

--- Conclusion ---

Either in new towns or existing city areas, if it is necessary to offer high level traffic service by using lesser energy and, at the same time, to conserve environments in harmony comprehensive traffic system which includes not only the traffics to connect residential areas with business centers in metropolitan areas but also the internal traffics within residential quarters must be carefully designed. The new transport system plan that incorporates the networks of pedestrians' paths networks, mentioned earlier, is one solution of this kind.

Studies from similar viewpoints must be made on land use plans in new towns or further on city function distribution plans, but it will take some more time to find final solutions. For the time being, it is necessary to promote the improvement of various existing transportation systems (improvement of facilities as well as application of computerized operation) as an effective means of better meeting new traffic demands.

Fig-1

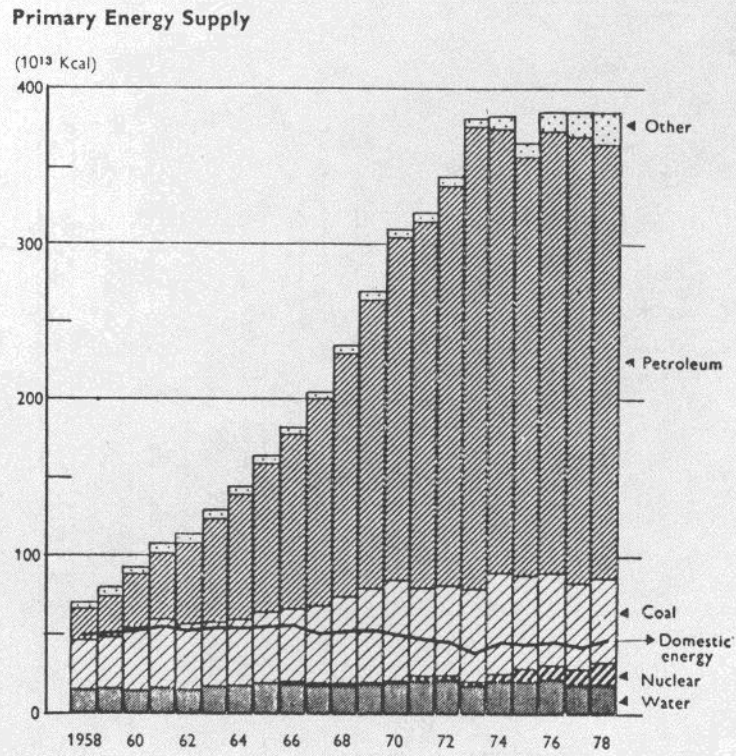


Fig-2

**Energy efficiency in Several transport systems**

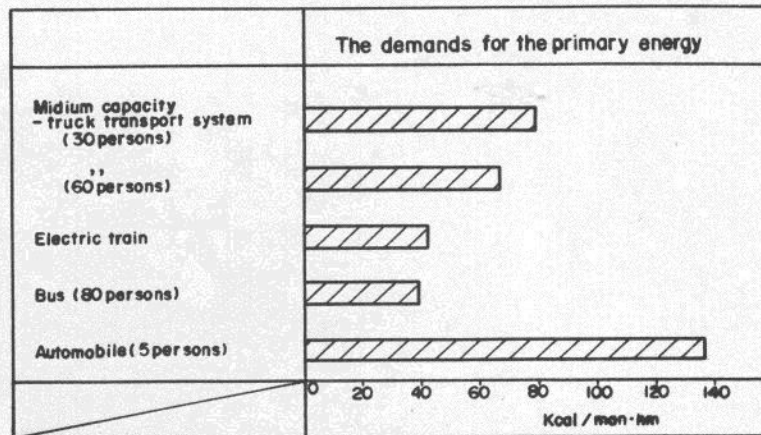




Fig - 3 Domestic demand of energy

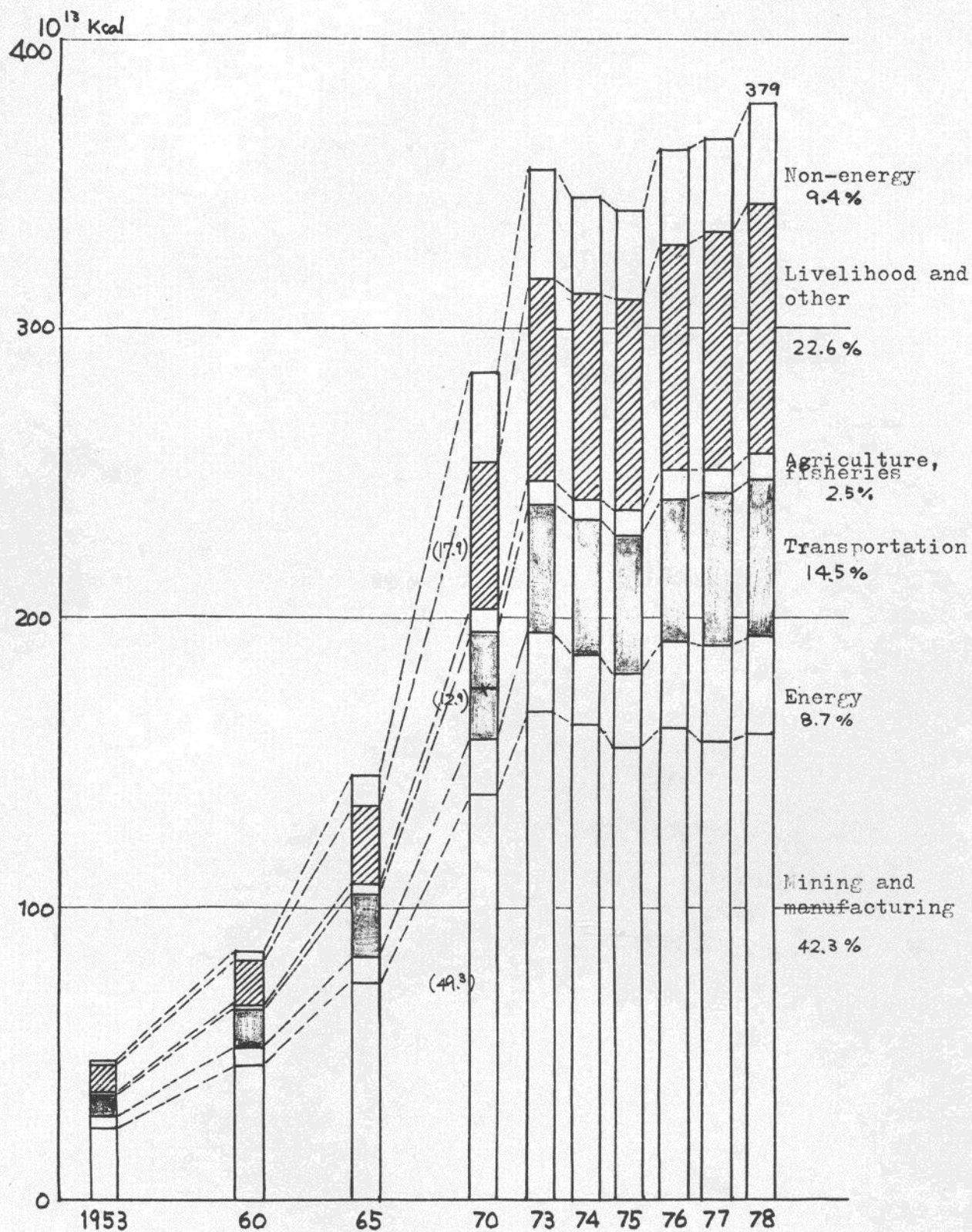


Fig - 4 Number of motor vehicles owned

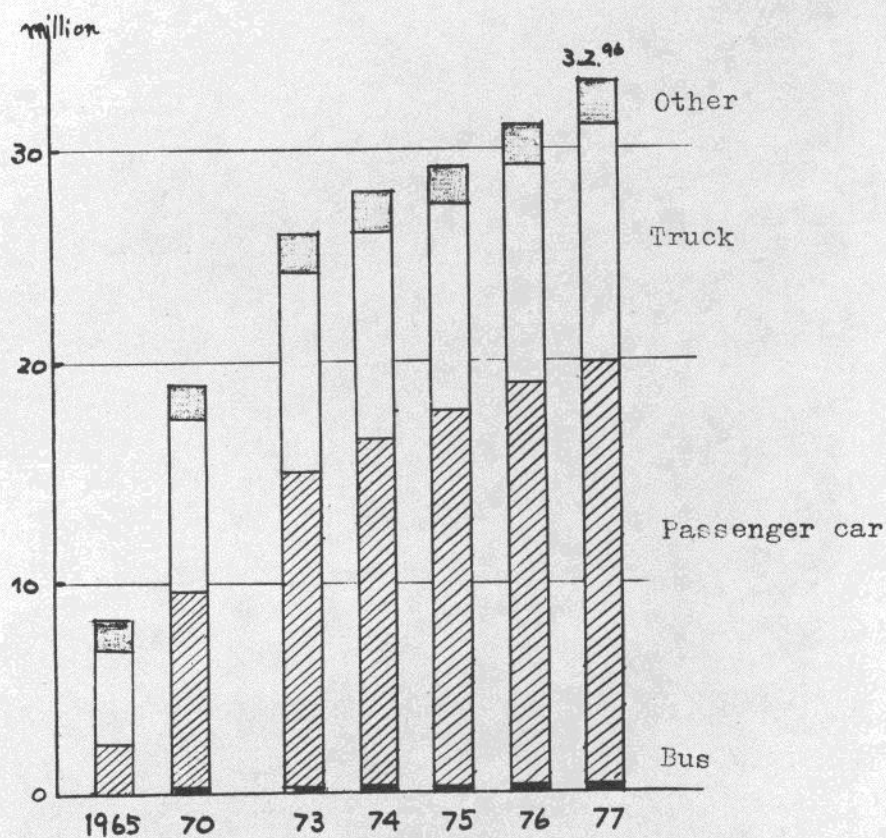


Fig - 5 Traffic amount of passenger

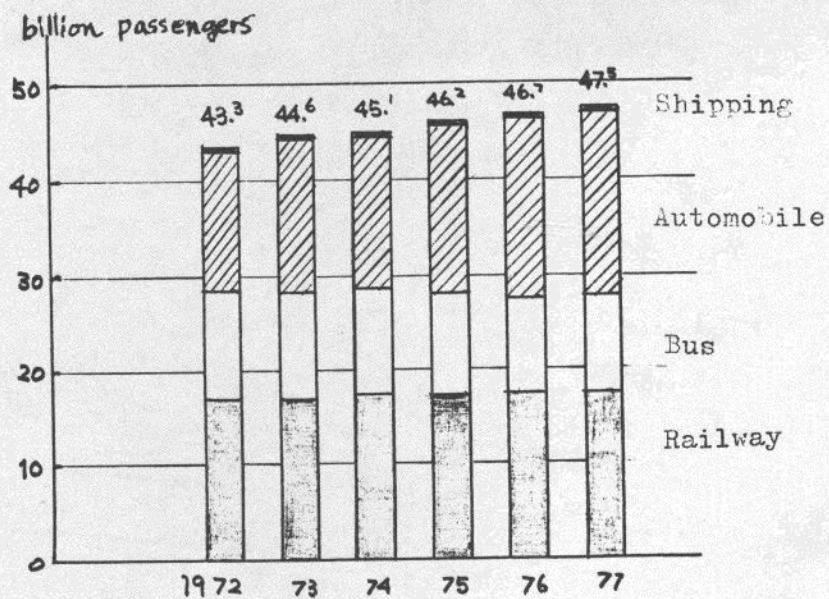




Fig - 6 Environmental protection means against road noise in Meimai New Town

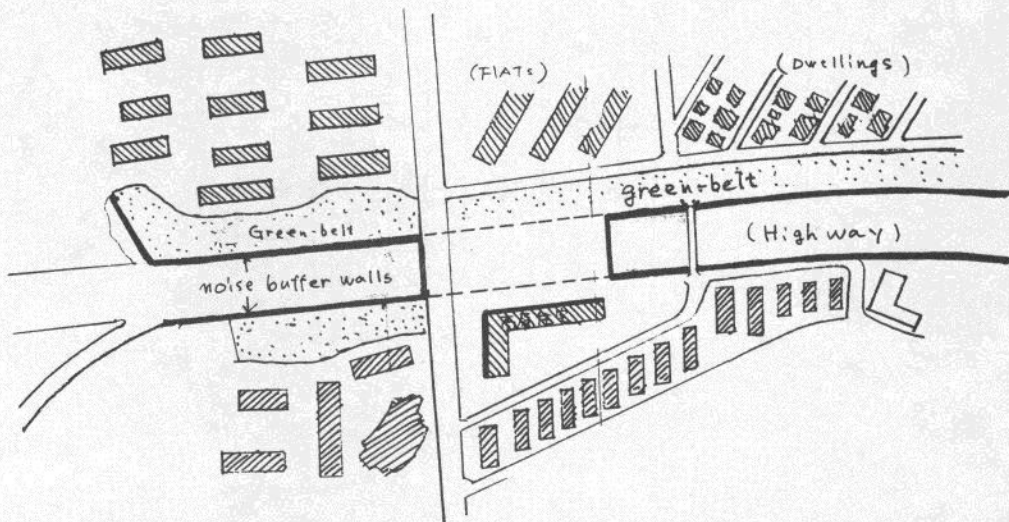
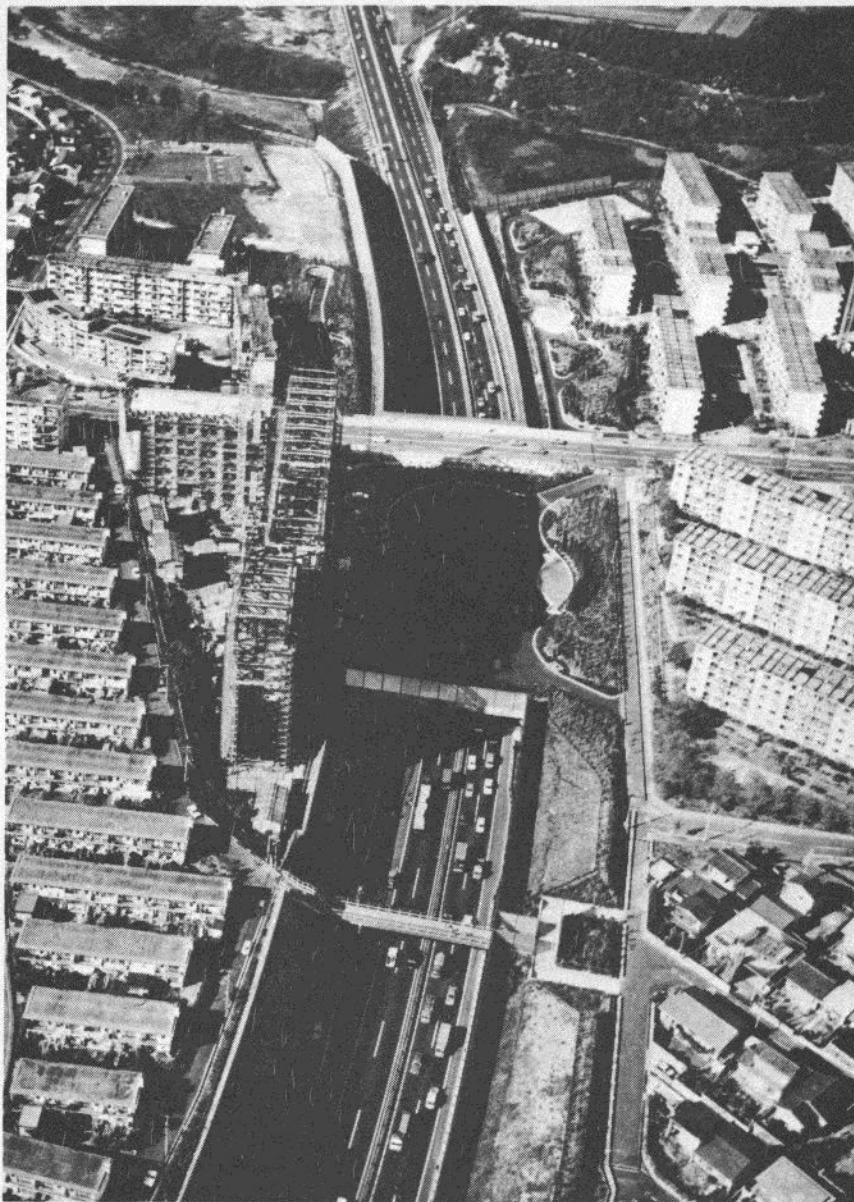


