4. BASIC DESIGN

4. BASIC DESIGN

4.1 Design Policy

The basic design of the Project will be conducted based on the following policies.

1) The functions of the Plant should be recovered as closely as possible to the original design capacity by renovating refrigeration equipment.
2) A stable supply of raw milk and an efficiency in transportation should be secured by providing a proper scale of transport vehicles.
3) The refrigeration equipment which corresponds to the existing system and meet the technical level of the operating agencies should be provided.
4) Equipment and materials should be selected in consideration of a severe condition of temperature in the middle of winter (-30 to -40°C), taking adequate measures to prevent freezing.
5) Equipment should be selected which is durable and easy to be operated and maintained in a proper system configuration.
6) Equipment should not be highly automatic but able to be repaired easily.
7) Equipment should have grades and specifications which require minimum operation and maintenance costs in consumption power, replacement of expendable supplies, and fuel consumption rate.

4.2 Study and Examination on Design Conditions

4.2.1 Refrigeration Equipment

Refrigeration equipment will be selected based on the following conditions in the Project.

(1) Criteria for Estimation of Equipment Capacity

The required capacity of each equipment should be in accordance with original design conditions as described below.

Table 4.1 Criteria for Estimation of Equipment Capacity

Item	Conditions
1) Ambient Temperature	+40°C to -30°C
2) Evaporation Temperature	-40°C, -30°C (Low Temperature Range)
	-15°C (Middle Temperature Range)
	-10°C, +5°C (High Temperature Range)
3) Condensing Temperature, Wet Bulb	+35°C, +20°C
4) Brine Outlet Temperature	-10°C
5) Chilled Water Outlet Temperature	+10°C, +1°C
6) Cooling Water Inlet Temperature	+25°C
7) Required Freezing Capacity	290,000 kcal/hr (Low Temperature Range)
	210,000 kcal/hr (Middle Temperature Range)
	2,000,000 kcal/hr (High Temperature Range)
8) Required Condensing Capacity	3,600,000 kcal/hr
9) Power	380V/3ph, 220V/1ph, 50 Hz

(2) Applied Standard

Since there is no standards concerning refrigeration equipment in Mongolia, High Pressure Gas Regulation, Refrigeration Safety Rules, and Japanese Industrial Standard (JIS) in Japan will be applied in the Project.

4.2.2 Transport Vehicles

Transport vehicles in the Project will be selected based on the following conditions.

1) Quantity will be limited to a supplementary amount of those which are in shortage in the Plant.
2) Models of vehicles should be unified as much as possible to ensure convenience in operation and maintenance of repairs and spare parts supply.

4.2.3 Weighing Equipment

Equipment will be selected in consideration of receiving and delivery volume of raw milk, transport volume of dairy products and processing capacity of cooling equipment.

4.3 Basic Plan

4.3.1 Equipment Plan

(1) Refrigeration Equipment

The existing refrigeration system has been technically established without any problems in its present condition. Local operator are proficient in operation, maintenance and control. Therefore, no alternation of the system is required, and renewal alone would be sufficient.

As stated in "3.2.5 Study and Examination on Content of the Request Equipment", all the major refrigeration equipment will be renewed.

1) Brine Cooler Unit for Middle Temperature Range

This unit will be used to produce cold brine (calcium chloride brine) and to cool raw milk and pasteurized milk mainly by a plate type cooler. The renewed unit will be a unit type combining a unit of the same type as the existing equipment and a heat exchanger of a horizontal flooded type of a shell-and-tube system. The existing equipment consisting of two units will be unified into one unit to ensure higher operational efficiency and easier maintenance. In order to cope with a failure of the equipment, an alternative operation by a cooler unit for high temperature will be ensured through a bypass piping from a system for high temperature with similar evaporating temperature.

2) Refrigerating Unit for High Temperature Range

This unit will be used for cooling a cold storage room. As with the existing equipment, an open type single stage condensing unit will be adopted.

3) Refrigerating Unit for Low Temperature Range

This unit will be used for a rapid hardening process for making ice cream, etc. as well as for cooling a freezed storage room. The existing equipment has a booster system which combines single compressor at high and low pressure sides. In the Project, a compound system will be employed where a cylinder of one compressor is used separately for a high and a low pressure sides so that both an installation area and a power consumption may be reduced.

4) Evaporator (Unit cooler)

An evaporator will be installed in each freezed and cold storage room as an internal cooler. It will be a plate fin coil type as with the existing equipment. However, the existing evaporator has a spit hole in a low position, preventing an easy flow of defrost drainage, and causing refreezing of defrost drainage. Therefore, a new evaporator with a side spit hole will be provided. For defrosting, the same hot gas system as in the existing system will be employed.

Since dairy products are to be stored, a relatively large TD (Temperature Difference) will be allowed. Although humidity control is not required, the inner surface of the cooler is often covered with a large amount of frost because of frequent door openings. A large fin pitch is required to solve this problem. Also, as a preventive measure against refreezing of defrost drainage, each evaporator will be equipped with a drain pan heater.

5) Ammonia liquid Pump

A unified type of a pump and a motor which is free from liquid leakage will be installed. Also, a pressure and explosion proof structure will be employed to ensure safety.

6) Evaporative Condenser

A pressure fan type will be used in order to minimize failure and ensure easy maintenance. Since calcium chloride may be fed to prevent circulating water from freezing, an anti-corrosion measure will be taken. The existing equipment has a cooling tower for cooling a refrigerator jacket and an oil cooler. The cooling tower itself will not be included in replacement items since it is in a relatively good condition. However, since the existing pump for circulating chilled water is exceedingly deteriorated, it will be replaced with a new one.

7) Pump

A centrifugal volute type of a full-hermetic outer fan type will be installed. The oil pump (refrigerator oil supply pump) will be a gear type.

8) Control Panel

One control panel will be installed in the machine room for controlling refrigeration equipment , and two panels will be installed for controlling the evaporator along the passage in front of the freezed and cold storages. The control panels will be a self-standing type. A collective indicator lamp will be equipped to show machine names so that their operational conditions may be clearly shown and necessary measures can be taken against abnormal conditions. The temperature controller/indicator will be a digital type to ensure easy operation and checking.

9) Pipings for Refrigerant, Chilled Water, Brine and Cooling Water

Since these pipings are relatively in good conditions, there are not many parts which need an immediate replacement. However, some connecting pipings which have been eroded will be replaced together with auxiliary pipings.

10) Pressure Vessels (Oil Separators and Intercoolers)

Since welded parts are found to be partly corroded, those regarded as hazardous with respect to safety and those with reduced capacity in separation will be replaced.

A list of descriptions and specifications of refrigeration equipment are given below.

Table 4.2 Descriptions and Specifications of Planned Refrigeration Equipment (1/2)

Name of Equipment		Specifications
1) Brine Cooler Unit	Quantity	: 1
	Type	: Single stage open type
	Refrigerating Capacity	: 215,000 kcal/h ET:-15°C, CT:+35°C
	Brine Cooler	: Shell-and-Tube
	Motor	: 110 kw
2) Two Stage Refrigerator Unit for Low Temperature	Quantity	: 4
	Type	: Two stage open compound type
	Refrigerating Capacity	: 74,000 kcal/h ET-40°C, CT:+35°C
	Motor	: 75 kw
3) Single Stage Refrigerator Unit for High Temperature (1/2)	Quantity	: 2
	Type	: Single stage open type
	Refrigerating Capacity	: 206,000 kcal/h ET-10°C, CT:+35°C
	Motor	: 75 kw
4) Single Stage Refrigerator Unit for High Temperature (2/2)	Quantity	: 5
	Type	: single stage open type
	Refrigerating Capacity	: 328,000 kcal/h ET-10°C, CT:+35°C
	Motor	: 130 kw
5) Evaporator (Unit Cooler) (1/3)	Quantity	: 26
	Type	: Ceiling hanger
	Defrost method	: Hot gas
	Cooling area	: 102 m^2
	Fan motor	: 0.4 kW x 2
6) Evaporator (Unit Cooler)(2/3)	Quantity	: 4
	Type	: Ceiling hanger
	Defrost method	: Hot gas
	Cooling area	: 164 m^2
	Fan motor	: 0.4 kW x 2
7) Evaporator (Unit Cooler)(3/3)	Quantity	: 4
	Type	: Ceiling hanger
	Defrost method	: Hot gas
	Cooling area	: 487 m^2
	Fan motor	: 2.2 kW x 3
8) Ammonia Circulation Pump	Quantity	: 6
	Type	: Unit type
	Discharge volume	: 200 l/min
	Head	: 22m
	Motor	: 2.2 kW
9) Evaporative Condenser	Quantity	: 10
	Type	: Pressed fan type
	Condensing capacity	: 380,000 kcal/hr CT:+35°C, WB:+20°C
	Cooling area	: 130 m^2
	Fan motor	: 2.2 kW x 2

Note: ET: Evaporating Temperature, CT: Condensing Temperature, WB: Wet Bulb

Table 4.2 Descriptions and Specifications of Planned Refrigeration Equipment (2/2)

Name of Equipment	Specifications	
10) Brine Pump	Quantity	: 3
	Type	: End suction volute
	Discharge Volume	: 45m³/h
	Head	: 30m
	Motor	: 11 kw
11) Oil Pump	Quantity	: 2
	Type	: Gear pump
	Discharge Volume	: 54 l/min
	Discharge Pressure	: 6 kgf/cm²
	Motor	: 1.5 kw
12) Chilled Water Pump (1/2)	Quantity	: 2
	Type	: End suction volute
	Discharge Volume	: 45m³/h
	Head	: 30m
	Motor	: 7.5 kw
13) Chilled Water Pump (2/2)	Quantity	: 4
	Type	: End suction volute
	Discharge Volume	: 90m³/h
	Head	: 53m
	Motor	: 22 kw
14) Cooling Water Pump for Condenser	Quantity	: 5
	Type	: End suction volute
	Discharge Volume	: 90m³/h
	Head	: 30m
	Motor	: 11 kw
15) Cooling Water Pump for Jacket	Quantity	: 2
	Type	: End suction volute
	Discharge Volume	: 90m³/h
	Head	: 30m
	Motor	: 11 kw
16) Oil Separator	Quantity	: 11
	Type	: Manual Return
17) Inter Cooler	Quantity	: 1
18) Control Panel for Refrigerator Unit	Quantity	: 1
	Type	: Self-standing cubicle type
19) Control Panel for Unit Cooler	Quantity	: 2
	Type	: Self-standing cubicle type

(2) Transport vehicles

1) Milk collection and Transport Vehicles

Tank lorries are used for transporting raw milk from milk stations and Milk Collection Center to the Plant as well as for delivering processed milk in bulk from the Plant to purchasers such as volume seller, government-related enterprises, and

schools. Since delivery must be done in a limited time of a day, tank lorries possessed by the Plant with the loading capacity of 3 or 5 tons are not suitable from a viewpoint of efficiency and fuel consumption rate.

Under the Project, therefore, diesel engine vehicles with a loading capacity of 2 tons will be provided. Compared with gasoline powered vehicles, they are suitable for transporting a small quantity owing to their superiority in fuel consumption. Each vehicle will be equipped with an insulated tank to retain the quality of milk during transportation.

The actual record of the transport volume in summer, 1986 when the Plant was functioning properly was 200 tons of collection amount and 126 tons of delivery amount, which totals 326 tons/day. At present the number of milk collection vehicles and delivery vehicles of pasteurized milk which are in constant operation is 58, and the transport volume is as follows.

a) 3.3, 3.5, 3.7 ton vehicles: 49 x 3.5 tons (average load) = 171.5 tons/day

b) 5 ton vehicles : 9 x 5 tons = 45.0 tons/day

About half the vehicles which finished collecting milk early in the morning are used for delivery after a tank is washed and disinfected. For this purpose 3 ton vehicles are used to transport a small volume which amounts to the following.

26 x 3.5 tons (average load) = 91 tons/day

Thus, the amount of shortage will be calculated as below.

326 - (171.5 + 45 + 91)=18.5 tons/day

To cover this amount by 2 ton vehicles provided under the Project, ten vehicles will be required.

2) Vehicles for Transporting Dairy Products

Insulated vehicles are used for transporting yogurt, ice cream and curds manufactured by the Plant to purchasers. They are increasingly deteriorated as with milk collection and transport vehicles. In particular, all the coolers loaded on the vehicles are defective and out of order. Moreover, the lowered insulation capacity of the coolers to accommodate products has given a serious effect on the transportation of frozen or cooled products. The volume transported per vehicle is approximately 2 tons. Since the existing vehicles with a loading capacity of 3 tons or 5 tons have a low efficiency in transportation, diesel engine vehicles with a loading capacity of 2 tons will be provided. Each vehicle will be equipped with a cooling equipment so that quality of products may be maintained.

At present, 36 vehicles are constantly in operation in the Plant. The shortage in transportation capacity calculated based on the amount actually transported per day in the summer of 1989 is as follows.

Vehicles for transporting dairy products

91 tons/day - (36 vehicles x 2 tons) = 19 tons/day

If the above shortage would be covered by vehicles with a loading capacity of 2 tons to be provided under the Project, a total of 10 vehicles will be needed.

Therefore, 10 vehicles conspicuously deteriorated will be replaced under the Project.

The specifications of transport vehicles are outline as follows.

Table 4.3 Outline of Specifications of Transport Vehicles

Name of Vehicle		Specifications
1) Milk Collection and Transport Vehicles	Quantity	: 10
	Model	: Insulated Tank Lorry
	Seating Capacity	: 3
	Engine Model	: Water cooled, Diesel
	Maximum Loading Capacity	: 2,000kg
	Effective Tank Capacity	: 2,000 liter
	Exhaust volume	: 3,600 cc
2) Milk Product Delivery Vehicles	Quantity	: 10
	Model	: Refrigerated Vehicle
	Seating Capacity	: 3
	Engine Model	: Water cooled, Diesel
	Maximum Loading Capacity	: 2,000kg
	Exhaust volume	: 3,000 cc

(3) Weighing Equipment

In summer when collected milk amounts to its utmost, the Plant receives a total of approximately 200,000 liters of raw milk (actual in 1989) during eight hours from 1:00 to 6:00 a.m. and from noon to 3:00 p.m. Consequently, the volume of milk received per hour is:

200,000 liters ÷ 8 hours = 25,000 l/hr

Since the above figure is the same as the total capacity of a plate-type cooler for raw milk, the weighing equipment to be provided in the Project should have a capacity of 15,000 l/hr. The weighing equipment for raw milk received will be installed right in front of a plate-type cooler in the receiving room.

