo Fire Science Laboratory and the Yokohama Fire Fighting Training Center, both taken as modeles of the proposed Fire Fighting Training Center in Brasilia. Further, the programs covered the visits to the facilities of the fire departments in other major cities for the officers to study materials and equipment for fire fighting service. These opportunities would help them to comprehend what the present Japanese fire defence service is like.

3. PROPOSAL FOR FIRE FIGHTING TRAINING CENTER (CeFAE)



3. PROPOSAL FOR FIRE FIGHTING TRAINING CENTER (CeFAE)

The proposal consists of the following three parts:

3-1 Basic Design of the Facilities

3-2 Training Guidance

3-3 Research Activities

The explanation will follow in each sub-chapter.

3-1 BASIC DESIGN OF FACILITIES

3-1-1 BASIC CONCEPTS AND CONDITIONS

a. All the new facilities should be located to the west of the north-south two-lane roadway within the project site, 500 m by 500 m.

b. Taking into account the facilities already existing or planned, the new facilities are planned in three zones, namely, from south to north, Training Zone; Sports Zone; and Administrative and Study Zone.

c. Each zone includes the following.

Training Zone:	Drill Tower, Auxiliary Drill Tower, Oil Pan, Outdoor Fire Training Area, Water Reservoir, Outdoor Circuit Training Field
Sports Zone:	Gymnasium, Diving Pool
Administrative and Study Zone:	Auditorium, Research Laboratory

d. Based on thorough survey on the duties, activities and training programs for which Brazilian Fire Services are now responsible, the Japanese side has proposed educational and training programs for the future fire protection activities in Brazil. With this view, the new training facilities are designed, in all aspects from the basic concepts to construction details, to embody various ideas and advice proposed by the representative of the Japanese fire departments.

e. In planning training facilities and programs, the training units are taken as follows: one class has 30 trainees and is devided into three groups, each comprizing ten trainees.

f. The architectural finishes are designed by considering those at the existing dormitory and classrooms as a standard for design.

g. In the basic approach, the structural framing systems of new facility buildings are of reinforced concrete construction predominantly adopted in Brasilia.

h. Not to speak of the structural analysis and construction program in the subsequent detail design stage, the Brazilian authorities are requested to pay thorough care to the details to assure safety against all conceivable consequences from possible training hazards in view that the facilities are for especial purposes.

3-1-2 SITE PLAN

A. Building

The site plan is based on the requirements of the Record of Meeting signed on November 21, 1980 between the Brazilian authorities and the Preliminary Survey Mission. With regard to the Research Laboratory, the location is, however, changed to the east of the classroom building by analyzing the size, usage and a possibility of future extension.

B. Electrical

a. Power Receiving

- The electrical power should be received by a new substation from the power line running along the main road in the site. The Drill Towers and associated floodlighting, pumps, road lighting, car-park lighting, training field floodlighting systems, etc. are all served by this new substation with the electrical power.
- The Gymnasium can be properly served by the existing substation, but, if insufficient, should be served by the new substation.
- Voltage drop should be less than 4 % between the secondary side of the transformer and equipment/fixtures.

b. Lighting

- Pedestrian lighting is recommendable through the Entire Training Center premises.
- The Fire Training Area requires lighting installations for night training. They should be installed at the rooftop of the Drill Tower and on the both sides of the Area by providing a total of six lighting poles.
- The lamps are of mercury-vapor type and arranged to yield at least five lux illumination on the training area.

c. Public Address System

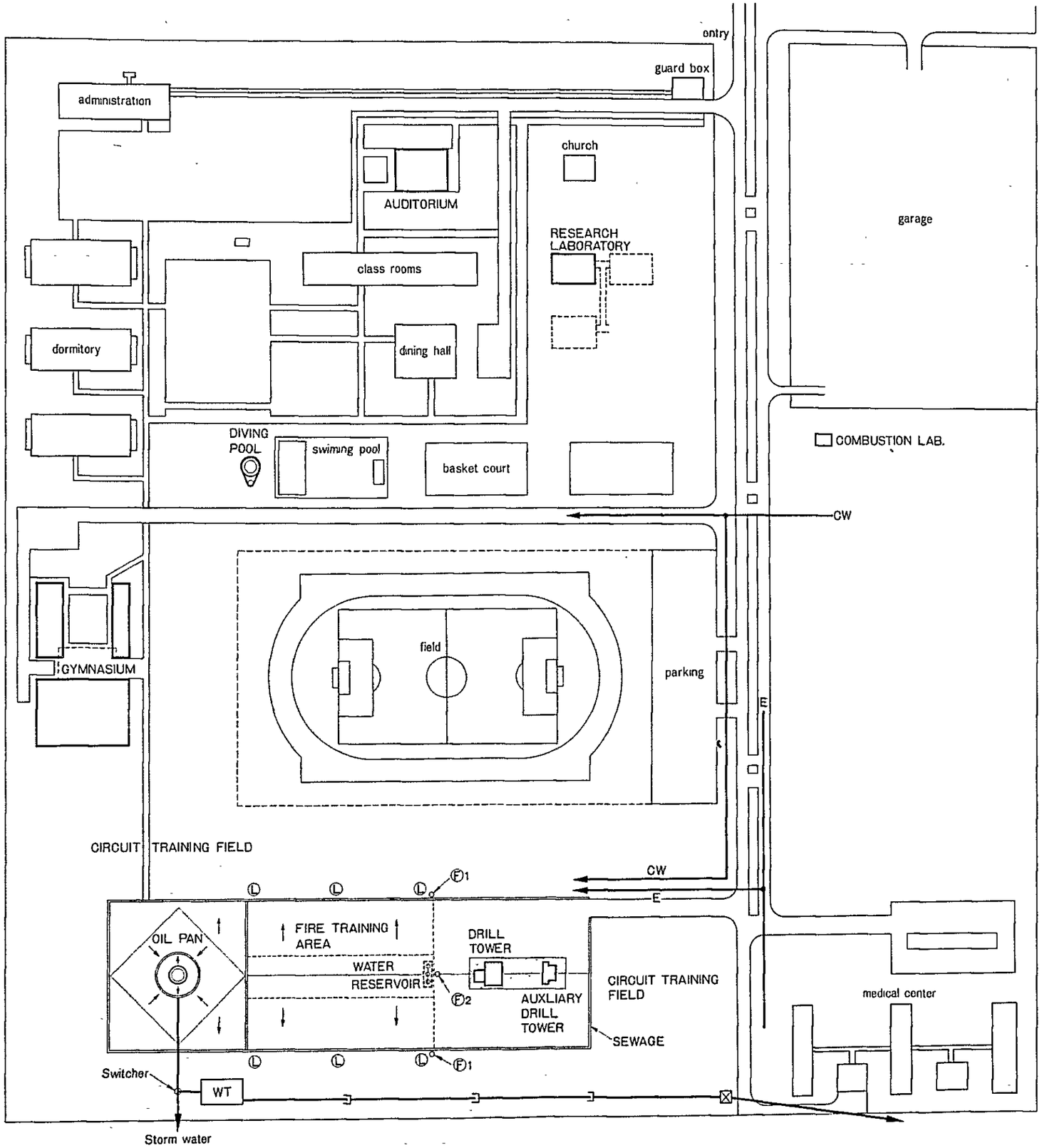
- o Throughout the Center, public address system should be provided for paging and announcing.