Fig - 7

## TAMA NEW TOWN

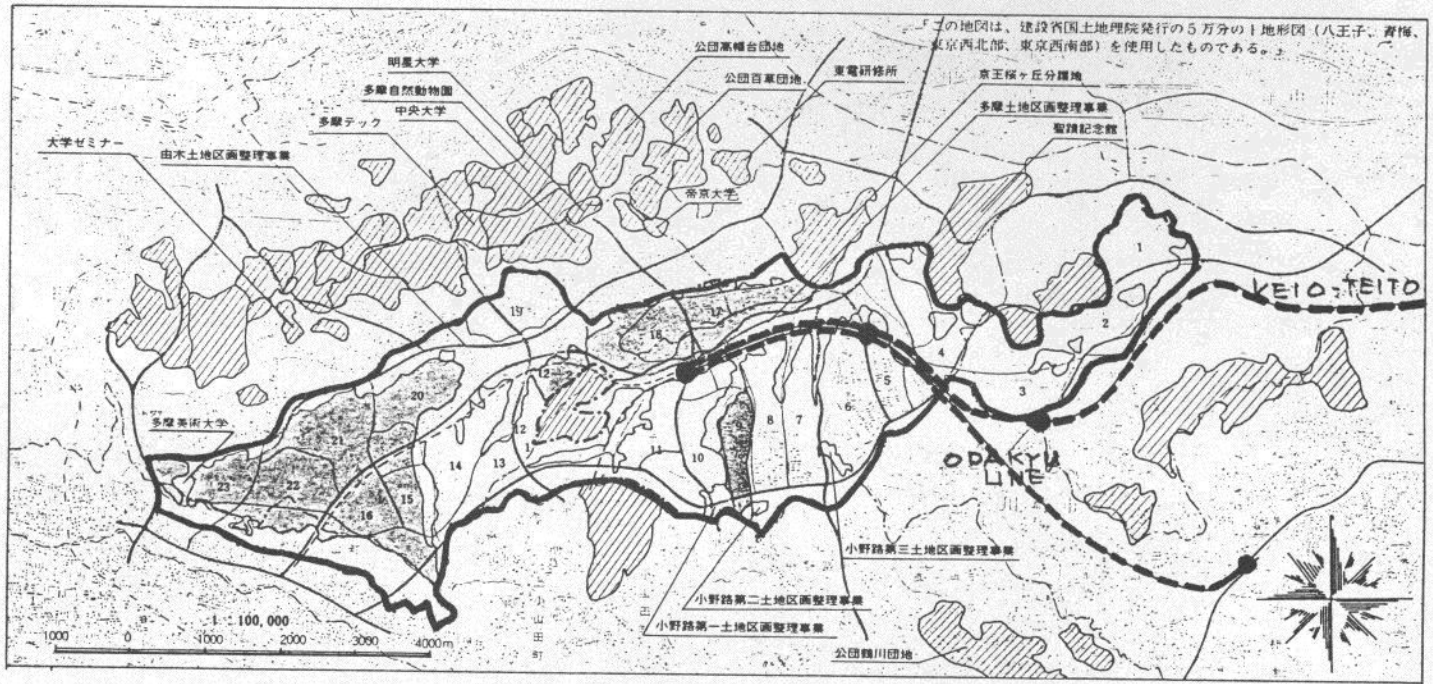
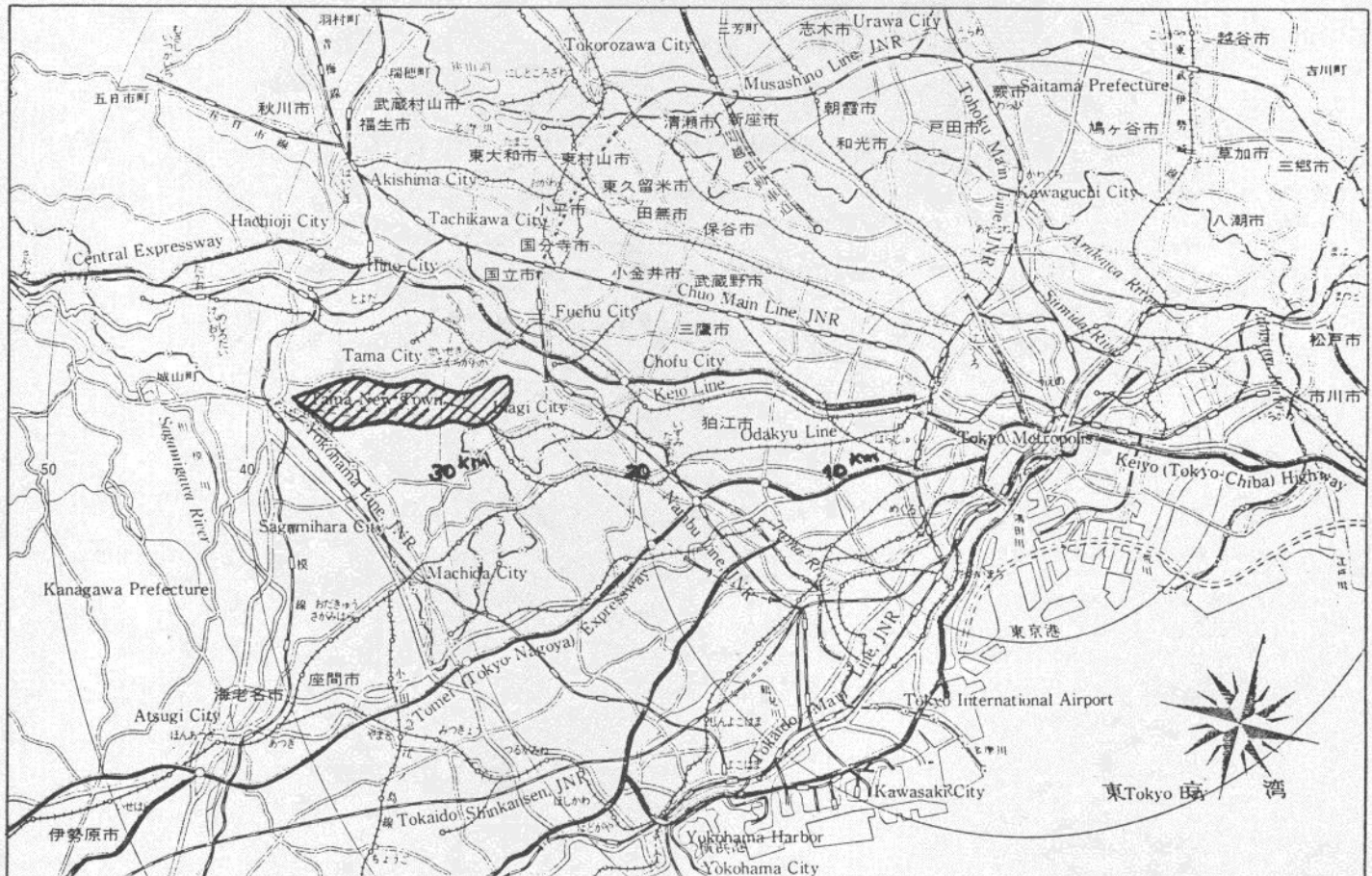