As the capacity of the equipment for pasteurizing and refrigerating milk is 15,000 l/hr, the capacity of weighing equipment for delivery should also be 15,000 l/hr

to cover the above volume. The maximum volume delivered per day in summer of the pasteurized milk sold in bulk amounts to approximately 63,000 liters. Therefore, a weighing equipment with the above capacity will require the time for delivery per day as follows.

63,000 liters ÷ 15,000 l/hr = 4.2 hours

The weighing equipment for delivery will be installed adjacent to the storage tank for pasteurized milk.

Weighing equipment include a flow meter, a truck scale and load cell types, but a magnetic flow meter will be provided in the Project which requires low installation and running costs, enables continuous weighing and seldom gets defective. Although a flow meter may cause a measurement error due to bubbles in milk produced by stirring, a device to eliminate bubbles will be incorporated in the equipment so that a range of errors may be minimized. Moreover, in order to prevent milk from freezing during transportation in winter, an anti-freezing measure will be taken for relevant parts of piping.

An outline of specifications of weighing equipment is described below.

Table 4.4 Specifications of Weighing Equipment

Name of Equipment		Specifications
1) Weighing Equipment for Receiving Raw Milk	Quantity	: 1
	Type	: Unit type magnetic flow meter system
	Capacity	: 15,000 liters/hr
	Milk Pump	: 15,000 liters/hr, 2.2 kw
	Attachment	: Bubble Eliminator
		Recorder
		Raw Milk Receiving Tank, 5,000 L
(2) Weighing Equipment for Milk Delivery	Quantity	: 1
	Type	: Unit type magnetic flow meter system
	Capacity	: 15,000 liters/hr
	Milk Pump	: 15,000 liters/hr, 1.5 kw
	Attachment	: Bubble Eliminator
		Reorder

Weighing Equipment System is illustrated below.

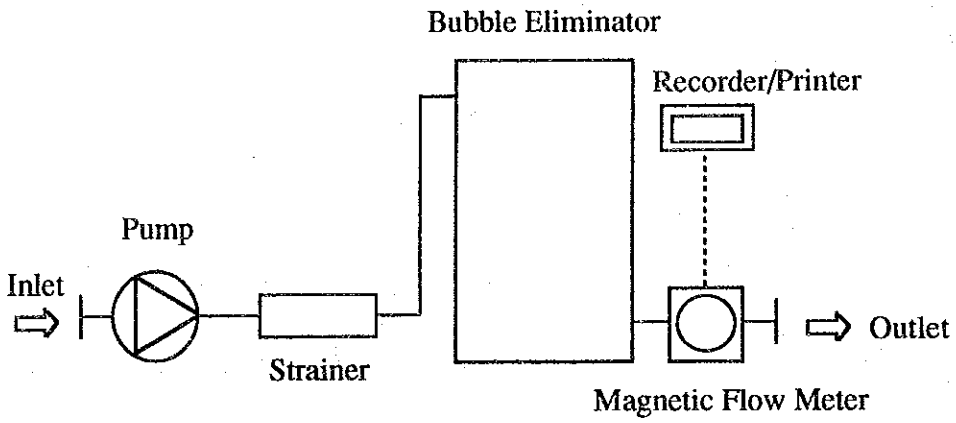


Figure 4.1 Weighing Equipment System

4.3.2 Basic Design Drawings

Basic design drawings of the Project which consist of the followings are included in the Appendix.

1) Floor Plan (1/2)
2) Floor Plan (2/2)
3) Refrigerant Piping System (1/3)
4) Refrigerant Piping System (2/3)
5) Refrigerant Piping System (3/3)
6) Cooling Water Piping System
7) Chilled Water and Brine Piping System
8) Defrost Piping System

4.4 Implementation Plan

4.4.1 Implementation Policy

(1) Implementing Organization

The executing agency of the Project is Ulaanbaatar Dairy Plant under the jurisdiction of the Ministry of Food and Agriculture in Mongolia. After the Exchange of Notes is concluded between the Government of Japan and the Government of

Mongolia, the consultant in Japan will enter into a contract of the detailed design and supervision with the Government in Mongolia. Then, a Japanese supplier will enter into a contract with the Government of Mongolia to procure and install the equipment under the supervision of the consultant. After the procurement and installation is completed, Ulaanbaatar Dairy Plant will be responsible for the operation and maintenance as an executing agency.

(2) Implementation Policies

The Project is to be implemented based on the following policies in consideration that the Project will be conducted under grant aid from the Government of Japan.

1) Opinions should be exchanged between the executing organization in Mongolia, the consultant and suppliers engaged in procurement and installation of equipment to maintain a good communication and facilitate the work smoothly.
2) The production plan of dairy products and the implementation plan should be closely coordinated to avoid problems in production process.
3) The refrigeration equipment to be provided should be in compliance with the existing refrigeration system.
4) Careful attention should be paid to avoid accidents during temporary storage, delivery and installation of the equipment.

4.4.2 Implementation Conditions

The Project is to be implemented based on the following conditions in consideration of the special situations at the site.

1) The average lowest temperature in the middle of winter is -20°C, and it sometimes goes down to -40°C. Since it is almost impossible to work outside during that time, the work on condensers to be installed outside should be scheduled accordingly.
2) It is necessary to replace compressors of the same temperature range in each refrigeration system by turns in order to avoid an overall suspension of the function during the implementation. A reduced capacity will affect production capability for several days. Therefore, a work schedule should be made based on a production line and plan.
3) Special attention should be paid for dealing with ammonia refrigerant which can be poisonous and in danger of explosion. Safety measures and emergency actions should be considered.

4.4.3 Supervisory Plan

In supervising the Project, a detailed supervisory plan should be made after sufficient coordination with the Mongolia side. Then, based on the supervisory plan, appropriate consultants will be sent to the site to supervise the work. The important points in supervision of the work are as follows.

1) The consultant should coordinate closely with the Mongolia side in order to conduct delivery and installation of the equipment smoothly from the detailed design stage.
2) Before delivery of equipment, the execution plan submitted by the vendor will be carefully reviewed and the appropriateness of the manufacturing process plan, procurement plan equipment specifications, etc. will be examined.
3) Before shipment, equipment will be examined in Japan to see that they meet design requirements of specifications, content, quality, etc. and appropriate instructions will be provided in case revision is required.
4) In delivery and turning over the equipment, it will be confirmed if the layout and installation of the equipment was properly conducted, and adequate instructions were given regarding operation and maintenance of the equipment. In particular, it will be ensured that operators in Mongolia are sufficiently familiar with the system of refrigeration equipment.
5) The consultant will keep a close contact and communication with Mongolia side and suppliers in order to facilitate the work smoothly.

4.4.4 Procurement Plan

Currently, it is extremely difficult to obtain a stable procurement of equipment in the middle of economic reforms in Mongolia. Subsequently, most of the equipment and materials including construction materials must be procured in Japan. The equipment and materials procured in Japan will be transported to China by ship, and then to Ulaanbaatar, Mongolia by train. As it is necessary to transfer at the border between China and Mongolia, the schedule should be made accordingly.

4.4.5 Implementation Schedule

(1) Scope of Work

The scope of work assigned to Japan and Mongolia is described below.

Table 4.5 Scope of Work

Content of Work	Japan	Mongolia
(1) Equipment		
1) To procure equipment.	○	
2) To install equipment.	○	
3) To make a trial operation.	○	
4) To provide training on operation.	○	
(2) To secure storage place.		
1) To store equipment and materials temporarily before installation.		○
2) To transport and store dairy products stored in refrigerators during the work period.		○
(3) To ensure customs clearance.		
1) Transportation to Mongolia.	○	
2) Internal transportation in Mongolia.	○	
3) Tax exemption and customs clearance.		○
(4) To bear commission to the Japanese exchange bank for the banking services based upon the B/A.		○
(5) To accord Japanese nationals in connection with the Project such facilities as may be necessary for their entry into Mongolia and stay therein for the performance of their work.		○
(6) To maintain and use properly and effectively the equipment provided under the Grant.		○
(7) To bear all expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment.		○
(8) To perform all the approval application procedures required for the work.		○

(2) Implementation Schedule

If the Project is implemented under grant aid from the Government of Japan, tender documents will be prepared after the Exchange of Notes is concluded between the two countries. Then, the tender and contract pertaining to the procurement and installation of equipment will be conducted, and the procurement and installation work will be executed. The implementation schedule will follow the sequence below.

1) Detailed Design Work

The detailed design is conducted and tender documents are prepared based on this basic design study report. The work period required is expected to be two and half months.

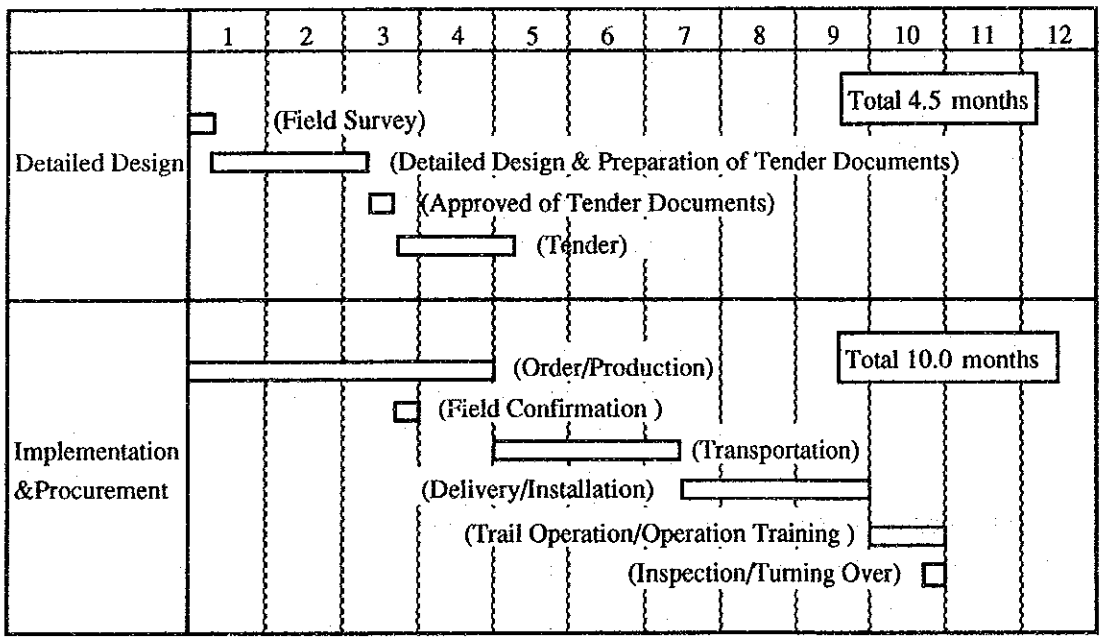
2) Tender Work

After the completion of the detailed design, participants in the tender concerning equipment procurement and installation work for the Project will be invited by public announcement. The executing agency will invite the participants in the tender and conduct the tender in japan with the presence of those who are concerned. The period required from the time of tender announcement to the contract is expected to be two months.

3) Equipment Procurement and Installation Work

After the contract is signed, the equipment procurement and installation work will start with the approval of the Government of Japan. Transpiration requires 2.5 months including a period of transfer at the border between China and Mongolia. The total period required is expected to be ten months. As it is almost impossible to work outside in the middle of winter from November to February, the installation period of equipment to be used outside will be excluded from that period.

Table 4.6 Implementation Schedule



4.4.6 Cost Allotted to Mongolia

As the Project is to cover replacement of existing equipment in the existing plant and providing vehicles, other costs such as infrastructure costs will not be borne by the Mongolia side.

(Estimation Conditions)

1) Estimation Time	August 1993
2) Exchange Rate	1US$ = 376.75 TUG 1US$ = 110.87 Yen 1TUG = 0.2942 Yen
3) Execution Period	Period of detailed design, procurement and installation of equipment is shown in the implementation schedule (Table 4.6).
4) Others	The Project will be implemented in accordance with the grant aid system in Japan.

5. PROJECT EVALUATION AND CONCLUSION

5. PROJECT EVALUATION AND CONDITIONS

5.1 Project Evaluation

Dairy products are staple foods in Mongolia with an annual intake volume per capita which is 1.24 times as much as that of meats. However, a supply volume of dairy products is not balanced between rural and urban areas, and a supply volume of 31kg is not sufficient to meet the annual demand per capita of 118.5kg in the capital Ulaanbaatar. It is pointed out that the lowered supply volume is largely caused by a functional deterioration of refrigeration equipment in Ulaanbaatar Dairy Plant which is the only source of dairy products in the city. Therefore, the Government of Mongolia requested grant aid from the Government of Japan concerning the improvement of the Plant in order to expand and stabilize a supply volume of dairy products in the capital Ulaanbaatar where one-fourth of the entire population is concentrated. The operational problems in the Plant, measures to be taken in the Project and their effects and improvements are described below.

Table 5.1 List of Project Evaluation

Current Problems	Measures Taken in the Project	Effects and Improvements
1) The output of dairy products in the Plant located in Ulaanbaatar which reached 44,000 tons in 1989 has been decreasing down to 18,000tons in 1992. - Major causes of this output decline are the reduced refrigeration, processing and storage capacity due to a functional deterioration of the refrigeration equipment in the Plant. As it is impossible to repair the existing equipment because spare parts cannot be obtained, it is necessary to replace major equipment.	- To improve refrigeration equipment to expand production of dairy products by enhancing refrigeration, processing and storage capacity of the Plant by replacing all the major refrigeration equipment including refrigerator units, evaporators, condensers, etc. - To replace related equipment including pump, refrigerant, piping of chilled water, brine, and cooling water.	- If the current conditions in the Plant remain the same, and a supply volume of dairy products per capita in the city goes down to 26kg in 2000 which meets only 22 percent of the demand. However, if the processing capacity is restored to the maximum, a supply volume of dairy products will be 66kg which is about three times as much as the current volume and meets 80 percent of the demand. - The recipient population benefited by the improvement of the Plant is about 600,000 city inhabitants, and it will reach 700,000 in 2000.