d. Telephone

- o Telephone sets and lines should be provided according to the requirements in usage, all from the telephone exchange room in the Administration Office Building.

C. Mechanical

- o The Buildings, Diving Pool and Water Reservoir should be provided with city water service. The layout of city water pipes is as shown in the drawing on next page. The capacity of city water intake should be enough to manage all the new facilities.
- o The facilities above should also be provided with drainage system separated from rainwater drainage. Drain from the Oil Pan Yard should be so treated as to reduce BOD and COD values down to the requirements of the local pollution control regulations. All drain water should be collected into a catch basin at the site end to lead into the city sewerage system.



Legend
- L : Lighting tower
- F_1 : Hydrant
- F_2 : Ground recessed hydrant
- WT : Water treatment system
- CW : City water
- E : Electricity

0 10 20 50 100 m

1 : 2,000

SITE PLAN

3-1-3 DRILL TOWER & AUXILIARY DRILL TOWER

A. Building

Drill Tower: reinforced concrete construction with 12 stories above ground and one basement, 41 m in height.

Auxiliary Drill Tower: reinforced concrete construction with 6 stories above ground, 18.7 m in height.

- o The basic design is developed to meet the functional requirements, to keep an open area sufficient to allow training with fire trucks and to maintain the convenience in correlative relation with the adjacent Outdoor Fire Training Area. In addition, aesthetically these towers are designed as a symbol of the Training Center seen side by side from the north gate.
- o The construction may be phased in several stages.
- o As to the exterior design, the typical design features in Brasilia are incorporated, providing pilotis on the ground level, windows imitative of those of apartment houses on the second to seventh floors and such windows as installed on high-rise buildings on the upper floors.
- o By carefully studying the requirements and convenience in training, the Heat Endurance Space and Smoke Endurance Space are combined into one room on the first floor, with the Labyrinth provided on the basement.
- o Anywhere within the Towers, a ring or a pipe section should be capable of carrying a max. three ton load in permanent term for each rope to be suspended from it.

B. Electrical

a. Lighting

The following is recommended:

- o Labyrinth: 100 lux by fluorescent lamps with a guard

- Heat and Smoke Endurance Training Room:

  50 lux by incandescent lamps
  For serving as a guide signal, a total of six incandescent lamps, three in green glass globes and three in red ones should be provided, with their switches installed in the Surveillance Room.

- Surveillance Room:

  Three fluorescent lamps
  These lamps should be devised so that they can be turned off during the training. The surveillant's desk should be lighted with an appropriate hand-lighting fixture which is so devised as to completely prevent the light from leaking outside.

- In the other rooms and stairwells, such illumination level as will permit work and walk free of any trouble will be sufficient for the purpose. A room for water shooting training should have incandescent lamps covered with a heavy-duty glass globe.

- All the lighting fixtures should be of waterproof type at socket housing.

- In the Heat and Smoke Endurance Training Room, lighting fixtures and wiring should be sound enough under the heat of 70°C.

- For night training, the floodlighting units should be such as to be adjustable in the angle of floodlight beams. Their installation is recommended on the following facilities:

Drill Tower (at eaves' top on 7th floor)	Mercury-vapor lamps, each 400 W	Four units
Auxiliary Drill Tower (at rooftop)	As above	As above
Lighting Towers (two on the ground)	As above	As above

b. Motor Control

o Air-filling Room

On-off operation of the compressor should be made performable at the control panel. The compressor should have a protective circuit against higher pressure than a certain level.

o Life Net

The life net between Towers should be of motor-operation type, with the motor and control panel installed on the second floor of the Auxiliary Drill Tower. Net stretching should be automatically controlled to come to a halt at the balcony of each Tower.

c. Receptacles

Except in the Surveillance Room, all the receptacles should be of zee shape and waterproof type, and be installed according to the following standard.