Fig - 8

## Map Showing Location of Tama New Town





## Outline of Tama New Town Project

Area: 3,020 ha

Target population: 410,000  
23 Neighbourhood Units

### Land Utilization Program

Dwelling - - - 47.0 %  
Roads - - - - 15.9  
Parks and Green Spaces - - - 11.3  
Educational Facilities - - - 10.4  
Commercial, Business Facilities - - - 3.7  
Other Public Utilities - - - 11.7

Construction Period: 1966 --- 1985

### Railway Construction ( The first stage of the program )

Keio-Teito New Town Line ( Extended line ) 9.82 km  
Odakyu New Town Line ( Blanch line ) 9.66 km

Construction cost: 41,842 million Yen

New Town Developers' share: 16,736 million Yen ( 40 % )

National and Local Government Subsidy: 62 million Yen

Fig- 9

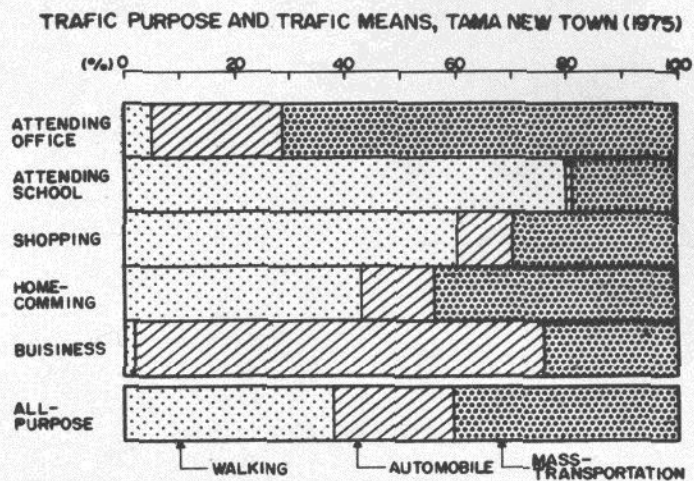
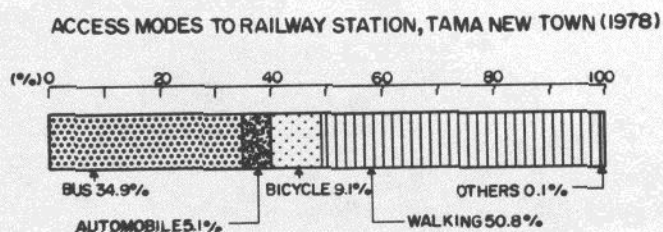


Fig- 10



Traffic purpose and Traffic means, TAMA NEW TOWN ( 1975 )

		walking	automobile	mass-transportation
Attending office	New Town Residents	5.6 %	22.5 %	71.9 %
	Inflow into N.T.	0	42.1	57.9
	Total	5.2	24.0	70.8
Attending school	New Town Residents	86.4	0.4	13.2
	Inflow into N.T.	0	5.0	95.0
	total	86.5	0.7	18.8
Shopping	New Town Residents	61.9	8.5	29.6
	Inflow into N.T.	0	60.0	40.0
	Total	60.3	9.8	29.9
Home-comming	New Town Residents	46.5	12.1	41.7
	Inflow into N.T.	0	35.4	64.6
	Total	43.1	13.4	42.7
Buisiness	Internal Trip	7.0	86.0	7.0
	Outflow and inflow	0	70.7	29.3
	Total	1.7	74.5	23.8
All-purpose	Internal Trip	70.0	11.1	18.9
	Outflow and Inflow	0	34.2	65.8
	Total	38.3	21.5	40.2