Current Problems	Measures Taken in the Project	Effects and Improvements
2) Milk collection is delayed due to a frequent failures of milk collection vehicles and a deterioration of transport vehicles. As a result, raw milk is in shortage due to lowered milk quality and collection loss caused by discarding spoiled milk. Similarly, quality of dairy products for sales is lowered due to functional deterioration of transport vehicles.	- To provide milk collection vehicles to strengthen milk collection and transport capacity including 10 milk collection vehicles (diesel vehicle with a water cooler). Milk collection vehicles are used for delivery of pasteurized milk. - To provide delivery vehicles of dairy products to strengthen sales system of dairy products including 10 delivery vehicles (diesel vehicle with a water cooler).	- Annual collection volume of 60,000 tons is required to achieve the maximum production volume of the Plant. Milk collection system will be strengthened with reduced collection loss and quality will be maintained by providing milk collection vehicles. - Transport capacity and fuel consumption will be improved compared with existing vehicles, and it will save operation and maintenance costs. - Supply and sales system of dairy products will be strengthened and quality of products will be retained.
3) A great amount of time is required for weighing received milk, causing production loss by lowered quality and discarding milk. Problems with farm milk producers also cause a decline in collection milk volume. Similarly, inadequate weighing equipment has caused problems with retailers and consumers.	- To maintain quality of milk by shortening receiving time. One unit of weighing equipment (unit type magnetic flow meter system) for receiving milk will be provided. - To provide one unit of weighing equipment (unit type magnetic flow meter system) for delivery of pasteurized milk to maintain quality of milk.	- Providing weighing equipment will shorten weighing time and thereby maintain the quality of milk and dairy products. - Providing weighing equipment will stabilize milk collection and facilitate sales by reducing problems with producers.

5.2 Conclusion

The Government of Mongolia has been implementing the Ninth Economic and Social Development Plan with a focus on a policy of domestic economic reforms and expansion of food supply as they revise the former socialistic planned strategy and strengthen relationships with western countries.

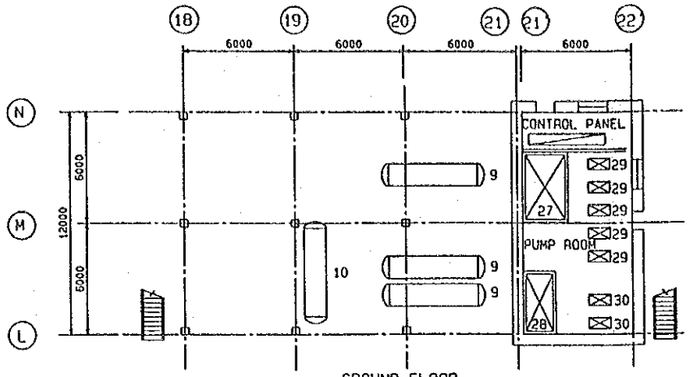
The objective of the Project is to improve the equipment in the dairy plant in Ulaanbaatar in order to promote a stable supply of dairy products in the capital which is the largest city in Mongolia. The implementation of the Project will recover the reduced refrigeration, processing and storage capacities and enable to secure a supply volume which is three times as much as the current volume. As a result, it is expected that an intake volume per capita of the dairy products which are staple foods of the nation will be expanded, and the self-sustaining food supply rate which has been lowered to 50 percent at present will be improved. The implementation of the Project is expected to support the current national development plan as well as to expand a supply volume of staple foods for the nation. Thus, the appropriateness of the Project under grant aid from the Government of Japan will be evaluated.

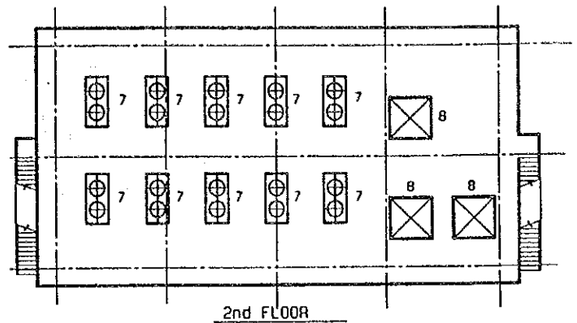
5.3 Recommendations

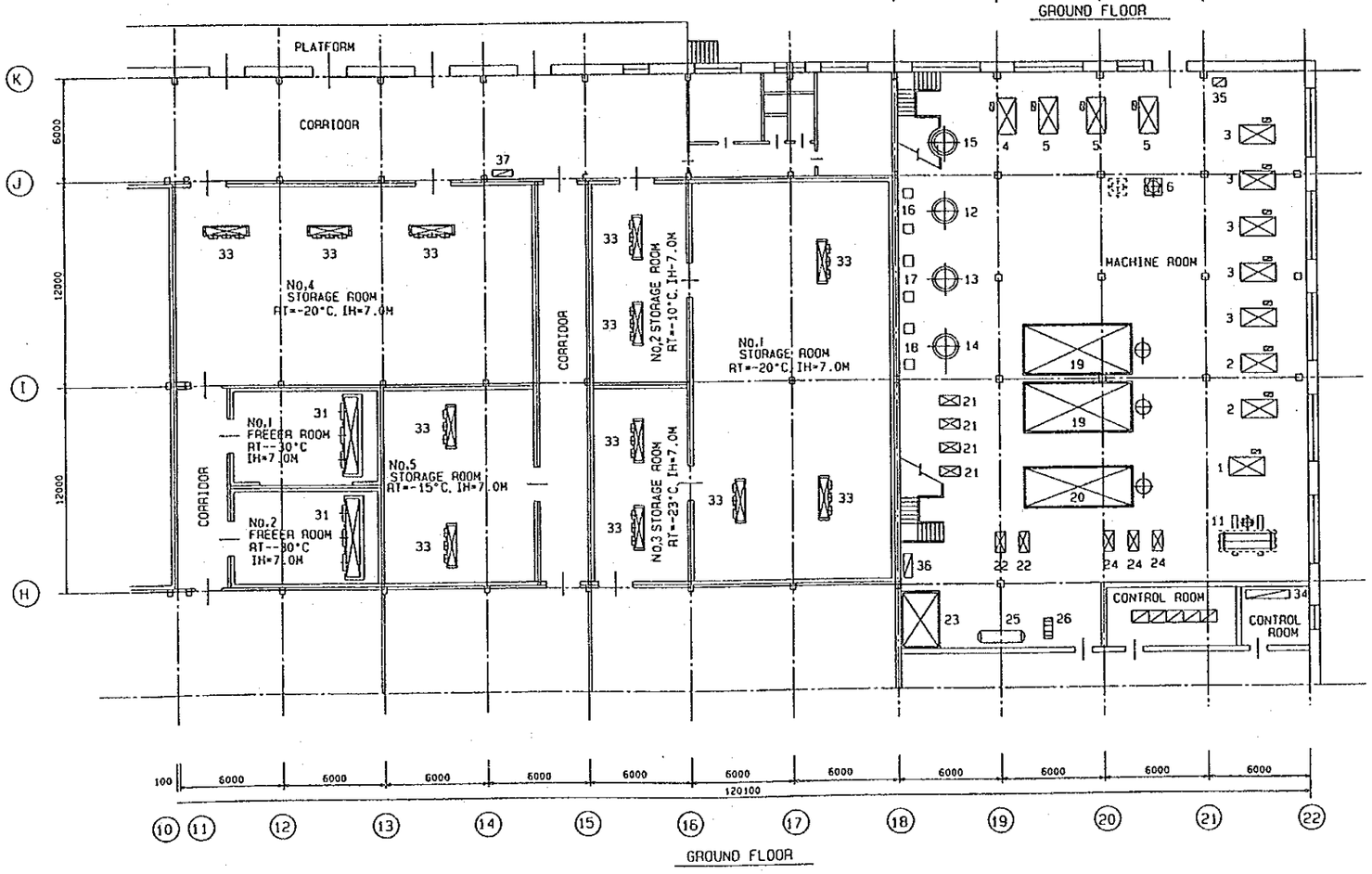
We would like to suggest that the Government of Mongolia take the following measures in implementation of the Project in order to realize more effective use of the facilities and equipment.

1) The equipment to be provided in the Project should be operated and maintained properly.
2) Sufficient training should be given to the personnel in order to achieve an effective and stable operation of the equipment.
3) Appropriate budgetary measures should be taken to secure necessary operation and maintenance costs. Special budget should be promptly secured for the planned operation and maintenance.

DRAWINGS

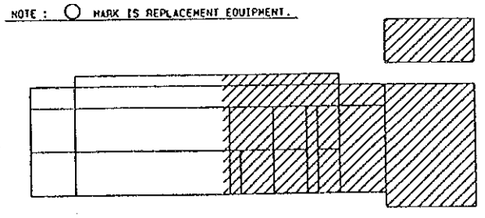




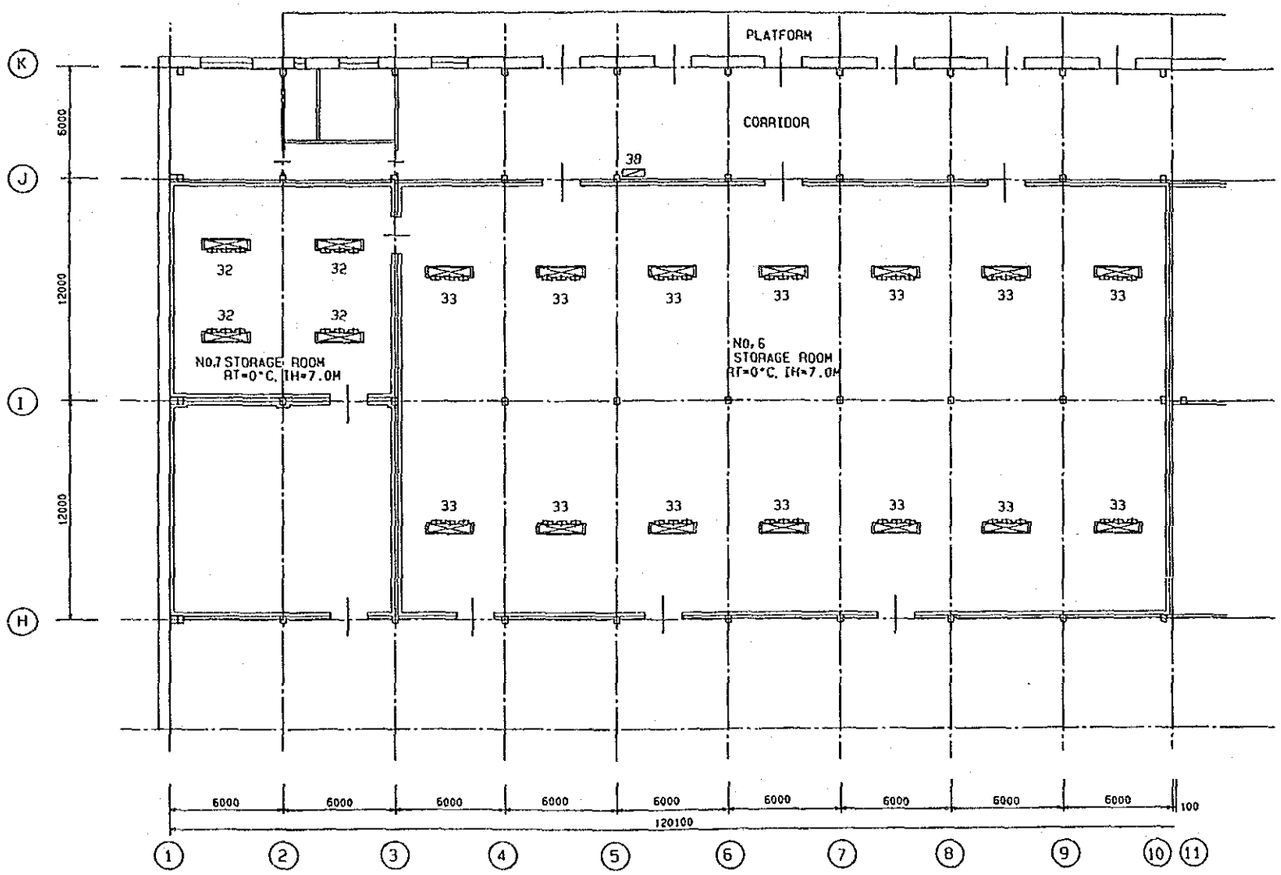


No.	UNIT No.	DESCRIPTION	CAPACITY	Q'ty
①	17001, 2	NH3 COMPRESSOR UNIT 110kW	ET-15°C 220000Kcal/h	1
②	17003, 4	NH3 COMPRESSOR UNIT 75kW	ET-10°C 205000Kcal/h	2
③	17005	NH3 COMPRESSOR UNIT 132kW	ET-10°C 305000Kcal/h	5
④	17007	NH3 COMPRESSOR UNIT 75kW	ET-30°C 119000Kcal/h	1
⑤	17008	NH3 COMPRESSOR UNIT 75kW	ET-40°C 74800Kcal/h	3
⑥		INTER COOLER		1
⑦	17028	EVAPORATIVE CONDENSER	C135/WB20°C 440kW	10
8	17033	COOLING TOWER		3
9	17029	H.P LIQUID RECEIVER	V=5M3	3
10	17029	H.P DRAIN RECEIVER	V=5M3	1
⑪		BRINE COOLER with ACCUMULATOR	-8/-4°C 220000Kcal/h	1
12	17011	L.P LIQUID RECEIVER (-10°C)	V=3.5M3	1
13	17011	L.P LIQUID RECEIVER (-30°C)	V=3.5M3	1
14	17011	L.P LIQUID RECEIVER (-40°C)	V=3.5M3	1
15	17012	L.P DRAIN RECEIVER	V=3.5M3	1
⑯	17014	NH3 LIQUID PUMP (-10°C)	V=10M3/h, H=21M 2.2kW	2
⑰	17014	NH3 LIQUID PUMP (-30°C)	V=10M3/h, H=21M 2.2kW	2
⑱	17015	NH3 LIQUID PUMP (-40°C)	V=10M3/h, H=21M 2.2kW	2
19	17010	WATER CHILLER with ACCUMULATOR		2
20	17099	WATER CHILLER with ACCUMULATOR		1
㉑	17018	CHILLED WATER PUMP	V=90M3/h, H=50M 22kW	4
22	17017	CHILLED WATER PUMP	V=45M3/H, H=30M 7.5kW	2
23	17024	BRINE SURGE TANK		1
㉔	17019	BRINE PUMP	V=45M3/H, H=30M 11kW	3
25	17013	OIL RECEIVER		2
㉖	17016	OIL PUMP	V=3M3/h, P=6kg/cm2	2
27	17036	WATER TANK for EVA-CON		1
28	17035	WATER TANK for COOLING TOWER		1
㉙	17034	COOLING WATER PUMP for EVA-CON	V=85M3/h, H=28.6M 11kW	5
㉚	17034	JACKET WATER PUMP	V=85M3/h, H=28.6M 11kW	2
㉛	18001	UNIT COOLER	S=460M2 46000Kcal/h	2
㉜	18002	UNIT COOLER	S=150M2 15000Kcal/h	4
㉝	18003, 4	UNIT COOLER	S=100M2 10000Kcal/h	26
㉞		CONTROL PANEL for COMP (MCC-1)		1
㉟		CONTROL PANEL for EVA (MCC-2)		1
㊱		CONTROL PANEL for PUMP (MCC-3)		1
㊲		CONTROL PANEL for COOLER (MCC-4)		1
㊳		CONTROL PANEL for COOLER (MCC-5)		1