Surveillance Room:	3 to 4 pcs.
Labyrinth:	3 to 4 pcs. zee shape, waterproof type
Boiler Room:	2 pcs. zee shape, waterproof type
Air filling Room:	2 pcs. zee shape, waterproof type
2nd and upper floors:	one each zee shape, waterproof type
Elevator Pit:	one zee shape, waterproof type
Elevator Machine Room:	one zee shape, waterproof type
Outside:	2 pcs. zee shape, waterproof type
Other places:	as required

d. Public Address System

- o The amplifier is installed in the Surveillance Room.
- o Cone type loud speakers are installed to develop not less than 60 dB in sound pressure anywhere inside the Towers. Four horn type loud speakers are installed on the eaves of the fifth floor, one each on each side of the Tower. Additional two sets are atop the Auxiliary Tower.
- o A wired microphone set is installed in the Surveillance Room and two receptacles for detachable wired phone are provided, one on the first floor exterior wall and the other on the ground between two Towers.
- o Wireless type microphones are also recommended.

e. Telephone

- o The Surveillance Room should be provided with telephone sets.

C. Mechanical

a. Smoke and Heat Endurance Training Room

Design temperature:	50°C
Preheating:	30 minutes
Room temperature during training:	35°C to 45°C

- o Heat

To heat the Smoke and Heat Endurance Room up to 50°C, developing humid conditions simultaneously, five propeller fan unit heaters of down blow type and five super heat steam humidifiers should be installed on the ceiling. The capacity of the unit heater and humidifier is 20,000 Kcal/H and 20 Kg/H respectively. A humidifier for an ordinary air conditioning apparatus can be applicable for it. A steam boiler for the unit heaters and the humidifiers installed in the boiler room has the capacity of 180,000 Kcal/H at the pressure of 0.3 Kg/cm^2. The boiler should preferably be of an oil fired type to assure easiness in the maintenance and control.

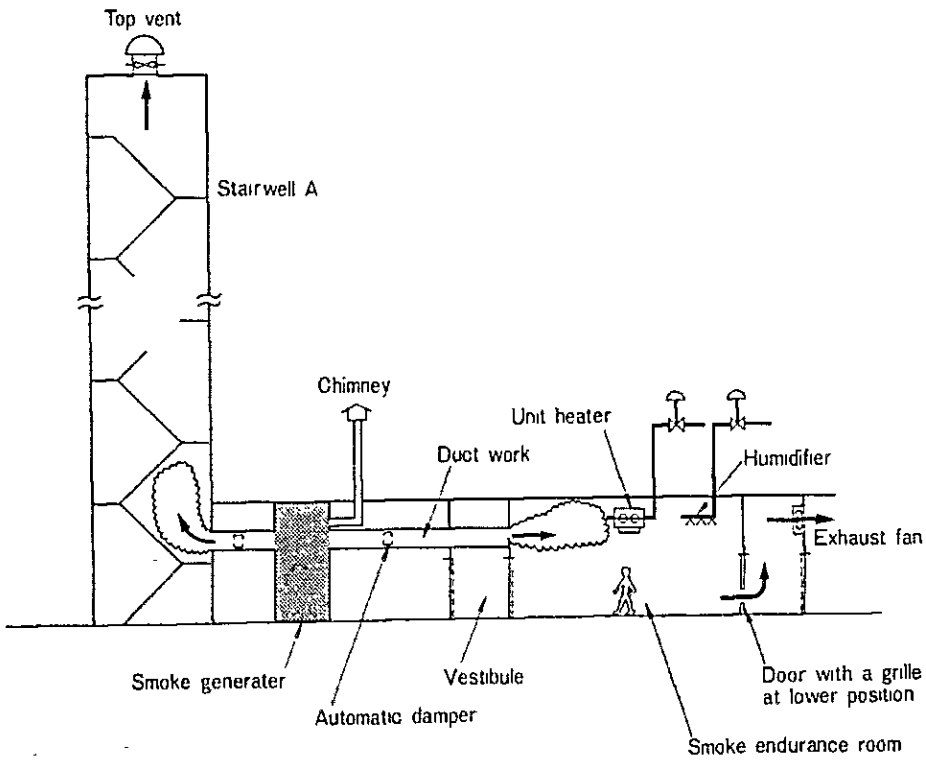
o Smoke

For the purpose of filling the room with smoke, a wood-burn smoke generator is provided, smoke being led into the room through stainless steel duct. The extracting fan is installed at the other end of the room. The capacity of the fan should be approximately 1,000 m^3/H.

o Fresh Air Outlet

To provide for emergency, fresh air outlets are located along the wall. The fresh air is branched from the air compressor in the Air Filling Room located on the 1st floor.

o The mechanical and electrical systems in the room should be such as to be free of corrosion.



b. Stairwell A

- o The Stairwell A is filled with smoke if required. For that purpose, a wood-burn smoke generator and the Stairwell A should be connected by stainless duct work with an automatic damper and a top venting fan with a capacity of 1,000 m^3/H is installed at the top floor at each construction stage.
- o To provide for emergency, fresh air outlets are installed at each landing of the stairwell.
- o At the entrance of the Stairwell A, concrete curb should be provided to prevent the training water from coming inside.

c. Surveillance Room

- o Mechanical Ventilation System

  To cool the Surveillance Room which is adjacent to the Smoke and Heat Endurance Training Room, mechanical ventilation is required. The ventilation system should be sized to develop the capacity of 5,000 m^3/H so as to keep the Surveillance Room not more than 5°C higher than the outside temperature.

- o Temperature, fan and damper control should be integrated in a panel located in the Surveillance Room.