図 車 両 標 準 図

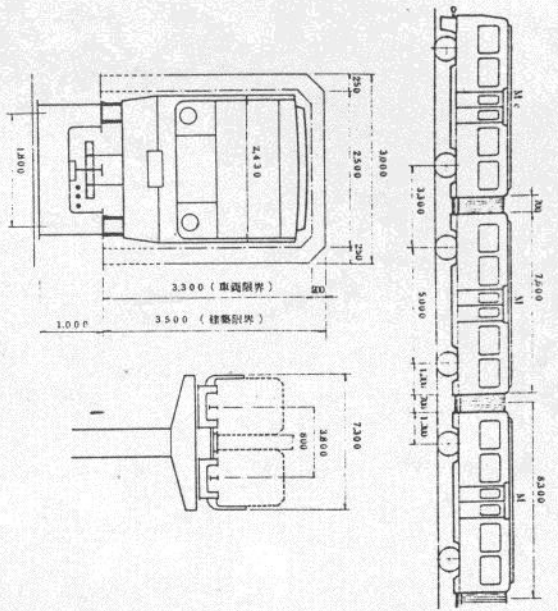


図 主要設備配置図

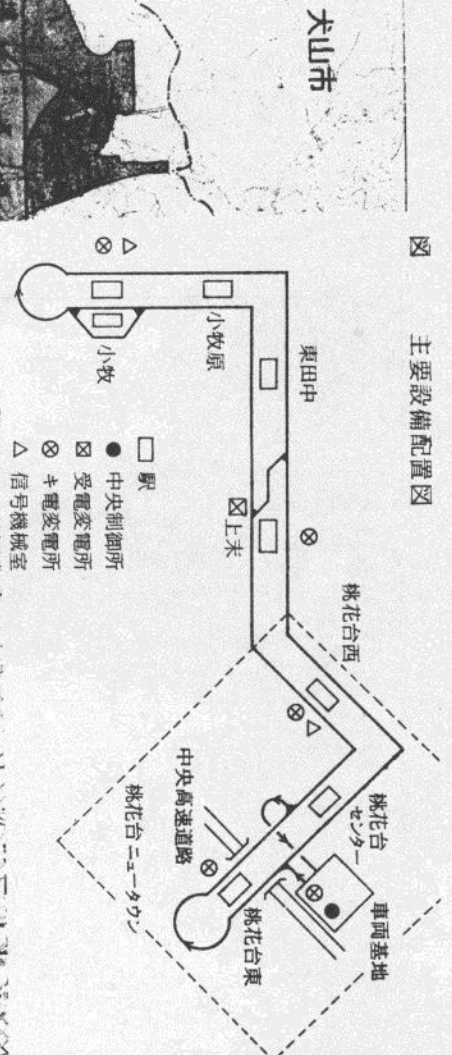


Fig- 11 New Transport System in Tokadai New Town

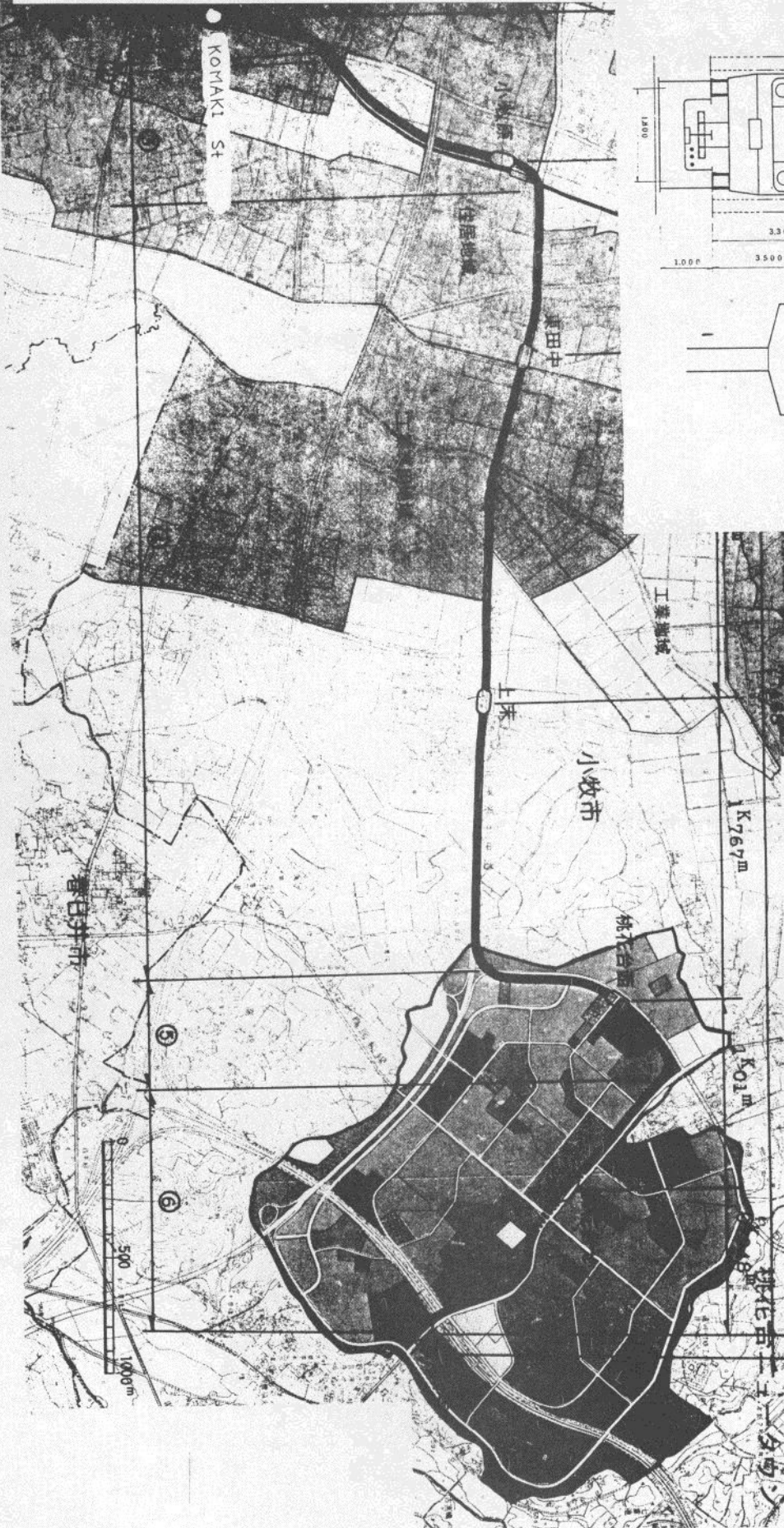


Fig-12 New Towns in Osaka and Hyogo Prefecture

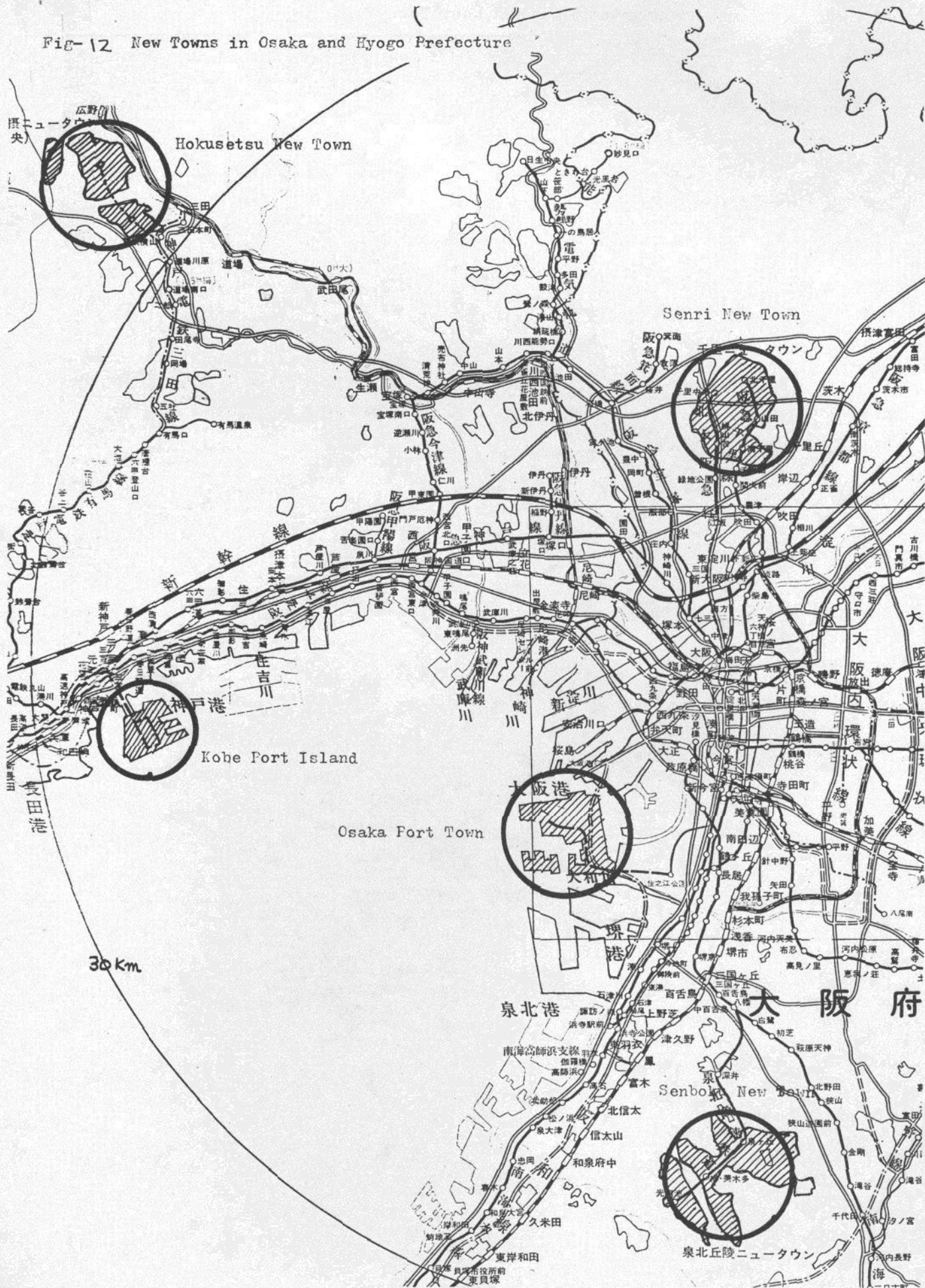