NOTE : ○ MARK IS REPLACEMENT EQUIPMENT.



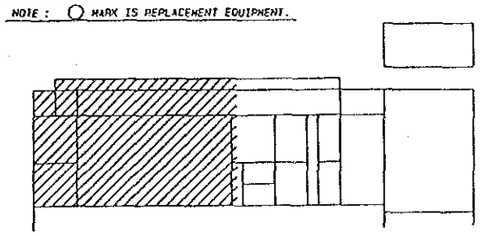
FLOOR PLAN (1/2)



GROUND FLOOR

NO.	UNIT No.	DESCRIPTION	CAPACITY	Q'ty
①	17001, 2	NH3 COMPRESSOR UNIT 110kW	ET-15°C 220000Kcal/h	1
②	17003, 4	NH3 COMPRESSOR UNIT 75kW	ET-10°C 206000Kcal/h	2
③	17005	NH3 COMPRESSOR UNIT 132kW	ET-10°C 306000Kcal/h	5
④	17007	NH3 COMPRESSOR UNIT 75kW	ET-30°C 119000Kcal/h	1
⑤	17008	NH3 COMPRESSOR UNIT 75kW	ET-40°C 74800Kcal/h	3
⑥		INTER COOLER		1
⑦	17028	EVAPORATIVE CONDENSER	CT35/WB20°C 440kW	10
8	17033	COOLING TOWER		3
9	17029	H.P LIQUID RECEIVER	V=5M3	3
10	17029	H.P DRAIN RECEIVER	V=5M3	1
⑪		BRINE COOLER with ACCUMULATOR	-8/-4°C 220000Kcal/h	1
12	17011	L.P LIQUID RECEIVER (-10°C)	V=3.5M3	1
13	17011	L.P LIQUID RECEIVER (-30°C)	V=3.5M3	1
14	17011	L.P LIQUID RECEIVER (-40°C)	V=3.5M3	1
15	17012	L.P DRAIN RECEIVER	V=3.5M3	1
⑯	17014	NH3 LIQUID PUMP (-10°C)	V=10M3/h, H=21M 2.2kW	2
⑰	17014	NH3 LIQUID PUMP (-30°C)	V=10M3/h, H=21M 2.2kW	2
⑱	17015	NH3 LIQUID PUMP (-40°C)	V=10M3/h, H=21M 2.2kW	2
19	17010	WATER CHILLER with ACCUMULATOR		2
20	17009	WATER CHILLER with ACCUMULATOR		1
㉑	17018	CHILLED WATER PUMP	V=90M3/h, H=50M 22kW	4
22	17019	CHILLED WATER PUMP	V=45M3/h, H=30M 7.5kW	2
23	17024	BRINE SURGE TANK		1
㉔	17019	BRINE PUMP	V=45M3/h, H=30M 11kW	3
25	17013	OIL RECEIVER		2
㉖	17016	OIL PUMP	V=3M3/h, P=6kg/cm2	2
27	17036	WATER TANK for EVA-CON		1
28	17035	WATER TANK for COOLING TOWER		1
㉙	17034	COOLING WATER PUMP for EVA-CON	V=85M3/h, H=28.6M 11kW	5
㉚	17034	JACKET WATER PUMP	V=85M3/h, H=28.6M 11kW	2
㉛	18001	UNIT COOLER	S=460M2 46000Kcal/h	2
㉜	18002	UNIT COOLER	S=150M2 15000Kcal/h	4
㉝	18003, 4	UNIT COOLER	S=100M2 10000Kcal/h	26
㉞		CONTROL PANEL for COMP (MCC-1)		1
㉟		CONTROL PANEL for EAC (MCC-2)		1
㊱		CONTROL PANEL for PUMP (MCC-3)		1
㊲		CONTROL PANEL for COOLER (MCC-4)		1
㊳		CONTROL PANEL for COOLER (MCC-5)		1

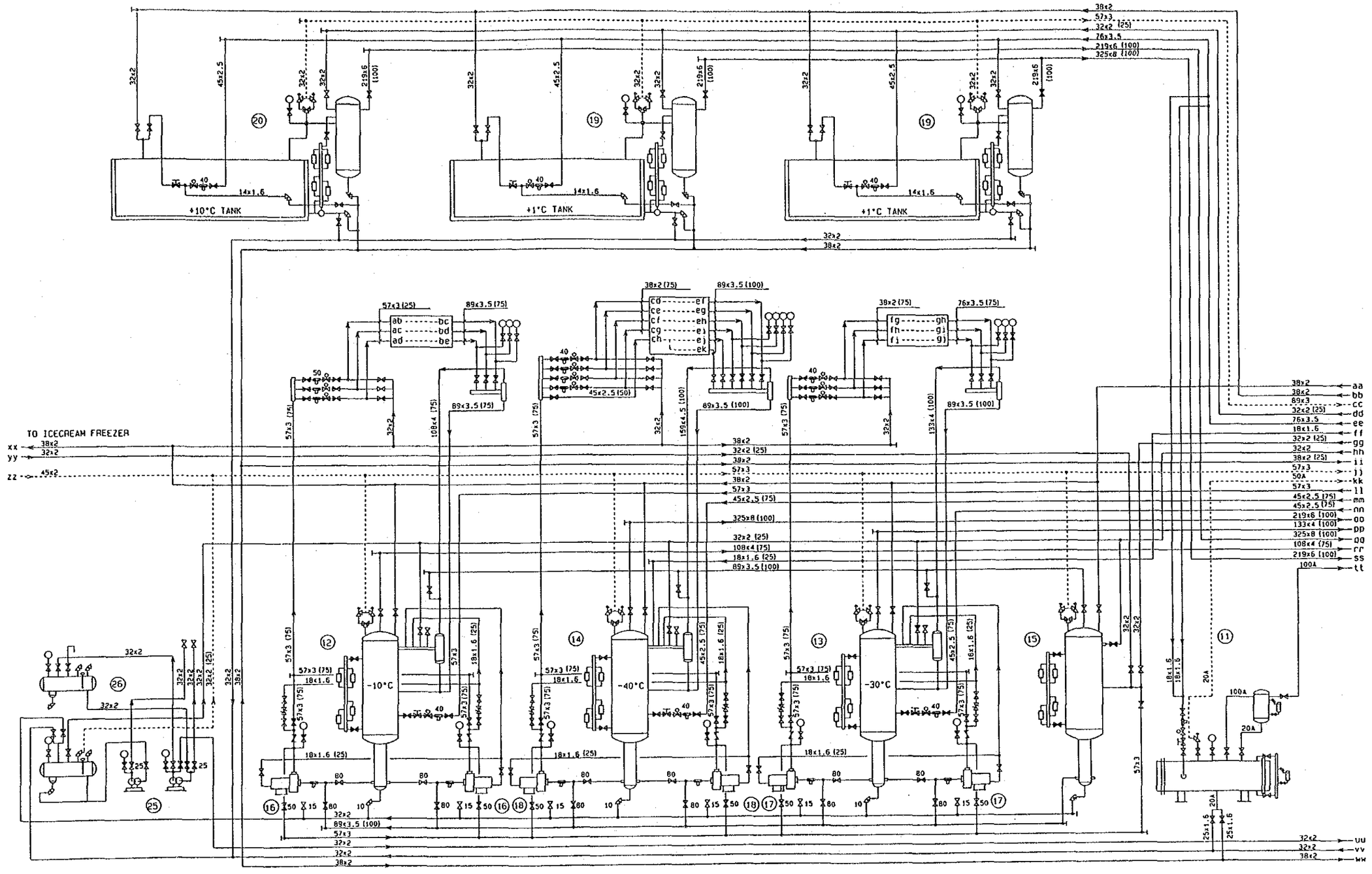
NOTE : ○ MARK IS REPLACEMENT EQUIPMENT.



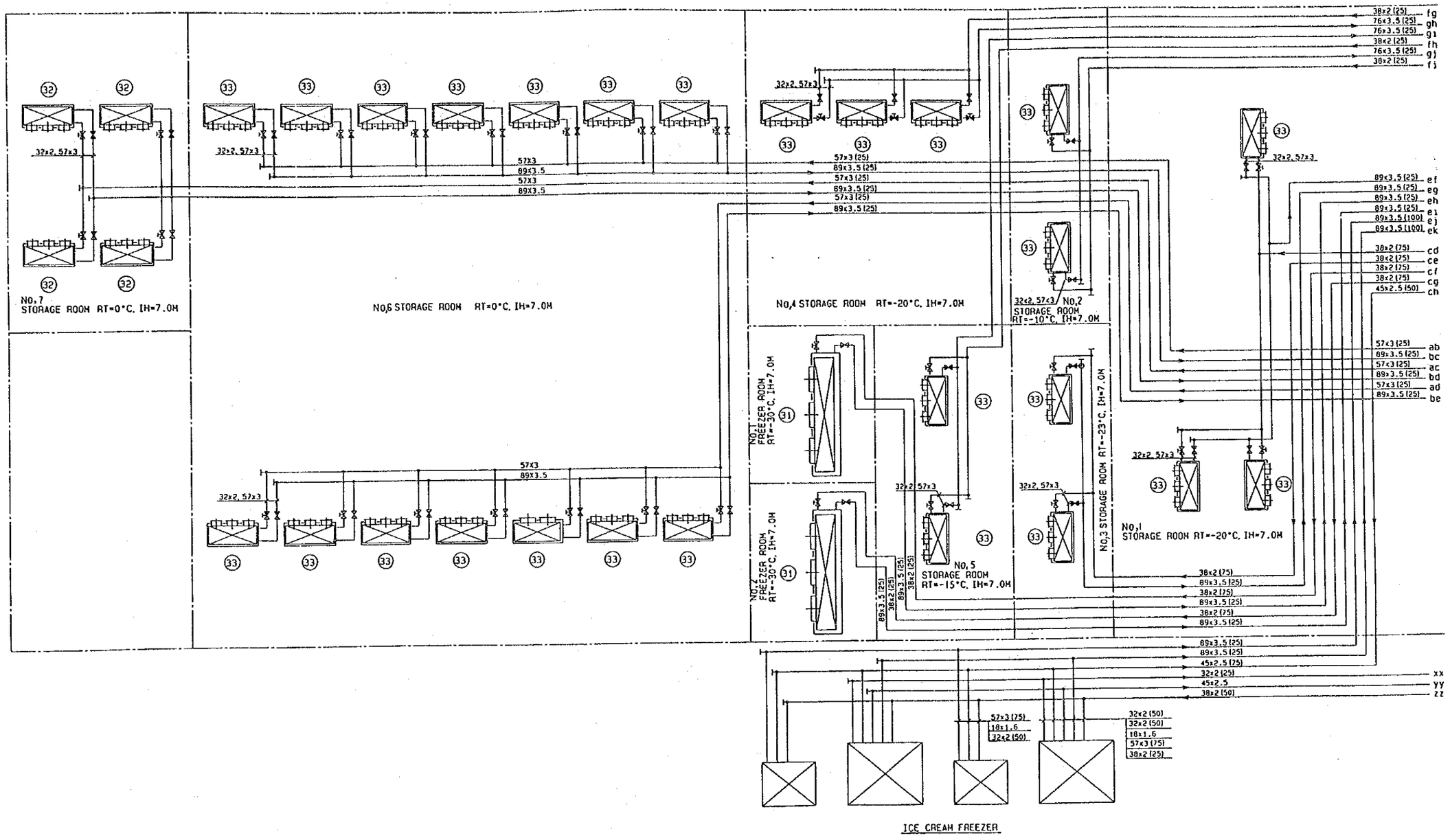
FLOOR PLAN (2/2)