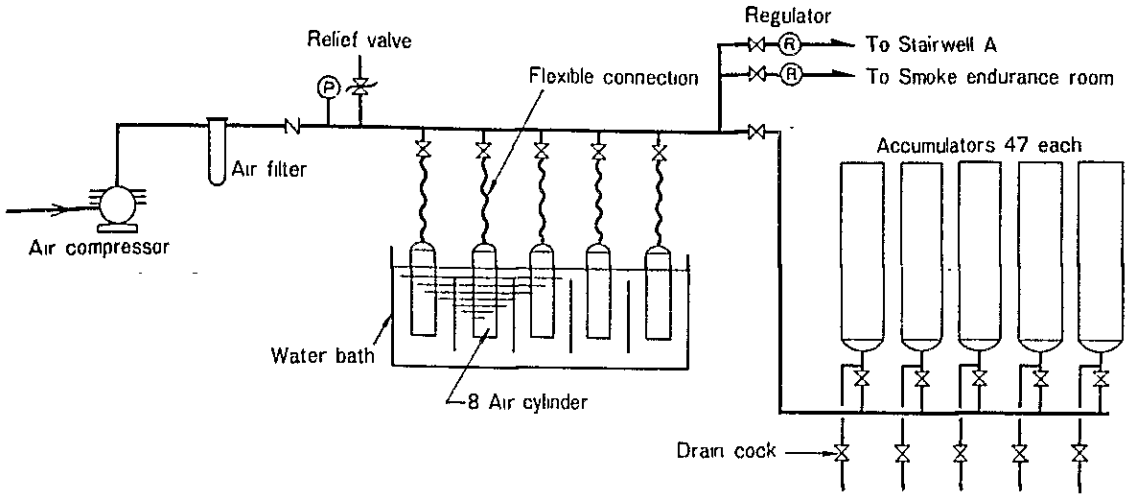
d. Air Filling Room

- o Air cylinders for training should be prepared at this tower. The diagram of making up cylinders is as shown in the following drawing. The specifications may be changed to meet any applicable local high pressure gas control code.

  Air compressor

Capacity:	250 Nℓ/min.
Maximum pressure:	150 Kg/cm^2
Oil-free type	

  Accumulators and piping should pass pressure check at 250 Kg/cm^2.



e. Sprinkler and Gas Demonstrating Room

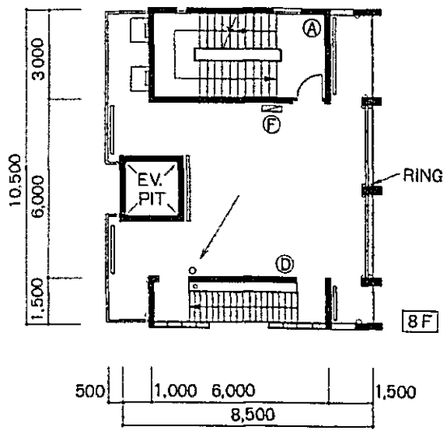
- o At the first stage, the sprinkler system is demonstrated. In the future, other systems like foam system, Halon 1301 system, etc. will be required.
- o Performance of three types of sprinklers used in Brazil should be demonstrated separately.
- o The number of the sprinkler head is one for each kind.
- o The water is supplied by a fire engine. The details of the system should be designed according to the local fire code.

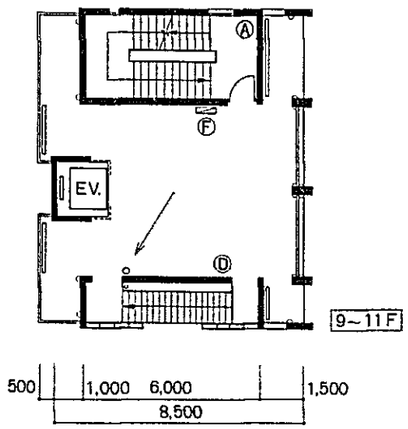
f. Standpipe System

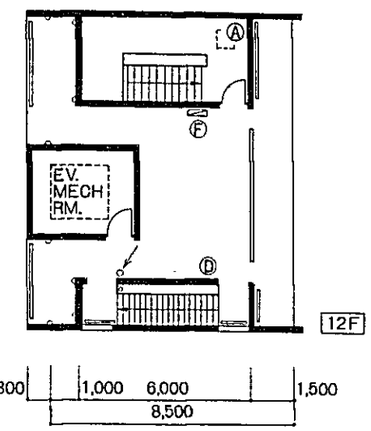
- o The tower is equipped with a standpipe system, with hose stations on the 4 - 12th floors.

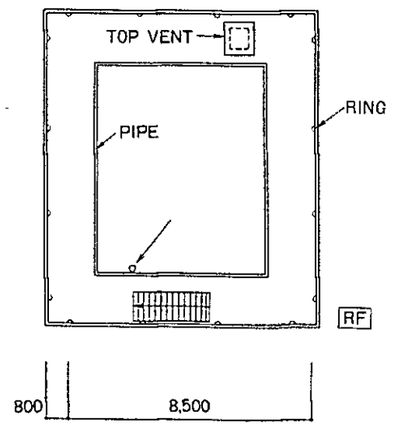
g. Basement

- o At the basement, a sump should be constructed to collect water from floors and rainwater in the Stairwell B and the ground-water seepage and to dewater them by pump.