Fig-13 New Transport System in Osaka Port Town

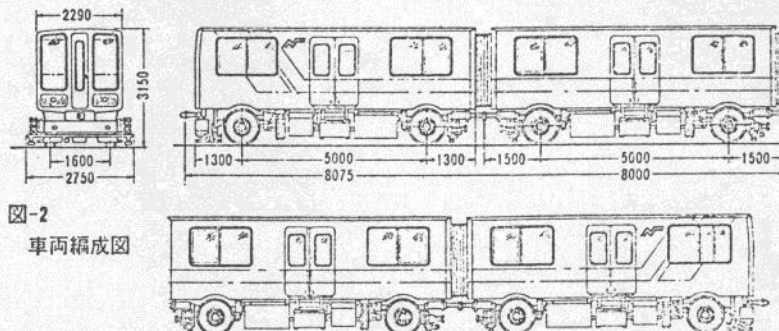
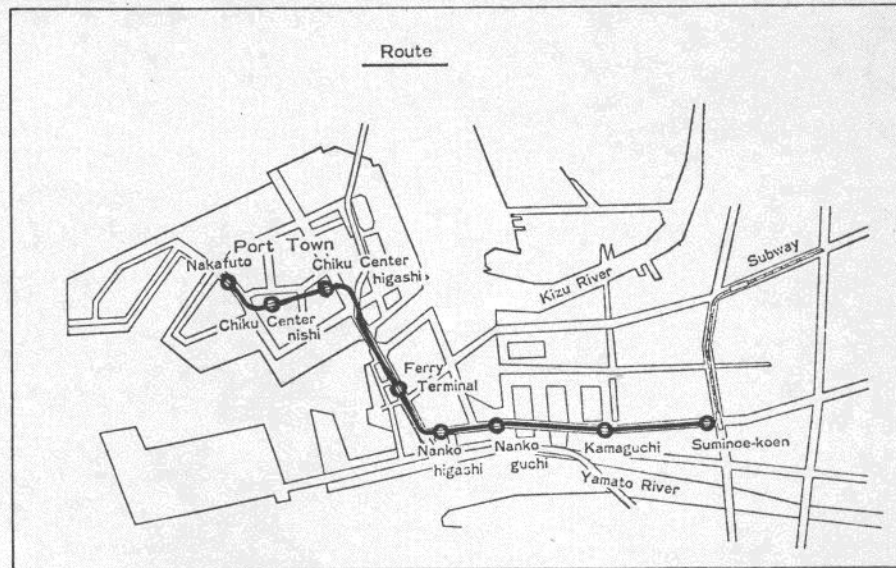
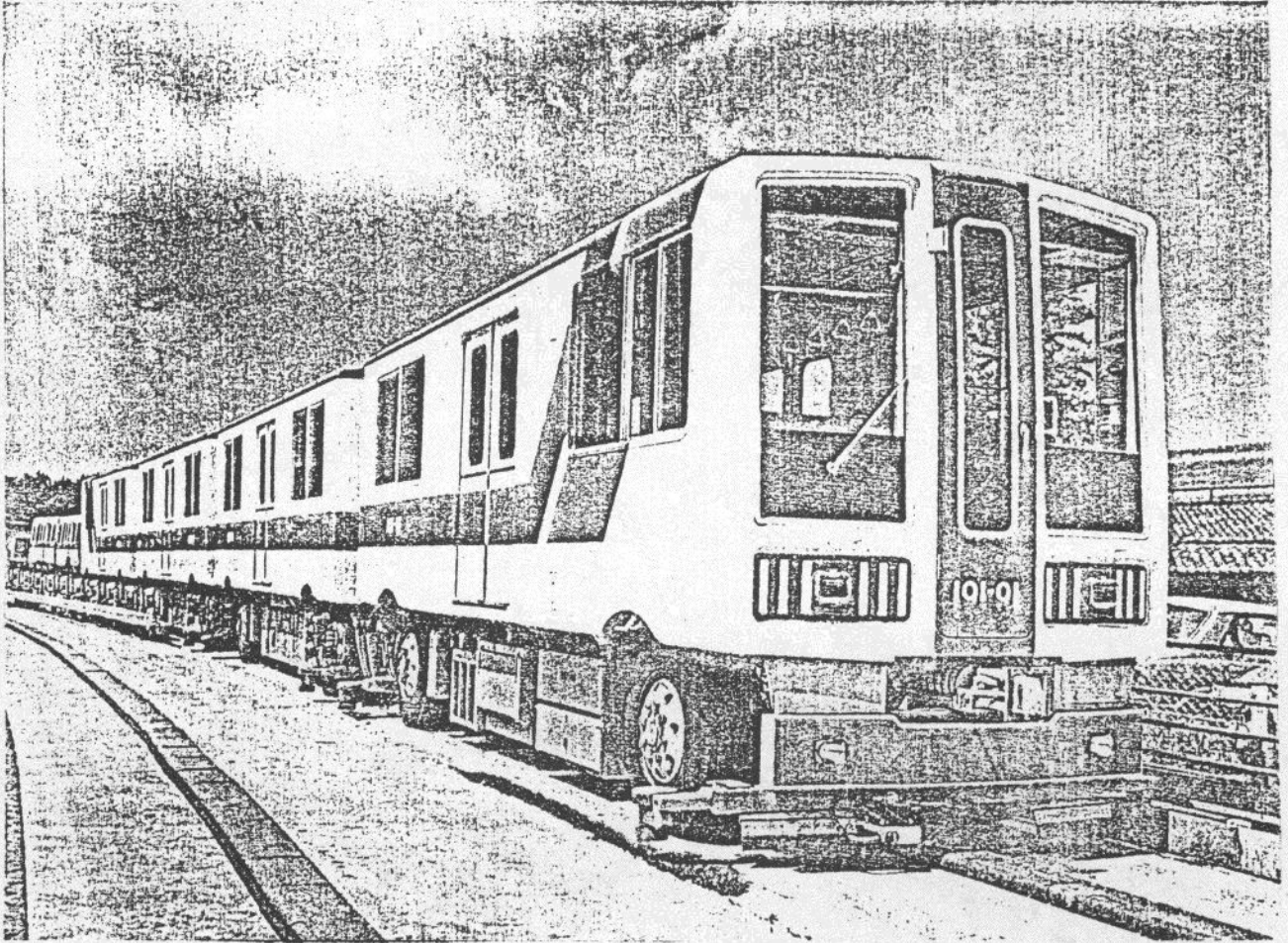
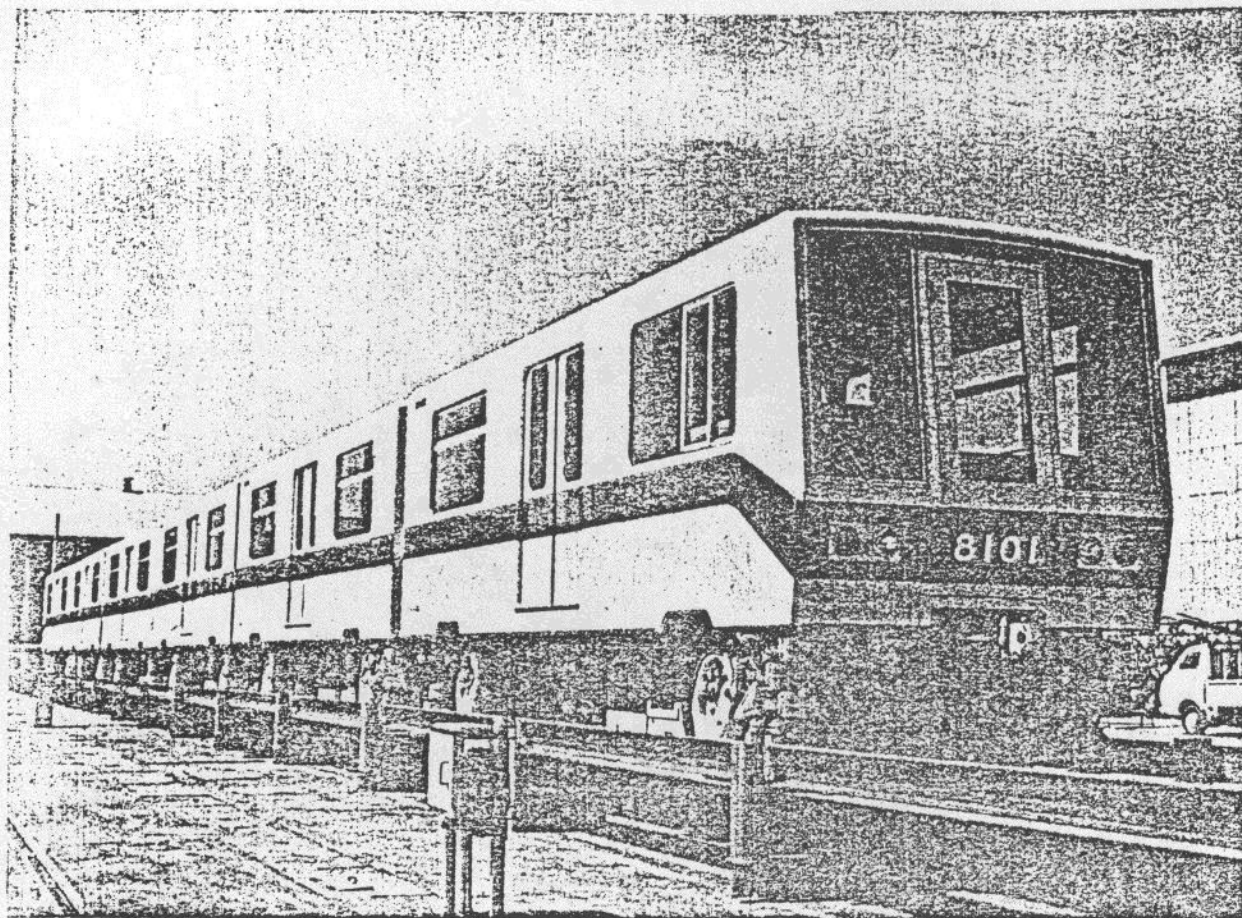
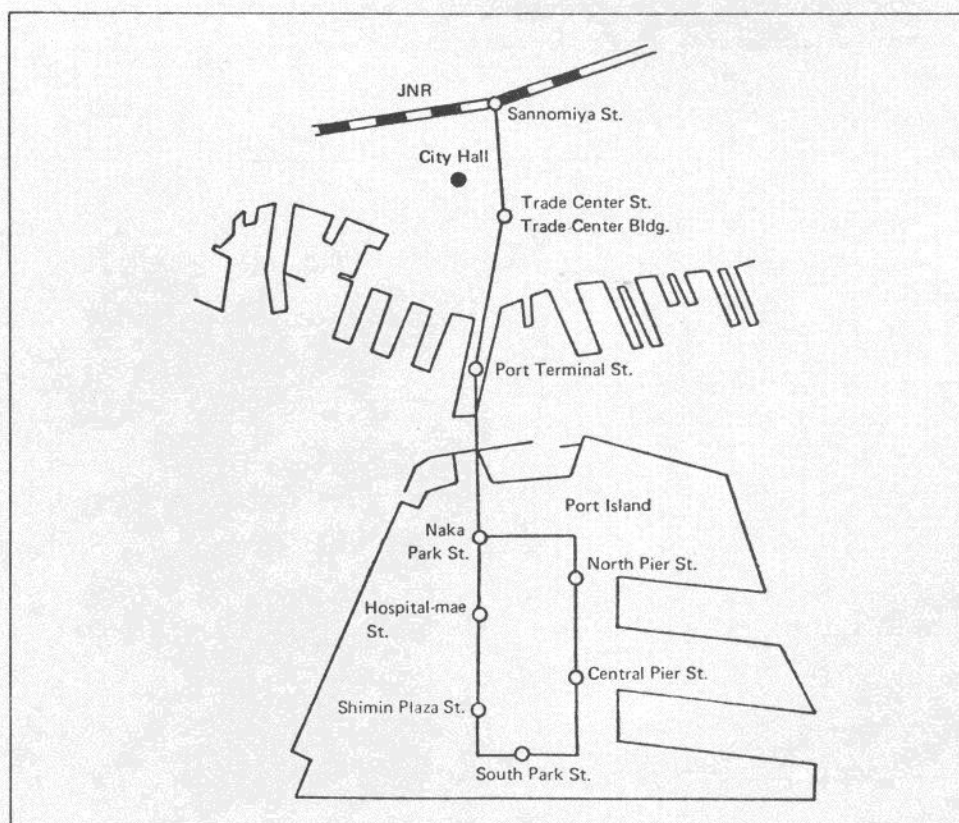