STOP VALVE	LEVEL SWITCH	STOP VALVE	RELIFE VALVE	FLEXIBLE TUBE
FLOW SWITCH	COCK VALVE	SOLENOID VALVE	PRESSURE R. V.	THREE WAY SV
SOLENOID VALVE	WP	EXPANSION VALVE	ANGLE VALVE	ELECTRONICS E.V.
FOOT VALVE	TH	CHECK VALVE	FLOAT SWITCH	CHARGE VALVE
INTERMEDIATE F/V	CHECK VALVE	SAFETY VALVE	LIQUID LEVEL G.	OP
AIR CUT VALVE		SIGHT GLASS	PRESSURE GAUGE	OP
BALLFLEX		STRAINER	BACK PRESSURE V.	LP
BALL TAP		EXPANSION VALVE	FLOAT VALVE	HP

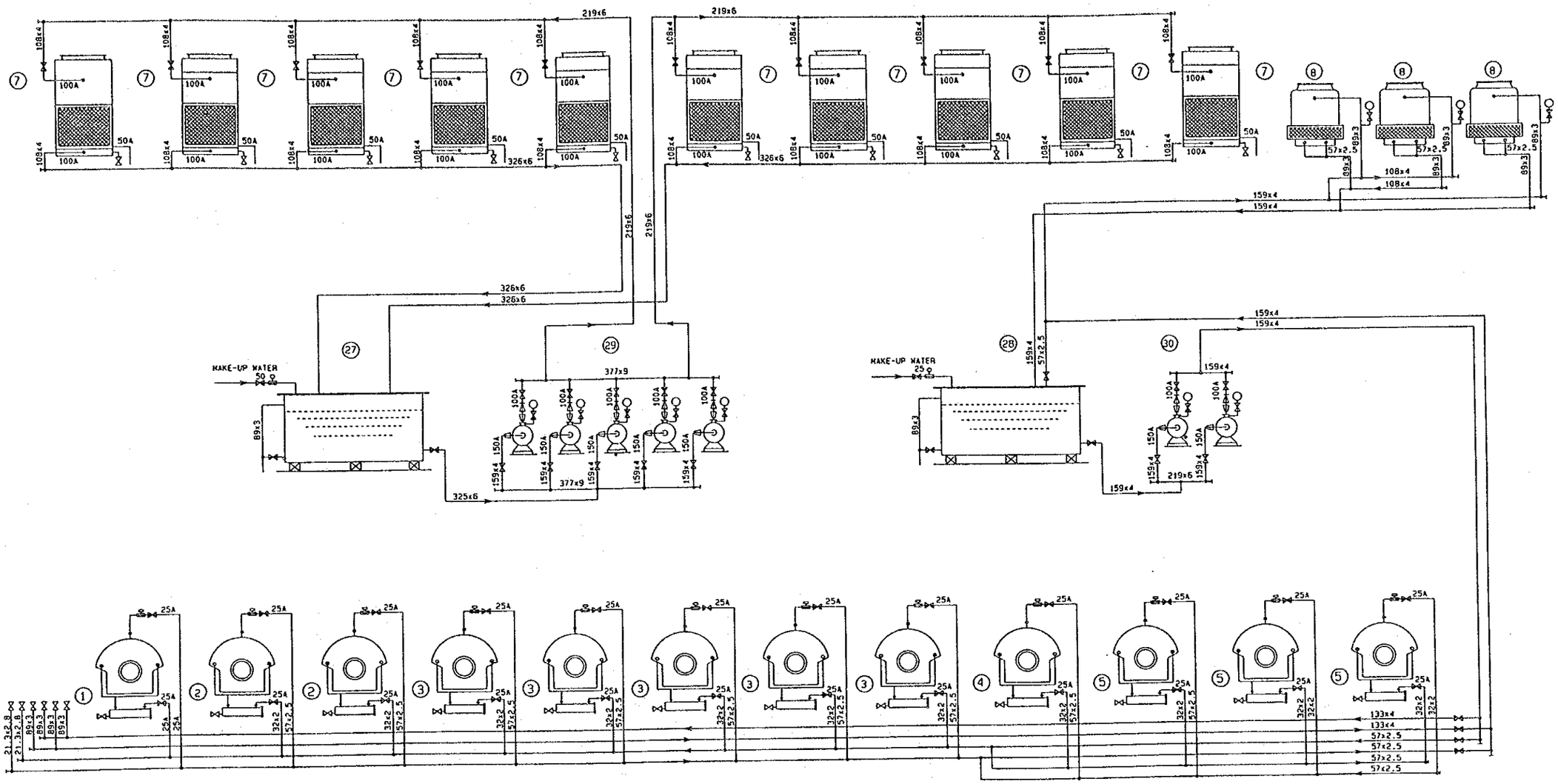
REFRIGERANT PIPING SYSTEM (1/3)



REFRIGERANT PIPING SYSTEM (2/3)

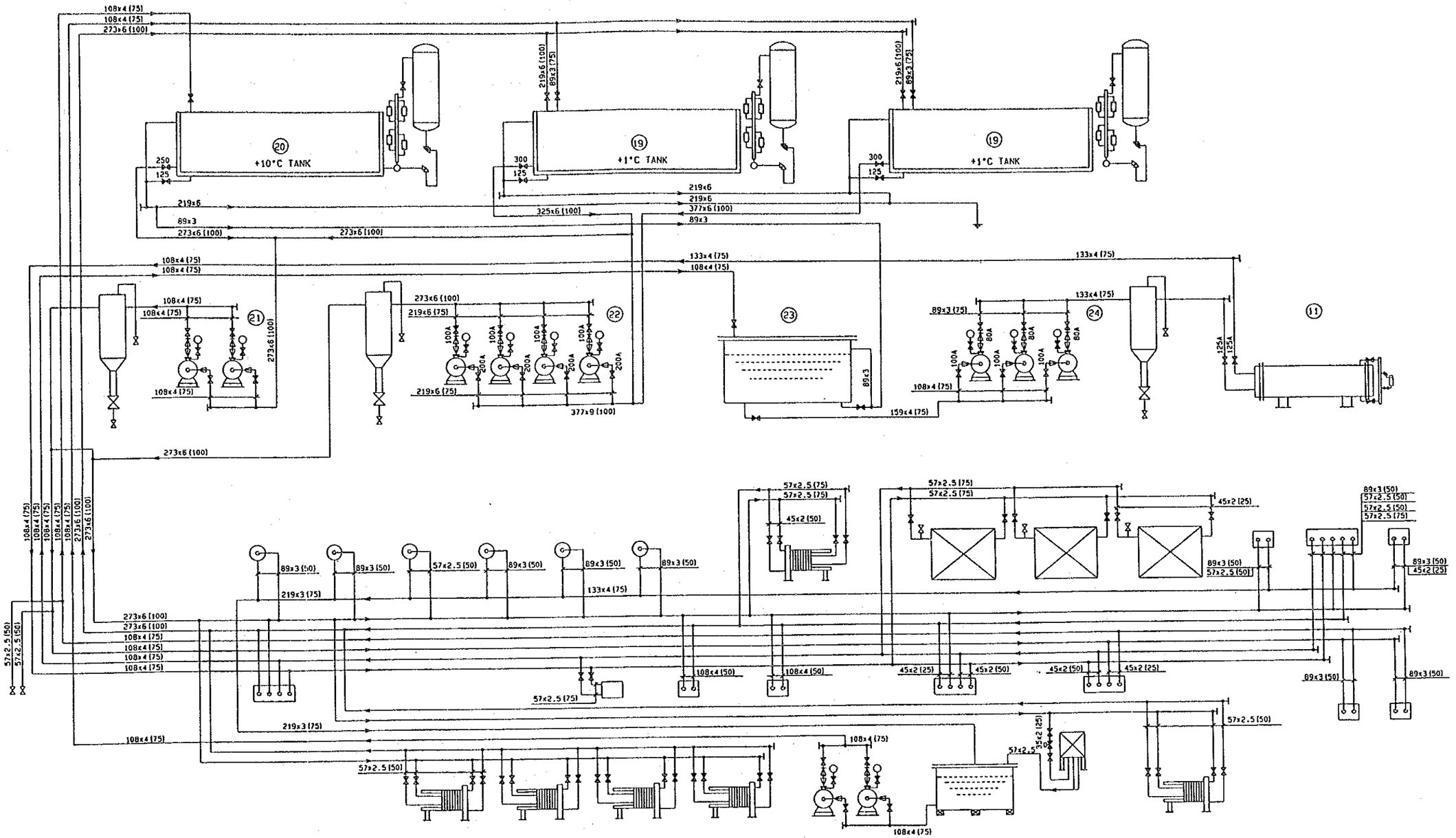


REFRIGERANT PIPING SYSTEM (3/3)



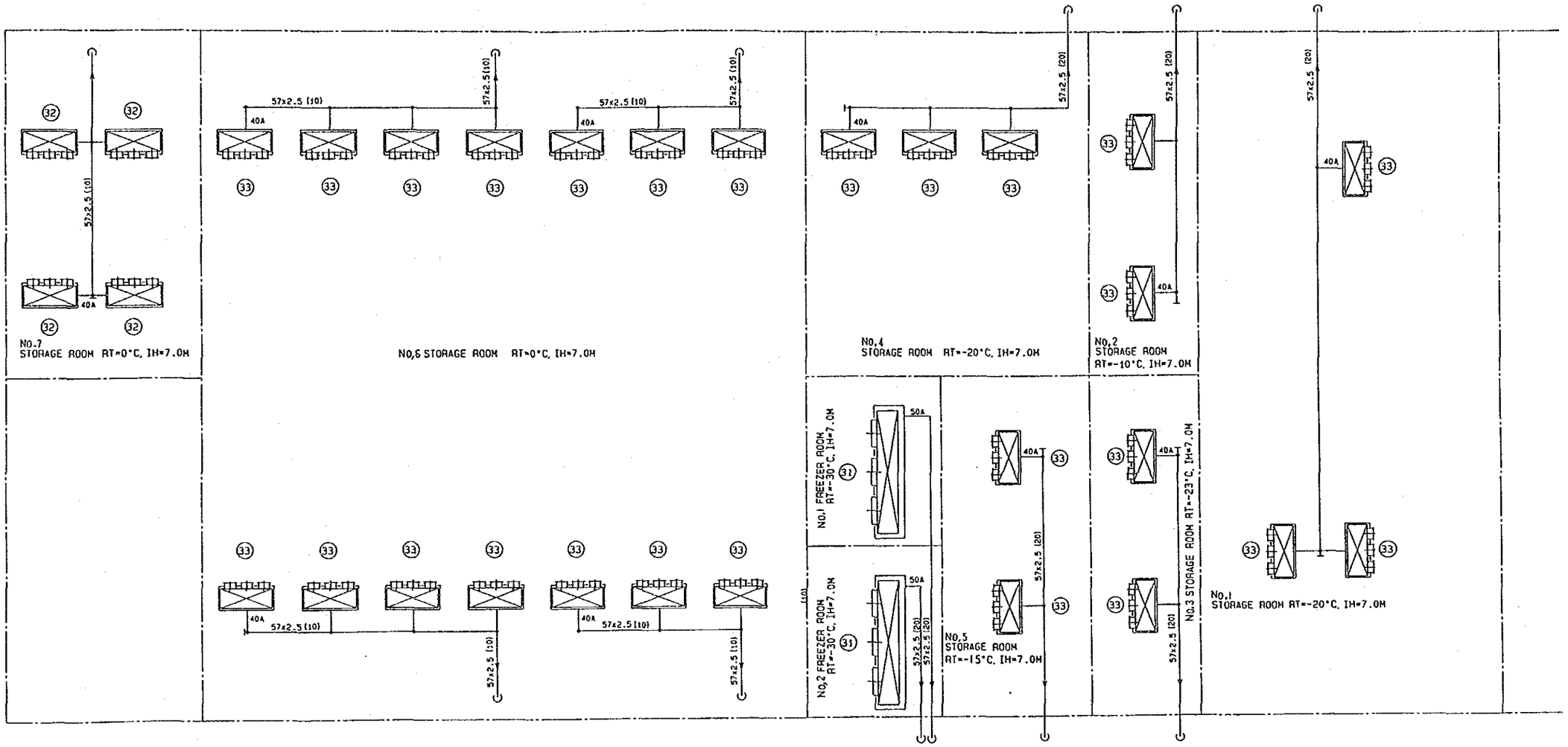
	STOP VALVE		LEVEL SWITCH		STOP VALVE		RELIFE VALVE		FLEXIBLE TUBE
	FLOW SWITCH		COCK VALVE		SOLENOID VALVE		PRESSURE R. V.		THREE WAY SV
	SOLENOID VALVE	WP	WP		EXPANSION VALVE		ANGLE VALVE		ELECTRONICS E.V.
	FOOT VALVE	TH	TH		CHECK VALVE		FLOAT SWITCH		CHARGE VALVE
	INTERMEDIATE F/V		CHECK VALVE		SAFETY VALVE		LIQUID LEVEL G.	OP	OP
	AIR CUT VALVE				SIGHT GLASS		PRESSURE GAUGE	OP	OP
	BALLFLEX				STRAINER		BACK PRESSURE V.	LP	LP
	BALL TAP				EXPANSION VALVE		FLOAT VALVE	HP	HP

COOLING WATER PIPING SYSTEM



STOP VALVE	LEVEL SWITCHI	STOP VALVE	RELIFE VALVE	FLEXIBLE TUBE
FLOW SWITCH	COCK VALVE	SOLENOID VALVE	PRESSURE R. V.	THREE WAY SV
SOLENOID VALVE	WP	EXPANSION VALVE	ANGLE VALVE	ELECTRONICS E.V.
FOOT VALVE	TH	CHECK VALVE	FLOAT SWITCH	CHARGE VALVE
INTERMEDIATE F/V	CHECK VALVE	SAFETY VALVE	LIQUID LEVEL G.	OP
AIR CUT VALVE		SIGHT GLASS	PRESSURE GAUGE	OP
BALLFLEX		STRAINER	BACK PRESSURE V.	LP
BALL TAP		EXPANSION VALVE	FLOAT VALVE	HP

CHILLED WATER & BRINE PIPING SYSTEM



DEFROST PIPING SYSTEM

APPENDIXES 1

1.1 Member of the Study Team

Basic Design Study Team

Name	Speciality	Organization
Takuo KIDOKORO	Leader	Director First Project Management Division Grant Aid Project Management Department, JICA
Nobuhide SUZUKI	Milk Products Processing Planner	Milk and Daily Products Division Livestock Industry Bureau Ministry of Agriculture, Forestry and Fisheries
Hiroshi KISHIMOTO	Refrigeration Plant Designer	System Science Consultants Inc.
Shunkichi SUZUKI	Milk Products Planner	System Science Consultants Inc.
Tetsuo MIZOBE	Products Distribution Planner	System Science Consultants Inc.
Yukimasa NAKANO	Interpreter	System Science Consultants Inc.