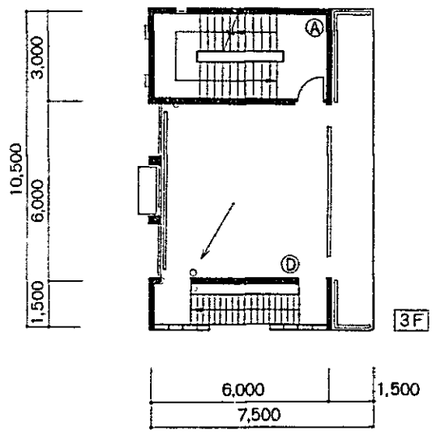


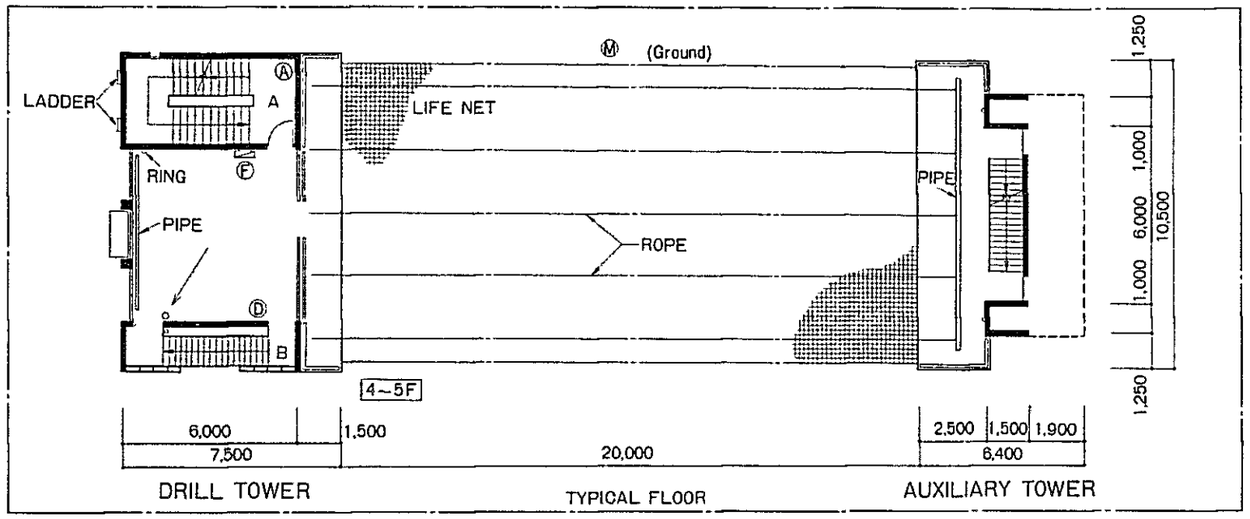


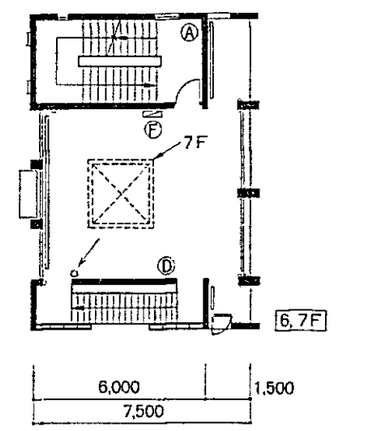


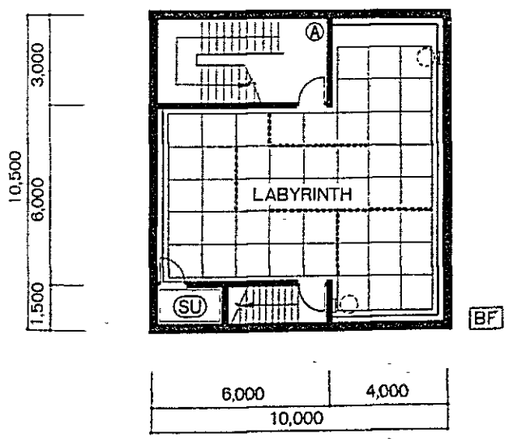


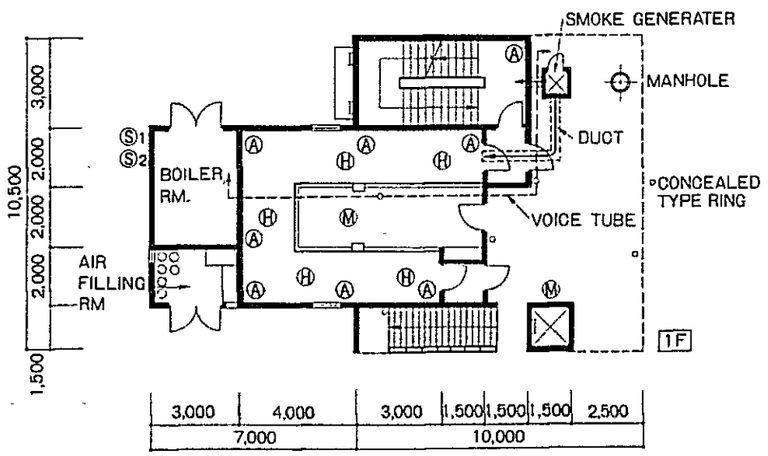
Legend
- F : Standpipe hose station
- SP : Sprinkler
- H : Unit heater and humidifier
- A : Fresh air outlet (Emergency)
- M : Wired microphone receptacle
- D : Drain
- S_1 : Siamese connection for standpipe system
- S_2 : Siamese connection for sprinkler demonstration
- SU : Sump with a discharge pump

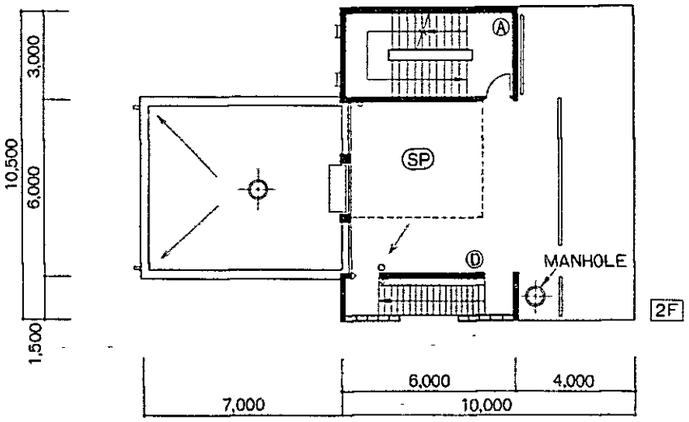












1:200

DRILL TOWER PLAN

3-1-4 GYMNASIUM

A. Building

Reinforced concrete construction with steel-framed roof, 14.0 m high above grade and 1,440 m^2 in floor area.