Fig-14 New Transport System in Kobe Port Island



△ 神戸ポートアイランド線第1編成目の車両8101ほか6連

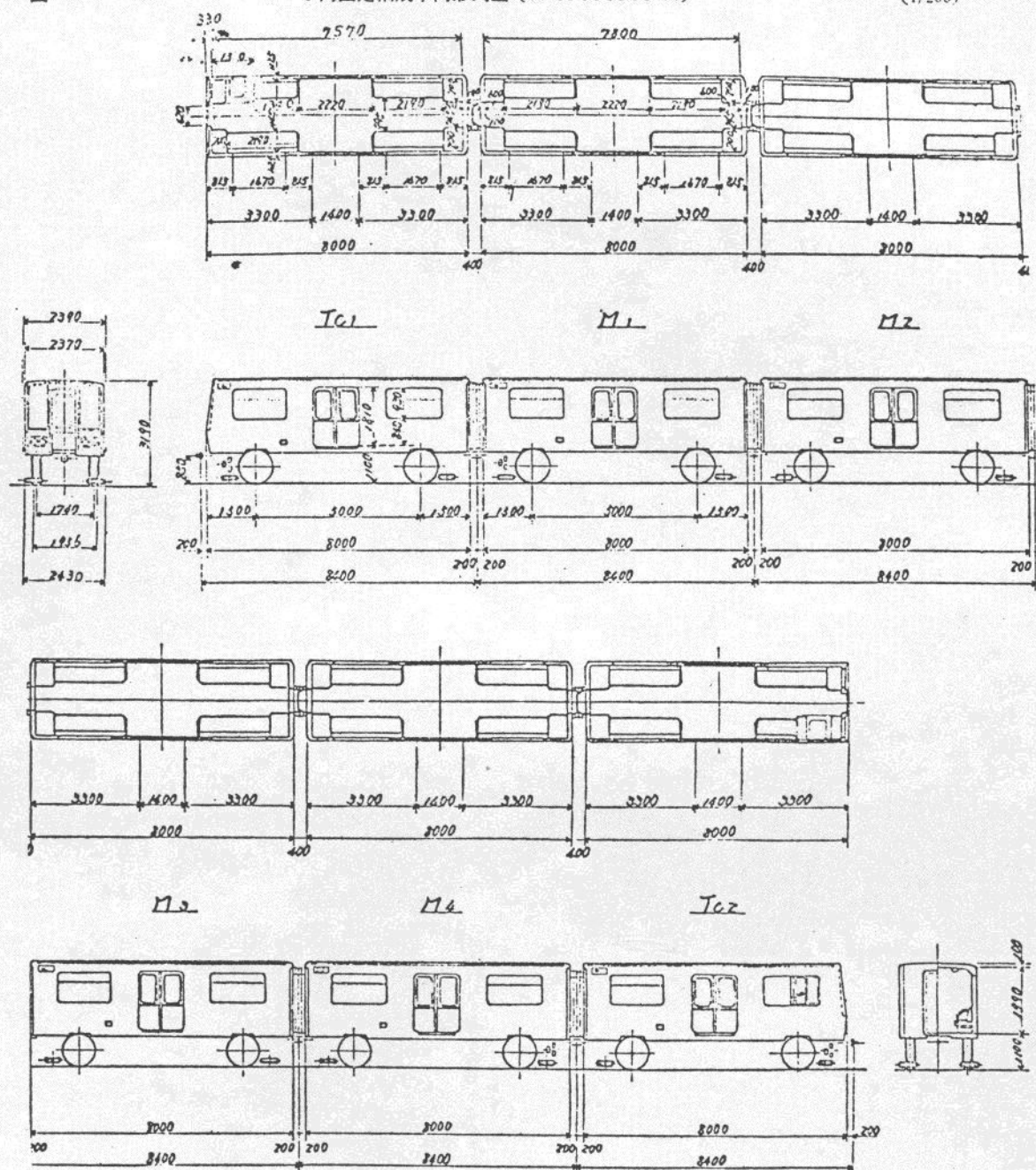
'80-4-16 神戸新交通提供





6 兩固定編成車輛形式圖 (Tc-M-M-M-M-Tc)

(1/200)



# TOPICS

## Kobe City New Transit System

### Introduction

The recently completed Kobe City New Transit System is a new system providing an intermediate means of transportation by railway and bus between an existing railway station and an expansive man-made offshore municipal port island equipped with port facilities, which is scheduled for completion in March, 1981.

This Kobe City New Transit (KNT) System, an elevated transit system extending for a total length of 6.4 km (double-track section 2.9 km, single-track section 3.5 km) starts out from the existing Sannomiya Station of the Japanese National Railways and comprises nine stations.

The system leads to the man-made Port Island, which has an area of approximately 436 ha and is situated at the central part of the Port of Kobe, roughly 3 km south of Sannomiya Station.