Draft Final Report Team

Name	Speciality	Organization
Hisashi OHNO	Leader	Grant Aid Division Bureau of Economic Cooperation Ministry of Foreign Affairs
Hiroshi KISHIMOTO	Refrigeration Plant Designer	System Science Consultants Inc.
Shunkichi SUZUKI	Milk Products Planner	System Science Consultants Inc.
Yukimasa NAKANO	Interpreter	System Science Consultants Inc.

1.2 Field Survey Schedule

1) Basic Design Study

No.	Date	Place	Activities	Mr. Kidokoro	Mr. Suzuki	Mr. Kishimoto	Mr. Suzuki	Mr. Mizobe	Mr. Nakano
1	July 1 (Thu.)	Narita→Bejing	Departure Narita → Arrival Bejing	○	○	○	○	○	○
2	2 (Fri.)	Bejing→ Ulaanbaatar	Departure Bejing → Arrival Ulaanbaatar *Courtesy call to JICA Bejing office	○ ○	○	○ ○	○ ○	○ ○	○
3	3 (Sat.)	Ulaanbaatar	*Meeting : Ministry of Food and Agriculture on explanation of Inception Report. *Meeting : Ministry of Trade and Industry explanation of Inception Report.	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○
4	4 (Sun.)	Ulaanbaatar	*Meeting within Study Team.	○	○	○	○	○	○
5	5 (Mon.)	Ulaanbaatar	*Courtesy call to Embassy of Japan *Dairy Plant (Site) inspection. *Meeting : Ministry of Trade & Industry on privatization.	○ ○ ○	○ ○ ○	○ ○ ○	○ ○	○ ○	○ ○
6	6 (Tue.)	Ulaanbaatar	*Meeting : Ministry of Trade & Industry *National Milk center (Site) inspection.	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○
7	7 (Wed.)	Ulaanbaatar	*Dairy Plant (Site) inspection. *Meeting : Ministry of Trade & Industry explanation of Draft Minutes.	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○
8	8 (Thu.)	Ulaanbaatar	*Signing of Minutes of Discussions. *Reporting to Embassy of japan *Dairy Plant inspection. *Date and information collection survey.	○ ○	○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○
9	9 (Fri.)	Ulaanbaatar→ Bejing	Departure Ulaanbaatar→Arrival Bejing *Study Team : Dairy Plant inspection. Visit to milk collecting center	○	○	○	○	○	○
10	10 (Sat.)	Bejing→Narita	Departure Bejing→Arrival Narita *Related facility survey : visit to Ulaanbaatar Meat Processing Plant. *Infrastructure and Construction condition survey.	○	○	○	○	○	○
11	11 (Sun.)	Ulaanbaatar	Meeting within Study Team.			○	○	○	○
12	12 (Mon.)	Ulaanbaatar	Independence day *Meeting within Study Team.			○	○	○	○
13	13 (Tue.)	Ulaanbaatar	Independence day *Meeting within Study Team.			○	○	○	○
14	14 (Wed.)	Ulaanbaatar	*Daily Plant (Site) Inspection *Infrastructure and Construction condition survey.			○	○	○ ○	○
15	15 (Thu.)	Ulaanbaatar	*Visit to Ulaanbaatar Meat Plant *Visit to UlaanbaatarCity			○	○	○ ○	○
16	16 (Fri.)	Ulaanbaatar	*Data collection.			○	○	○	○
17	17 (Sat.)	Ulaanbaatar	*Data collection.			○	○	○	○
18	18 (Sun.)	Ulaanbaatar	*Meeting within Study Team.			○	○	○	○
19	19 (Mon.)	Ulaanbaatar	*Final Meeting :Ministry of Trade & Industry Ministry of Food & Agricuture, Daily Plant *Reporting to Embassy of Japan.			○ ○	○ ○	○ ○	○ ○
20	20 (Tue.)	Ulaanbaatar→ Bejing	Departure Ulaanbaatar → Arrival Bejing			○	○	○	○
21	21 (Wed.)	Bejing→Narita	Arrival Japan.			○	○	○	○

2) Draft Final Report team

No.	Date	Place	Activities	Mr. Ohno	Mr. Kishimoto	Mr. Suzuki	Mr. Nakano
1	Oct. 1 (Fri.)	Narita→Peking	Departure Narita → Arrival Peking	○	○	○	○
2	2 (Sat.)	Bejing→ Ulaanbaatar	Departure Peking → Arrival Ulaanbaatar	○	○	○	○
3	3 (Sun.)	Ulaanbaatar	*Meeting within Study Team.	○	○	○	○
4	4 (Mon.)	Ulaanbaatar	*Courtesy call to Embassy of Japan. *Meeting with Ministry of Food & Agriculture and Ministry of Trade & Industry on explanation of Draft Final Report.	○ ○	○ ○	○ ○	○ ○
5	5 (Tue.)	Ulaanbaatar	*Meeting with Dairy Plant. *Dairy Plant inspection.	○ ○	○ ○	○ ○	○ ○
6	6 (Wed.)	Ulaanbaatar	*Meeting within Study Team. *Dairy Plant inspection	○ ○	○ ○	○ ○	○ ○
7	7 (Thu.)	Ulaanbaatar	*Meeting with Ministry of Ministry of Trade & Industry on explanation of Draft Minutes. *Signing of Minutes of Discussions.	○ ○	○ ○	○ ○	○ ○
8	8 (Fri.)	Ulaanbaatar→ Peking	*Reporting to Embassy of Japan. *Departure Ulaanbaatar → Arrival Peking	○ ○	○ ○	○ ○	○ ○
9	9 (Sat.)	Peking→Narita	Arrival Japan.	○	○	○	○

1.3 List of Members Contacted

1) Basic Desgin Study

(1) Ministry of Trade and Industry

H. GANBAATAR	Deputy Minister
LODOIDAMBYN NASANBUYAN	Assistant of Director
D. ODONGUA	Officer of Foreign Trade Dept.
C. ERDENECHULUUN	Officer of Price Policy Dept.

(2) Ministry of Food and Agriculture

TSEVEENJAVIIN UULD	Minister
BADRAHIIN ALZAHGUI	Director of Food Dept.
TUMURDAVAA BAYARSAIHAN	Chief of Foreign Relations Dept.
R. DURIMA	Officer of Foreign Relations Dept.

(3) Stare Commission for Privatization

B. OCHBADRAKH	Deputy Chairman

(4) National Development Board under the Prime Minister of Mongolia

BALDAN DOYODDORJ	Officer of Dept. of Economic Cooperation

(5) Ulaanbaatar Dairy Plant

T. DAMDINSUREN	General Director
R. DAMDINSUREN	Deputy General Director
DASHNYAMIN YANDUUREN	Freezing Plant's Director
L. JIGMID	Icecream Plant's Director
P. CHULUUNJAB	Tank Track Station's Director

(6) Embassy of Japan

YOSHIHIRO HASUMI	Ambassador
FUMIAKI TOMINAGA	Counsellor

2) Draft Final Report Explanation

(1) Ministry of Trade and Industry

Ts. YONDON	First Deputy Minister
LODOIDAMBYN NASANBUYAN	Assistant of Director
D. ODONGUA	Officer of Foreign Trade Dept.

(2) Ministry of Food and Agriculture

BADRAHIIN ALZAHGUI	Director of Food Dept.
TUMURDAVAA BAYARSAIHAN	Chief of Foreign Relations Dept.
R. DURIMA	Officer of Foreign Relations Dept.
RADNAAGIIN DOLJINSUREN	Officer of Food Dept.

(3) Ulaanbaatar Dairy Plant

T. DAMDINSUREN	General Director
R. DAMDINSUREN	Deputy General Director
DASHNYAMIN YANDUUREN	Freezing Plant's Director
L. JIGMID	Icecream Plant's Director
P. CHULUUNJAB	Tank Track Station's Director

(4) Embassy of Japan

YOSHIHIRO HASUMI	Ambassador
FUMIAKI TOMINAGA	Counsellor
KEIZO KAGAWA	First Secretary

1.4 Minutes of Discussions

1) Basic Design Study

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY ON THE PROJECT
FOR IMPROVEMENT
OF ULAANBAATAR DAIRY PLANT
IN MONGOLIA

In response to request from the Government of Mongolia, the Government of Japan decided to conduct a Basic Design Study on the Project for Improvement of Ulaanbaatar Dairy Plant (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Mongolia a study team, which is headed by Mr. Takuo KIDOKORO, Director of First Project Management Division, Grant Aid Project Management Department, JICA, and is scheduled to stay in the country from July 1 to July 21, 1993.

The team held discussions with the officials concerned of the Government of Mongolia conducted a field survey at the study area.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The team will proceed to further works and prepare the Basic design Study report.

Ulaanbaatar, July 8, 1993

Takuo KIDOKORO
Leader
Basic Design Study Team
JICA

H.GANBAATAR
Deputy, Ministry of Trade
and Industry

B.ALZAHGUI
Director of Food Department,
Ministry of Food and Agriculture

G.DAMDINSUREN
Director of "SUU" Company,
Ministry of Food and Agriculture

ATTACHMENT

1. Objectives

The objective of the Project is to stabilize the supply of dairy products to Ulaanbaatar city by improving the facilities of Ulaanbaatar Dairy Plant.

2. Project Site

The Project site is located at Ulaanbaatar Dairy Plant in Ulaanbaatar city which appears in Annex-1.

3. Responsible, administrative and executing organization

(1) Responsible organization : Ministry of Trade and Industry
(2) Administrative organization : Ministry of Food and Agriculture
(3) Executing organization : Ulaanbaatar Dairy Plant

4. Items requested by the Government of Mongolia

After discussions with the Basic Design Study Team, the following items whose priority was in numerical order were finally requested by the Mongolian side. The final components of the Project will be decided after further studies.

(1) Supply of compressors, liquid pumps, unit coolers and related accessories for the renewal of existing refrigeration system
(2) Supply of milk transport vehicles
(3) Supply of weighing machines for milk (this item is additionaly requested to the Basic Design Study Team by the Mongolian side)

5. Japan's Grant Aid System

(1) The Government of Mongolia has understood the system of Japanese Grant Aid explained by the Basic Design Study Team.
(2) The Government of Mongolia will take necessary measures, described in Annex-3 for smooth implementation of the Project, on condition that the Grant Aid Assistance by the Government of Japan is extended to the Project.

6. Schedule of the Study

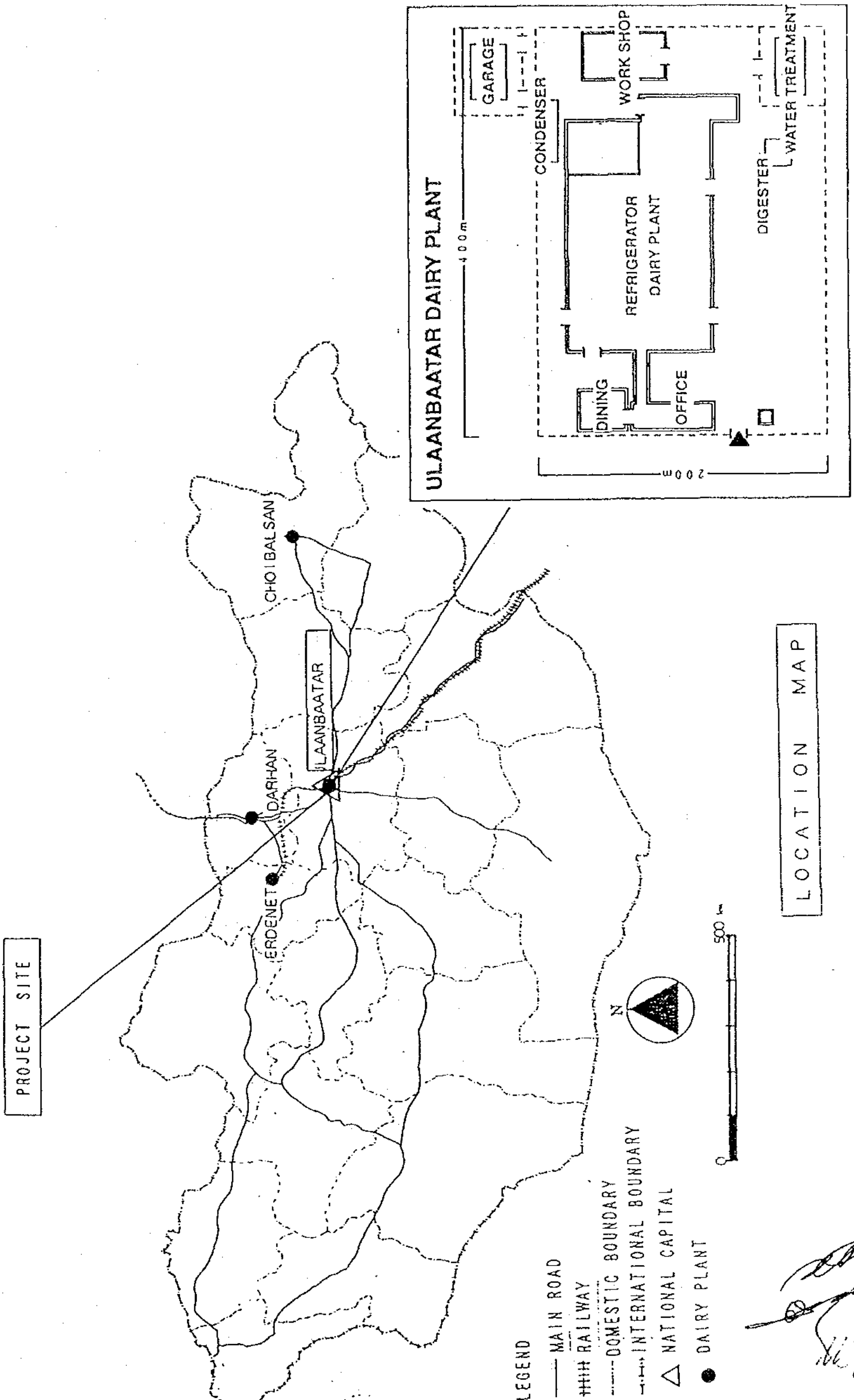
(1) The consultants will proceed to further studies in Mongolia until July 21, 1993.