- Other Facilities: two buildings

1)	Judo Exercising Area	122 m^2
	Fundamental Training Room	122 m^2
	Locker Room (30 persons)	122 m^2
	Office, Storage and Meeting	122 m^2
2)	Locker Room (120 persons) with toilets and showers	324 m^2

- Inside the Gymnasium, a mini-soccer game can be played.
- Height from the floor to the metal net ceiling below the roof beams to protect the lights is 12 m.
- Two rings for fixing ropes are provided onto each column at an upper and a lower gallery levels.
- The lockers for 120 persons are to serve the trainees in the center, their families, and visiting crews and teams.
- The Gymnasium and other buildings are connected by a roof to reserve the roofed open space for training while it rains.

B. Electrical

a. Lighting

Lighting fixtures and illumination standards given below will serve for developing the detail designs.

Space	Lamp	Illumination (Lux)
Gymnasium	Metal-halide lamp	500
Training	Fluorescent lamp	300
Judo	Fluorescent lamp	300
Office	Fluorescent lamp	300
Meeting	Fluorescent lamp	300
Lockers	Fluorescent lamp	200
Storage	Fluorescent lamp	100

Here, the lamps above the arena ceiling should be mounted to allow for easy replacement from the upper part of ceiling.

C. Mechanical

- Ordinary building service systems are sufficient enough for the purpose. No other especial system is required.

3-1-5 OIL PAN

A. Building

- Reinforced concrete construction, 10 m high and 6 m in inside diameter.

B. Electrical

- No special system is required.

C. Mechanical

- As the foam used to extinguish an oil fire has high BOD and COD values, the drain from the Oil Pan Yard should meet the local pollution control requirements before discharge. The expected BOD and COD values are 4000 mg/L and 6000 mg/L respectively. The treatment system should be not less than 2.5 m^3/day in capacity, and a 75 m^3 drain accumulator should be installed before the treatment process in order to allow extended training.
- A switcher to the rainwater drain system should be installed before the treatment system in order to avoid overflow from the accumulator or dillution of foam-containing drain when it rains.
- The oil pan is provided with drainage pipe to enable the waste to be drained off by turn of a valve.

3-1-6 OUTDOOR FIRE TRAINING AREA

A. Building

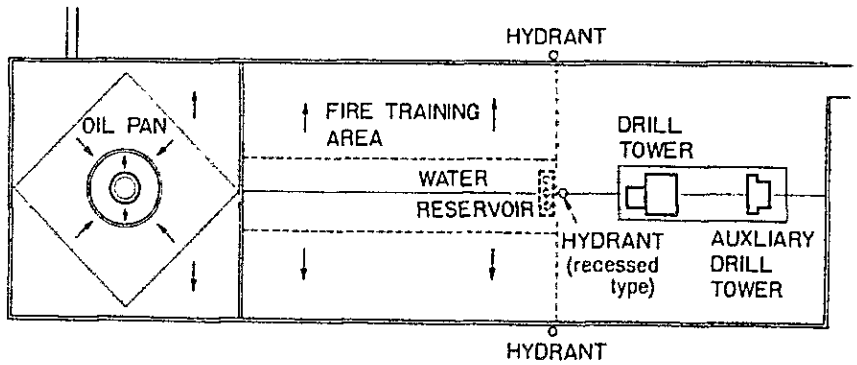
- o 70 m wide x 90 m long
- o Asphalt finish
- o Here, one class consisting of 30 trainees can perform simultaneous water shooting training in three groups.
- o The Water Reservoir, 100 tons in capacity, is provided close to the Drill Tower.

B. Electrical

- o For lighting, see 3-1-2 Site Plan.

C. Mechanical

- o A total of three hydrants are provided along the endline, one at the center and each of the other two along the side line. The center hydrant is of recessed type buried in the ground.



3-1-7 WATER RESERVOIR

A. Building

Reinforced concrete construction, 100 tons in capacity and 4.0 m in height of structure and 3.0 m in water depth.

- o The reservoir is to be built in the ground near the Drill Tower.
- o The fire trucks with a pump are positioned near the reservoir for pumping up and shooting training.

B. Electrical

- o No special system is required.

C. Mechanical

- o Automatic water supply system is required.

3-1-8 DIVING POOL

A. Building

Reinforced concrete construction, 6 m in diameter, 8 m in height and 7 m in water depth.

- o In order to ensure safety, four surveillance windows are provided.

B. Electrical

- o No special system is required.

C. Mechanical

- o The water filtering system for use in ordinary swimming pools should be installed. The water velocity at the suction pipe should be reduced to prevent a diver from being sucked.
- o Overflow openings are required.
- o A hydrant is provided for water supply.

3-1-9 AUDITORIUM

A. Building

Single-storied reinforced concrete construction, 525 m^2 in floor area, roofed with corrugated colored steel sheets.

- o Theater type large classroom with 300 fixed-seats.
- o Black curtains are used when a film is projected.

B. Electrical

a. Lighting

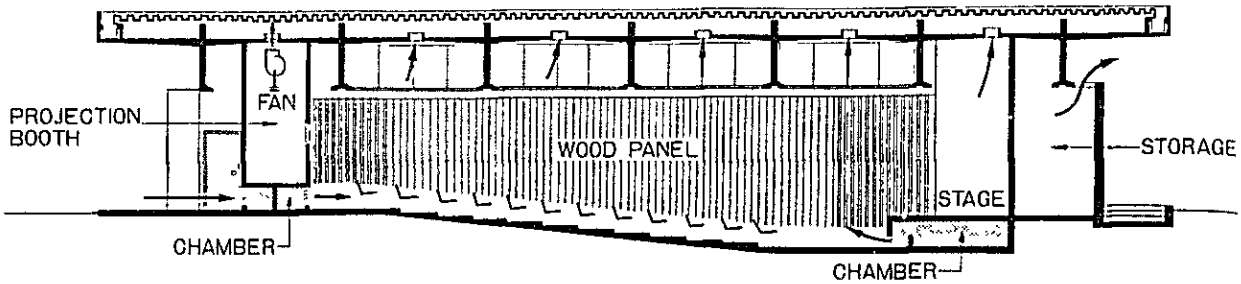
- o Fluorescent lamps to give 400 lux when measured at desk top.
- o Lighting fixtures for a blackboard should be arranged not to give disagreeable reflection on the board.