(2) JICA will prepare the draft report in English and dispatch a mission in order to discuss its contents in or around early in October, 1993.

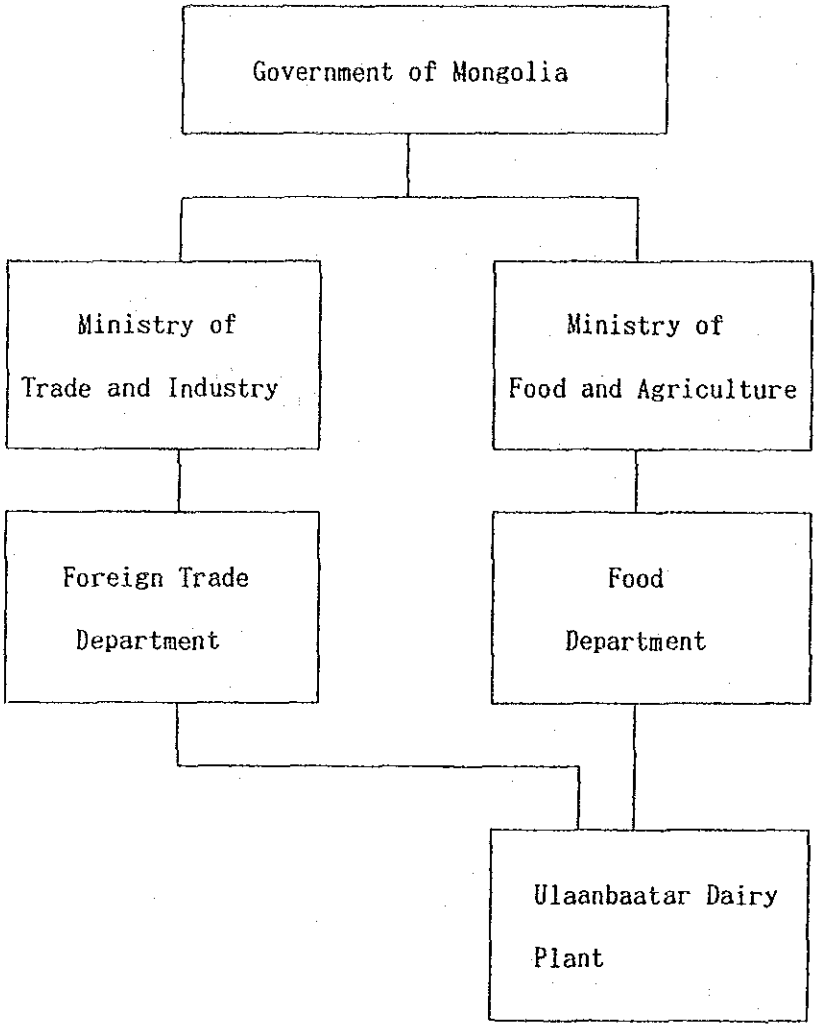
(3) In case that the contents of the report is accepted in principle by the Government of Mongolia, JICA will complete the final report and send it to the Government of Mongolia by early November, 1993.

T.K.

ANNEX-1 PROJECT SITE



ANNEX-2 ORGANIZATION CHART



ANNEX-3. Major Understandings to be taken by the Mongolian Government

No.	Items

1. To carry out all the work for the renewal of existing refrigeration system
2. To clear, remove the products in the storage, if required for the execution of works
3. To provide the enough temporary space for storage the supplying equipment and machineries
4. To provide facilities for the distribution of electricity, water supply, drainage and incidental facilities when needed.
5. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the B/A.
6. To ensure unloading and customs clearance at port disembarkation in recipient country (tax exemption and custom clearance of the products for the project at the country).
7. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts.
8. To extend such facilities as may be necessary for entry into Mongolia and stay therein for the performance work to the Japanese nationals whose services may be required in connection with the supply of products and the services under the verified contracts.
9. To ensure prompt processing of required internal formalities to secure the implementation time schedule of the project.
10. To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and the installation of the equipment.
11. To maintain and use properly and effectively the facilities constructed and the equipment provided under the Grant.

T.K.

2) Draft Final Report Explanation

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY ON THE PROJECT
FOR IMPROVEMENT OF ULAANBAATAR DAIRY PLANT
IN MONGOLIA
(CONSULTATION ON DRAFT REPORT)

In July 1993, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study team on the project for Improvement of Ulaanbaatar Dairy Plant (hereinafter referred to as "the Project") to Mongolia, and through discussions, field survey, and technical examination of the results in Japan, has prepared the draft report of the study.

In order to explain and to consult Mongolia on the components of the draft report, JICA sent to Mongolia a study team, which is headed by Mr. Hisashi OHNO, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs, and is scheduled to stay in the country from October 2 to 8, 1993.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Ulaanbaatar, October 7, 1993

Hisashi OHNO
Leader
Basic Design Study Team
JICA

Tsedengiin YONDON
First Deputy Minister,
Ministry of Trade and Industry

Badrahiin ALZAHGUI
Director of Food Department,
Ministry of Food and Agriculture

Tuluhiin DAMDINSUREN
Director of "SUU" Company,
Ulaanbaatar Dairy Plant

ATTACHMENT

1. Components of draft report

The Government of Mongolia has agreed and accepted in principle the components of the draft report proposed by the Team.

2. Japan's Grant Aid System

(1) The Government of Mongolia has understood the system of Japanese Grant Aid explained by the Team.

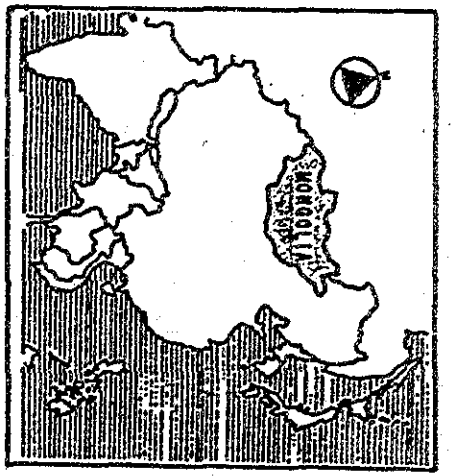
(2) The Government of Mongolia will take the necessary measures, described in Annex-3, for smooth implementation of the Project on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

3. Privatization

The team confirmed that the Ulaanbaatar Dairy Plant should not be privatized more than 49 percents of it's share.

4. Further schedule

The team will make the final report in according with the confirmed items, and send it to the Government of Mongolia by the end of November 1993.



PROJECT SITE

ERDENET

DARHAN

CHOIBALSAN

ULAANBAATAR

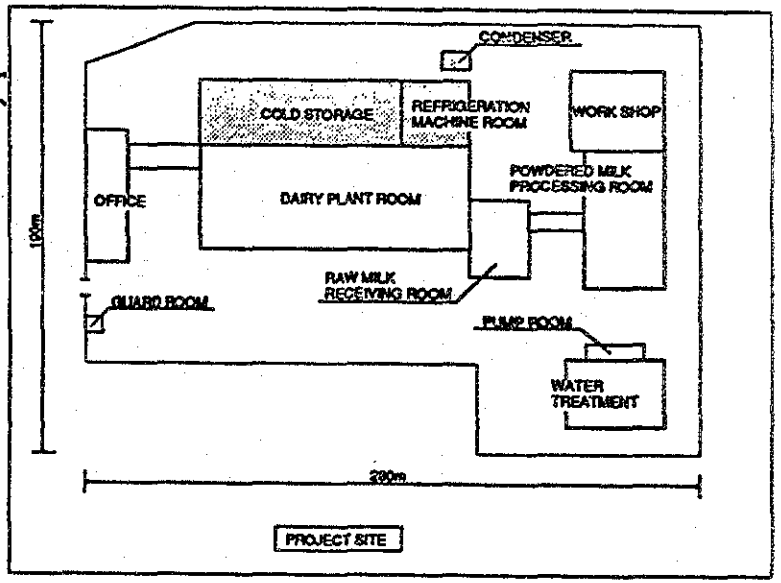
LEGEND

- MAIN ROAD
- RAILWAY
- DOMESTIC BOUNDARY
- INTERNATIONAL BOUNDARY
- NATIONAL CAPITAL
- DAIRY PLANT

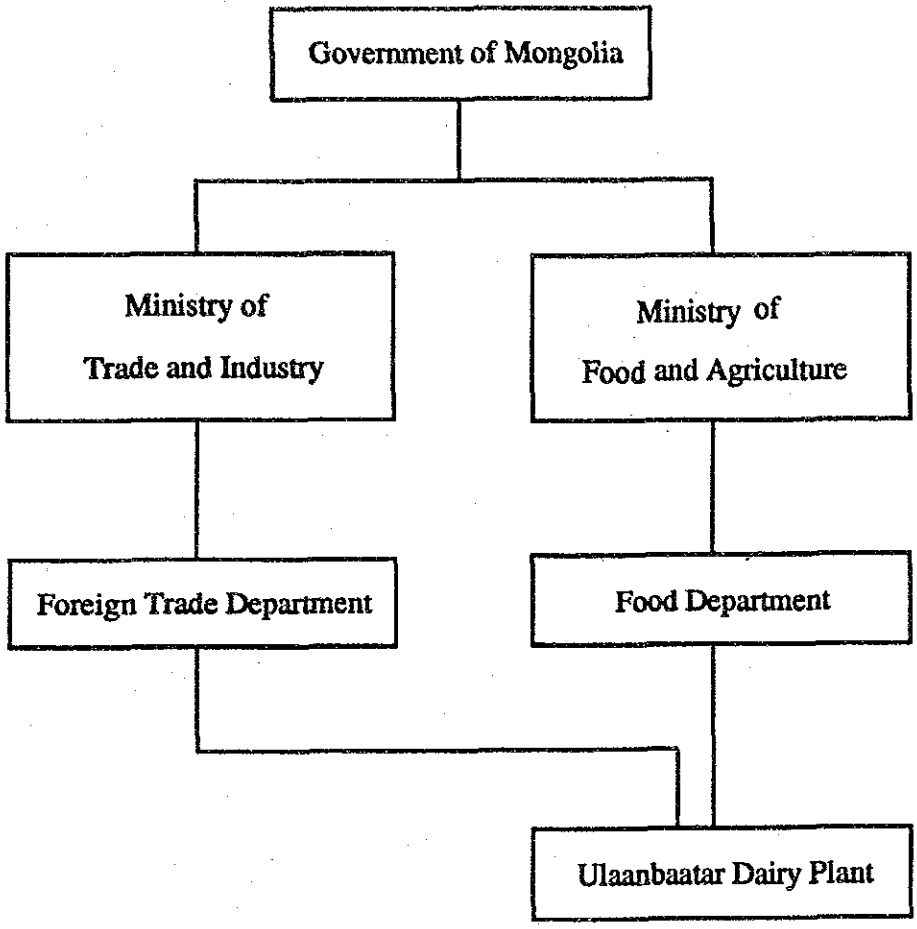
N

0 500 km

PROJECT SITE



ANNEX-2 ORGANIZATION CHART



ANNEX-3 Necessary measures to be taken by the Government of Mongolia in case Japan's Grant Aid is executed.

No.	Items

1. To clear, remove the products in the storage, if required for the execution of works.

2. To provide the enough temporary space for storage of the supplying equipment and machinery.

3. To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities to the Project site when needed.

4. To bear commissions to Japanese foreign exchange bank for the banking services based upon the Banking Arrangement (B/A).

5. To exempt taxes and to take necessary measures for customs clearance of the materials and equipment brought for the project at the port of disembarkation.

6. To accord Japanese Nationals whose services may required in connection with the supply of products and the services under the verified contract such facilities as may be necessary for their entry into Mongolia and stay therein for the performance of their work.

7. To maintain and use properly and effectively that the equipment provided under the Grant.

8. To secure the fuel for an effective and smooth operation of the vehicles provided under the Project.

9. To bare all the expenses other than those to be borne by the Grant, necessary for the transportation and the installation of the equipment .