b. Public Address System

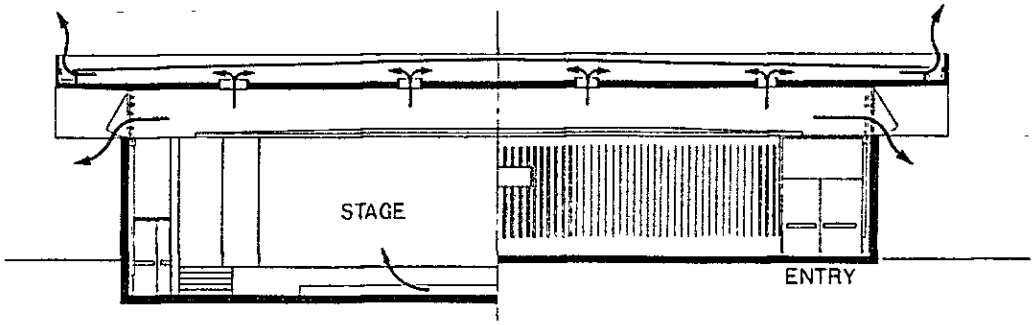
- o Microphones are at the center of the stage and at the both ends in the front.
- o Loudspeakers are at the left and the right above the stage and some on the ceiling.
- o Movable type loudspeakers are recommended for picture projection, their receptacles provided on the floor of stage at each side of a screen.
- o An amplifier should be installed in a projection booth.
- o The location of microphones and loudspeakers above the stage should be carefully studied to prevent howling.

C. Mechanical

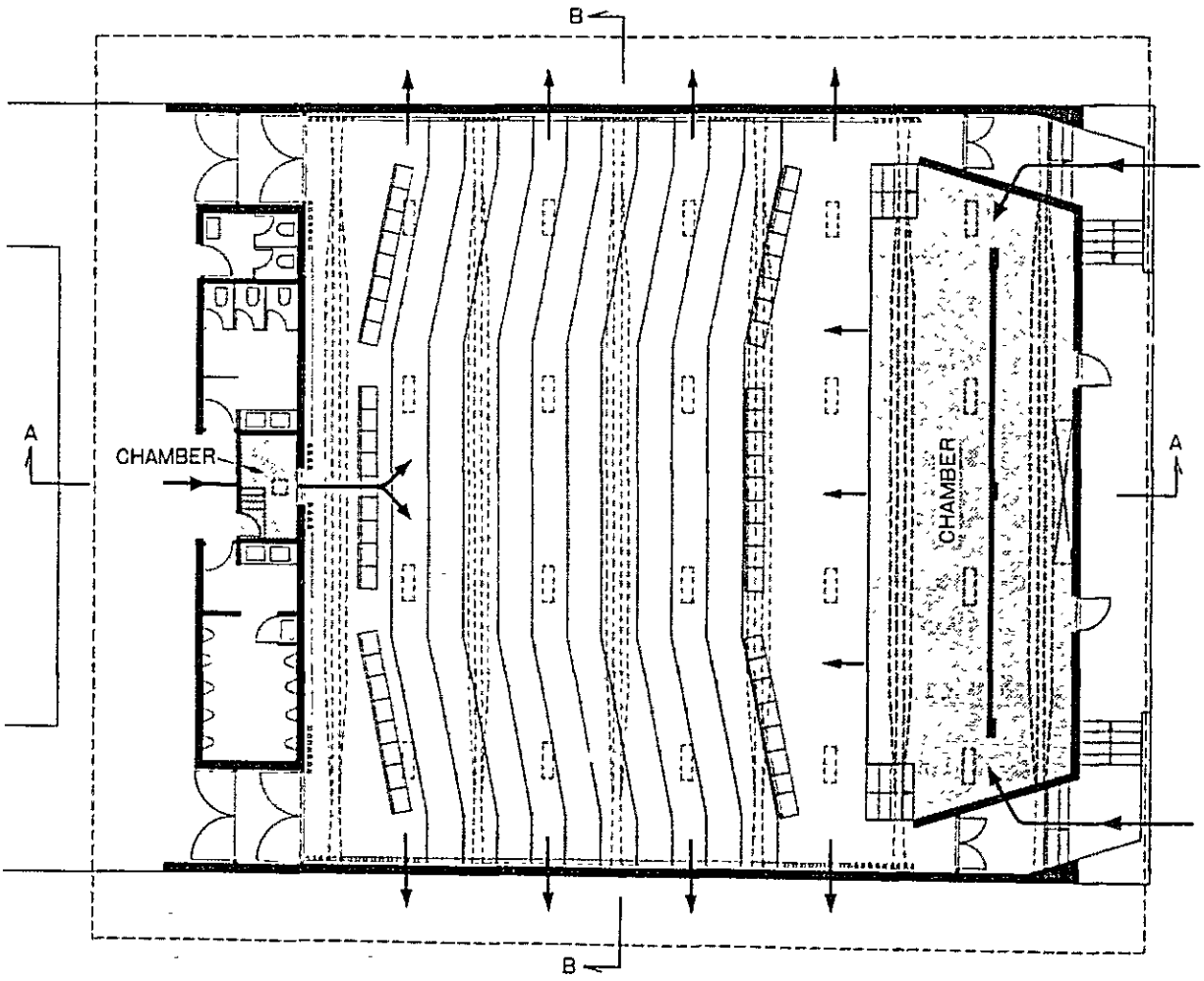
- o Natural ventilation will give good thermal condition in the auditorium space even at the time of black-curtained dark condition for films as shown in drawings; therefore, no air conditioning system is required.
- o The projection room should have mechanical ventilation to extract heat generated by projectors.