APPENDIXES 2

Table 2.1 Growth of population

Year	Total (1,000)	Urban (1,000)	Rural (1,000)	%	Growth Rate of Urban Area	% of Urban Area
1985	1,900.6	1,016.8	883.8			53.5
1986	1,949.7	1,052.8	898.9	2.8	3.5	54.0
1987	1,997.0	1,098.4	898.6	2.4	4.3	55.0
1988	2,044.0	1,166.1	877.9	2.4	6.2	57.0
1989	2,095.0	1,193.6	902.0	2.5	2.4	57.0
1990	2,149.3	1,225.1	924.2	2.6	2.6	57.0
1991	2,187.2	1,235.6	951.6	1.8	0.9	58.5

Source : Annual Statistical Yearbook, 1992

Table 2.2 Population of Main Cities

Year	Total	Ulaanbaatar		Darkhan		Erdenet	
	(1,000)	(1,000)	%	(1,000)	%	(1,000)	%
1985	1,016.8	503.3		73.1		52.1	
1986	1,052.8	520.4	3.4	78.1	6.8	53.4	2.5
1987	1,098.4	535.5	2.9	83.1	6.4	54.5	2.1
1988	1,166.1	548.4	2.4	85.7	3.1	56.1	2.9
1989	1,193.6	560.8	2.2	87.4	2.0	57.1	1.8
1990	1,225.1	575.0	2.6	88.6	1.4	58.2	1.9
1991	1,235.6	578.9	0.7	88.3	-0.3	57.1	-1.9

Source : Annual Statistical Yearbook, 1992

Table 2.3 Gross Domestic Production (GDP)

(%)

Sector / Year	1980	1985	1986	1987	1988	1989	1990	1991
A. Material	81.3	83.4	83.0	82.9	82.6	83.6	83.5	-
1. Agriculture	18.6	18.8	21.8	19.5	19.4	20.4	20.2	19.7
2.Industry	29.2	32.8	33.5	33.0	34.1	34.1	33.8	32.5
3. Construction	7.1	5.7	6.2	6.8	7.2	7.0	5.7	4.7
4. Transport	13.6	13.8	13.5	13.1	12.7	11.6	11.3	5.0
5. Communication	1.3	1.7	1.7	1.7	1.8	1.8	1.9	1.3
6. Commerce	9.7	9.1	5.3	6.6	7.1	7.1	9.1	-
7. Others	2.0	1.6	1.8	1.7	1.5	1.6	1.4	-
B. Service	18.7	16.6	17.0	17.1	17.4	16.4	16.5	-
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-
GDP Growth Rate	-	4.7	8.3	4.5	5.1	4.2	-2.1	-

Source : World Bank, Mongolia Country Economic Memorandum, December 1991

Table 2.4 Number of Employers engaged in National Economy

(%)

Sector / Year	1980	1985	1986	1987	1988	1989	1990	1991
A. Material	76.0	73.6	73.4	72.8	72.0	71.3	72.0	68.2
1. Agriculture	39.7	33.3	32.0	30.9	29.8	29.4	27.4	27.0
2.Industry	16.0	18.6	18.0	19.3	19.3	18.9	20.8	18.0
3. Construction	6.0	6.0	6.1	6.2	6.3	6.6	7.9	7.8
4. Transport	6.3	6.9	7.5	7.5	7.7	7.4	7.8	6.5
5. Communication	0.8	1.0	1.0	1.0	1.0	1.1	1.1	1.2
6. Commerce	6.4	7.4	7.6	7.6	7.5	7.5	6.5	6.5
7. Others	0.4	0.3	0.3	0.3	0.3	0.4	0.5	1.2
B. Service	24.0	26.4	26.6	27.2	28.0	28.0	28.8	31.8
1. Housing, City	2.8	3.6	3.6	3.6	3.9	3.9	4.2	-
2. Science, Study	1.8	1.8	1.8	1.9	2.1	2.2	-	-
3. Education, Culture	9.6	10.5	10.4	10.5	11.4	11.8	-	-
4. Social Security	6.3	6.6	6.8	7.1	7.0	7.1	-	-
5. Finance, Insurance	0.4	0.4	0.4	0.4	0.4	0.5	-	-
6. Administration	2.2	2.5	2.4	2.3	2.1	1.9	-	-
7. Others	1.0	1.1	1.1	1.1	1.1	1.1	-	-
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
(1,000)	511.2	561.6	580.9	598.4	616.1	633.2	651.4	665.8

Source : World Bank, Mongolia Country Economic Memorandum, December 1991

Table 2.5 Weather Condition in Ulaanbaatar City

Month	1	2	3	4	5	6	7	8	9	10	11	12
Average Temperature	-25.6	-22.0	-10.8	0.1	8.2	14.8	16.9	14.9	7.5	-1.3	-14.2	-23.7
Maximum	3	4	18	25	32	35	39	37	36	24	13	2
Lowest	-48	-46	-41	-26	-13	-5	0	-4	-14	-30	-43	-49
Rainfall	1.6	1.8	2.5	7.9	14.7	51.5	74.2	58.2	32.0	11.5	5.1	2.4

Temperature : ℃, Rainfall : MM

Table 2.6 Standard of Water Quality

Items	Standard of Water Quality in Mongolia	Central Water Source	Factory Water Source	Meat Industry Complex
1. Color (degree)	2	1	1	0.5
2. Stain (degree)	2	0	0	0
3. ph	5.5-8.5	6.8	6.85	6.87
4. Cl (mg/l)	350	4	28	26
5. NO_2 (mg/l)	0	0	0	0
6. NO_3 (mg/l)	40	1.08	2.28	8.64
7. NH_4 -N(mg/l)	0	0	0	0
8. Fe (mg/l)	0.3	0.012	0.062	0.04
9. Coliform	<333	<333	<333	<333
10. Enterococcus	<50	<50	<50	<50

Source : Information of Ulaanbaatar City

Table 2.7 Road Condition

(km)

Road	Pavement	Gravel	Non-Pavement	Total Length
National	1,135	1,544	6,992	9,671
(Ulaanbaatar - Prefecture)	(11.7%)	(16.0%)	(72.3%)	(100.0%)
Regional	112	1,350	37,919	39,381
(Prefecture - District)	(0.3%)	(3.9%)	(85.8%)	(100.0%)
District	0	0	150,000	150,000
(District - Farm)	(0.0%)	(0.0%)	(100.0%)	(100.0%)
Total	1,247	2,894	194,911	199,052
	(0.6%)	(1.5%)	(97.9%)	(100.0%)

Source : Ministry of Roads, Transport and Communication

Table 2.8 Agriculture and Cropping Area

(1000 ha)

Year	1960	1970	1980	1985	1990
A. Agricultural Land	532	744	1182	1354	1371
B. Cropping Area					
- National Farm Area	205.8	342.8	556.9	636.4	n.a.
%	77.5	75.4	79.1	80.6	
- Cropping Area	59.7	111.8	147.1	153.2	n.a.
%	22.5	24.6	20.9	19.4	
C. Total Cropping Area	265.5	454.6	704.0	789.6	n.a.

Source : Central Statistical Board of the MPR.

Table 2.9 Number of Establishment by Farm Categories

Year	1940	1960	1970	1980	1985	1990
A. State Farm						
Production	10	25	32	49	52	53
Feed Production			10	13	17	20
Sub - Total	10	25	42	62	69	73
B. Civil Cooperative	91	354	272	255	255	255
C. Service		17	17	17	17	17
D. Semi Cooperative					11	9
Sub - Total	91	371	289	272	283	281
Total	101	396	331	334	352	354

Source : Central Statistical Board of the MPR.

Table 2.10 Number of Live Stock

(Unit : 1,000 head)

Year	1980	1985	1989	1990	1991
Camel	591.5	559.0	558.3	537.5	476.0
Horse	1,985.4	1,971.0	2,199.6	2,262.0	2,259.3
Cattle	2,397.1	2,408.1	2,692.7	2,848.7	2,822.0
Sheep	14,230.7	13,248.8	14,265.2	15,083.0	14,721.0
Goat	4,566.7	4,298.6	4,959.1	5,125.7	5,249.6
Total	23,771.4	22,485.5	24,674.9	25,856.9	25,527.9

Source : UNDP, Agricultural Sector Review

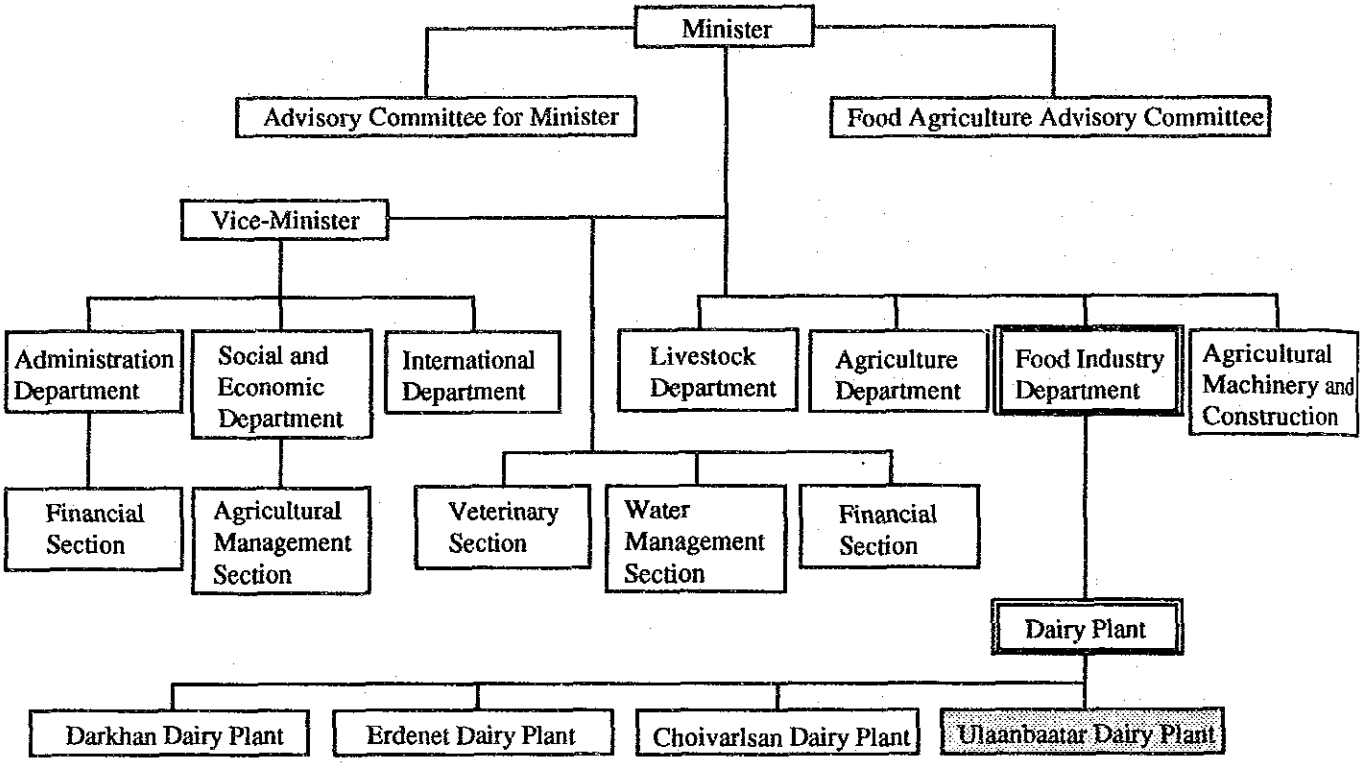


Figure 2.1 Organization of Ministry of Food and Agriculture

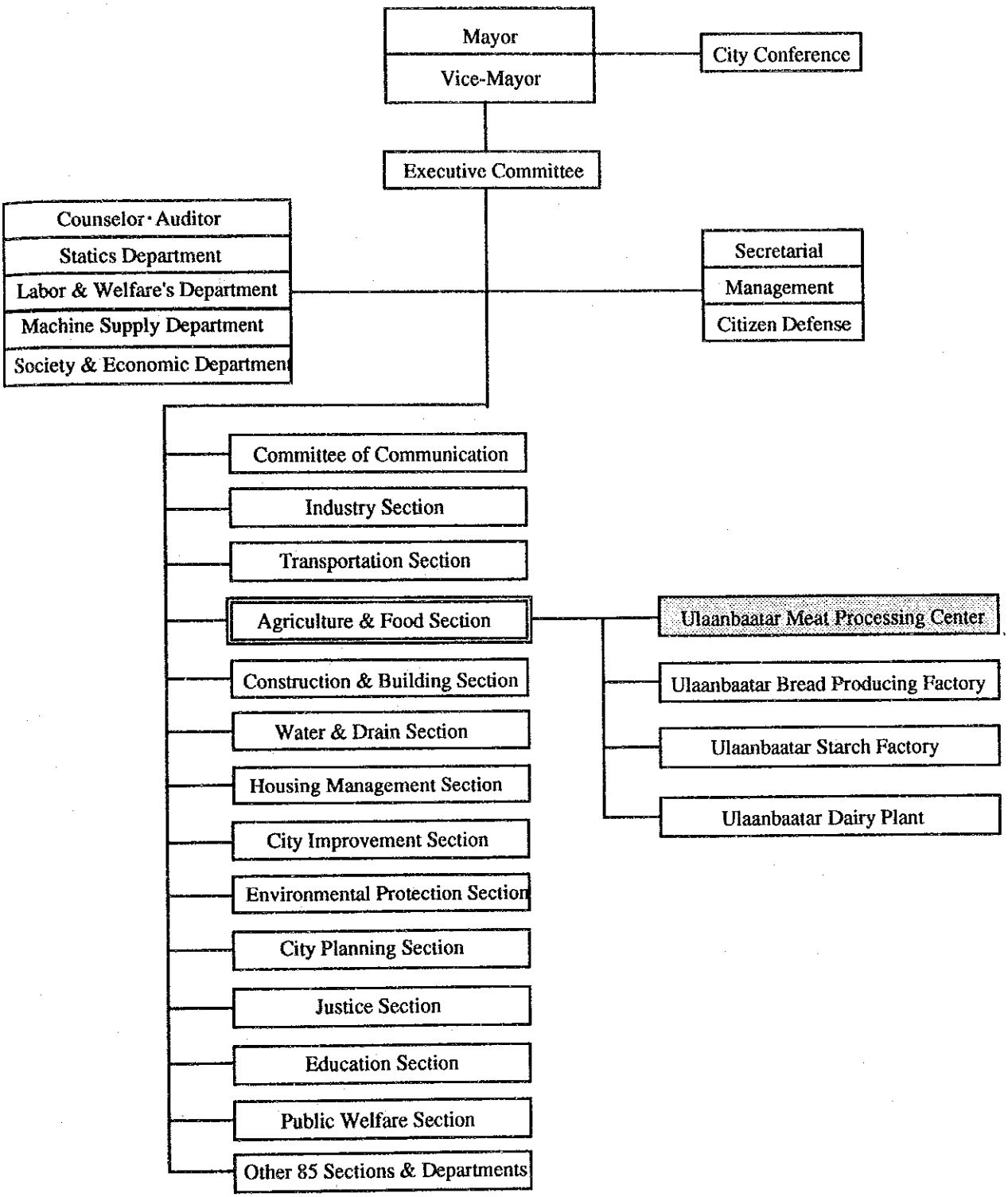


Figure 2.2 Organization of Ulaanbaatar City

JICA