Section A



Section B



Plan

← shows natural ventilation

3-1-10 CIRCUIT TRAINING FIELD

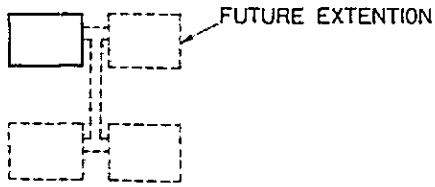
- The Training Field is located in the south of the site where full of natural topographical features is reserved.
- Existing trees around the Outdoor Fire Training Area and the Drill Tower are recommended to be left unremoved, if possible.
- For the training, open space in front of the Gymnasium may be used.
- For training equipment, see 3-2-7 Circuit Training Field.

3-1-11 RESEARCH LABORATORY

A. Building

Single-storied reinforced concrete building, 315 m^2 in floor area, roofed with corrugated steel sheets.

- o To facilitate the future extension, the basic unit is taken as 3 m x 15 m.
- o The entire laboratory has a study zone and a laboratory zone, with a clerestory between them for daylighting and natural ventilation. These two zones are separated by glass and partition wall. The clerestory is also to be used as duct space for venting the exhaust air from some experimental equipment.
- o Rooms to be housed at the first phase:
  - Physicochemical Lab.
  - Electrical Lab.
  - Preparation Room
  - Lab. for trainees as separated from the other research lab.
  - Office as separable into plural office sections in the future
  - Lavatory
- o The Combustion Experiment Room is located to the south of the garage.
- o Idea for the future extension plan.



B. Electrical

o Lighting

The following lighting fixtures and illumination are recommended.

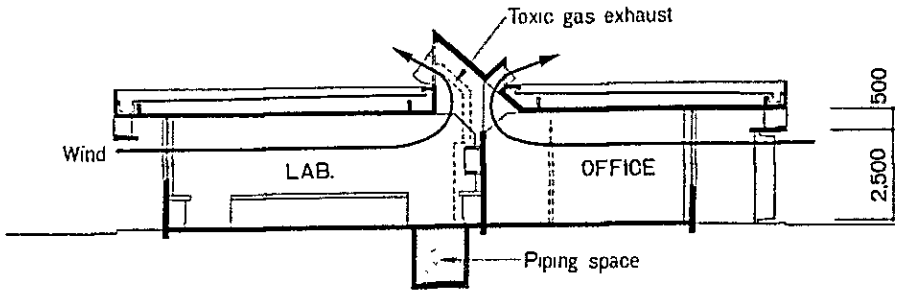
Space	Lamp	Illumination (Lux)
Laboratory	Fluorescent lamp	500
Office	Fluorescent lamp	300
Preparation	Fluorescent lamp	300

o Receptacles

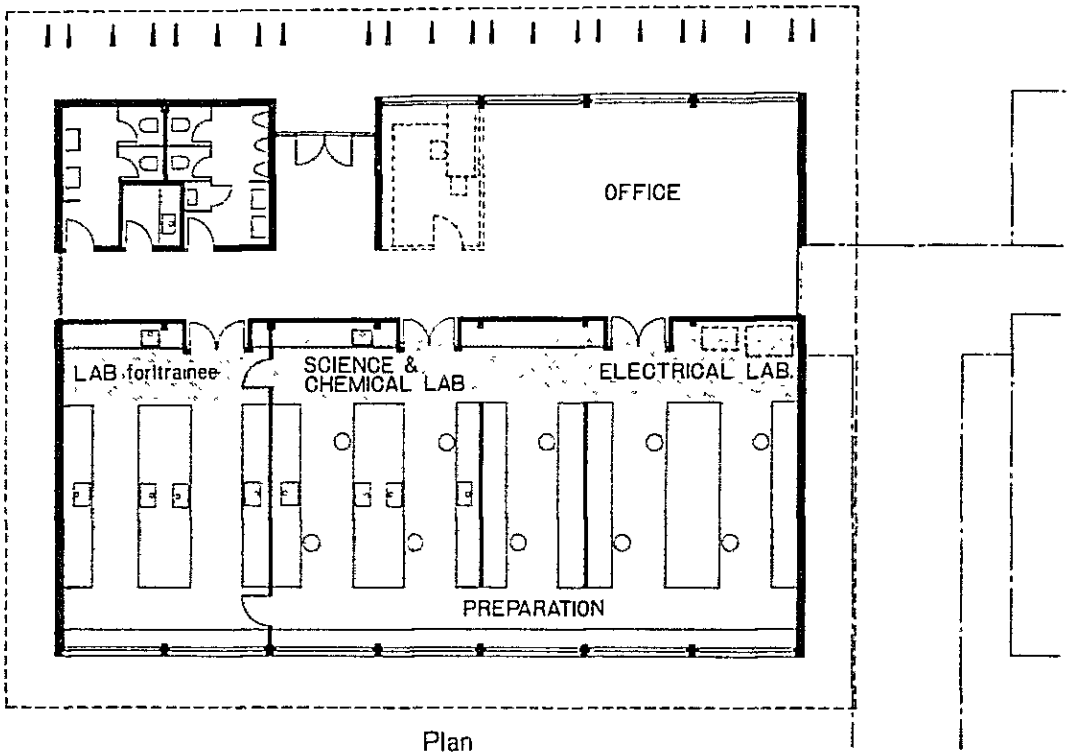
On each testing table, a receptacle should be provided for test equipment.

C. Mechanical

o Toxic gases generated in a fume hood or a combustion chamber should be extracted outside by a fan located just above it. The odor of the Laboratory is naturally vented through the top vent. All the service lines -- city water, gases for experiment, drain, electricity etc. -- are located in the underground service space, as shown on next page, which makes the future extension and change easier.



Section



Plan