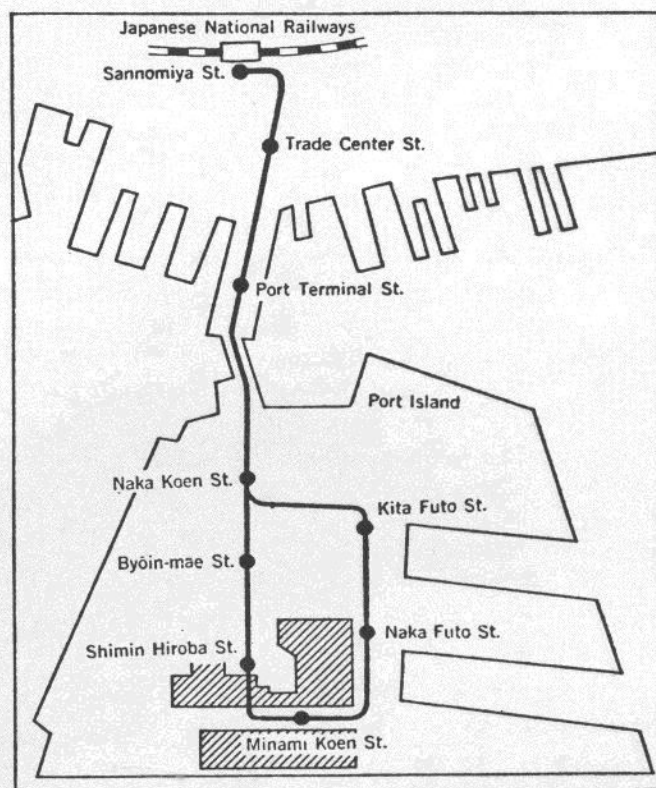
The land reclamation project, commenced in fiscal 1966, has almost been completed, and various facilities are currently under construction with completion scheduled for next year's festival 'Portpia 81'. These facilities include the New Central Citizens' Hospital, Shimin Hiroba, International Interchange Hall and International Exposition Hall. (Tentative name)

The Central Control Room of this KNT System is located near the Naka Futo Station, while the expansive 29,000 m<sup>2</sup> Rolling Stock Base including inspection yard, workshop, storing lines and other facilities are located at the southeast end of the island.

Trains are operated unmanned in 6-car formations and at minimum intervals of 2 minutes and 30 seconds. Each train accommodates 450 passengers, so the transit system can transport about 10,000 passengers/hour. The train completes the loop run in roughly 25 minutes.

A more detailed description of the KNT System is given below.

Route of KNT System



### 1. Rolling Stock

Each passenger car has a length of 8,400 mm, breadth of 2,390 mm and height of 3,190 mm, and accommodates 75 passengers. Six of these cars are connected to form one train.

The car body is constructed of light-weight welded aluminum alloy and incombustible fiber-glass reinforced plastics is used as the inlining material. Guidance along the tracks is performed by means of two pairs of guide wheels provided at the front and rear ends of the car, respectively, and the all-wheel steering system is adopted. The running wheels are of very compact design



and use noiseless urethane-filled rubber tires.

Overload is prevented by an overload sensing device, while the bogies adopt the independent suspension system for improved riding comfort.

The regenerative braking system is adopted for braking in the range from maximum speed to near stopping speed, and the pneumatic-hydraulic braking system is used for braking at very low speeds and for stopping.

The 3-phase, 600 V AC power feeding system is adopted, and power collection is performed by the 3-wire spring pressure system.

In view of their excellent control characteristics, two 90-kW DC compound motors are used as the main motors on four of the six cars which form the train.

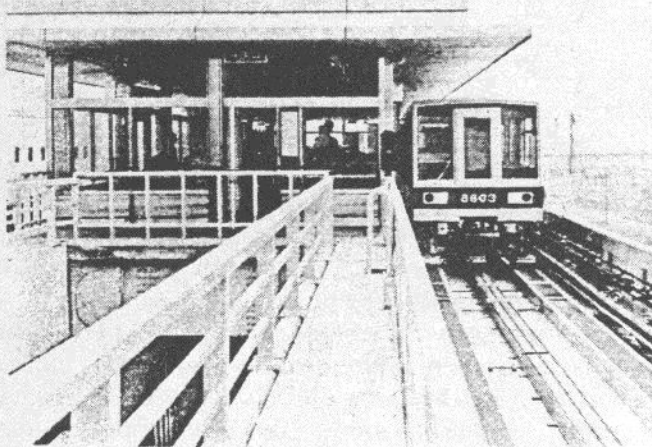
The thyristor-Leonard control system adopted by the KNT system permits all operations from full-speed running to regenerative braking to be controlled without switching of contacts.

Regarding the safety system, a train detection transmitter based on the check-in check-out system is adopted on account of the use of rubber tires, together with an automatic train control (ATC) system which is adopted in an integrated combination to improve system reliability.

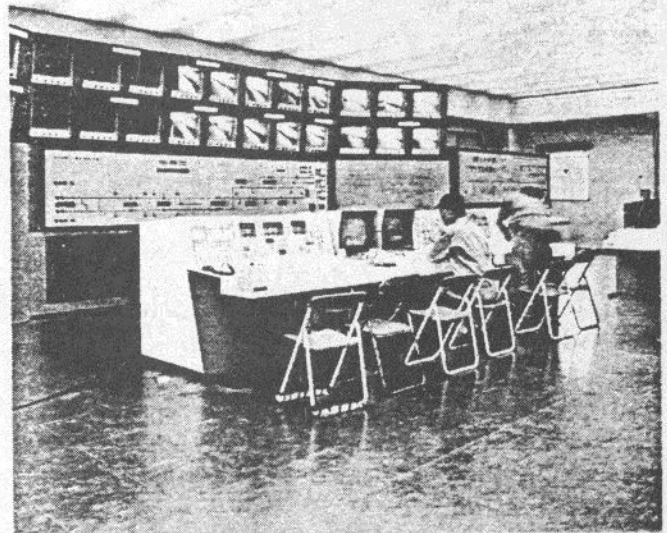
An automatic train operation (ATO) system supporting the ATC system is also adopted as a link in the train operation/control system. The train is thereby provided with automatic functions for all operations from starting to braking, opening and closing of doors and others.

## 2. Switch System

The floating (rising) type switch system



KNT and station.



Central control room.

adopted guides the rolling stock constantly on the tracks by means of the straight or curved rising and falling movable guide rails which follow the movement of the car.

The system consists of the drive mechanism, movable guide rails, fixed guide rails and running tracks. It features short switching time (about 2.5 sec) and possesses a self-locking function, by which great system safety is ensured. Single-switch and cross-switches are used to meet specific needs.

## 3. Power Facilities

The power receiving substation is situated near the Naka Koen Station, which is about halfway along the Port Island transit system. Here, power of 20 kV received and stepped down to 6 kV by means of 9,000-kVA transformers for distribution to the respective feeder substations and station power rooms.

The feeder substation uses one or two dry type 2,000 kVA transformers to step down the voltage to 600 V for distribution to the respective feeder sections.

A total of six feeder substations are provided in addition to the power receiving substation, and the operation and control of these substations and power rooms, as well as the supply and switching off of power to the railway lines, are performed by means of a computerized remote



surveillance system from the Central Control Room.

The railway line adopts the 3-phase, 600 V AC double-track system, and a hard copper trolley wire having a trapezoidal groove is mounted on a stainless steel rack for installation on the walls along the track. A 500-kVA diesel engine generator is provided to supply power in case of emergency.

#### 4. Signal System

The signal system is based on the Automatic Train Control System, and control is performed by the fixed block signal system. Train detection is performed by means of the continuous verification check-in, check-out system, with the check-in signals transmitted from the front section of the car and the check-out signals from the rear section of the car. These signals are received by means of a ground loop for detection of train position.

Route preservation is by electric relay interlocking of the first kind, which is performed from the Central Control Room by centralized control, utilizing the Centralized Traffic Control System.

Signal equipment is installed at Sannomiya Station, Naka Koen Station and Naka Futo Station, and operated by centralized control. Door control and forward/reverse switching at the stations are performed by means of the door/running direction switching equipment, and the signal transmission loop for all this equipment is laid on the surface between the tracks.

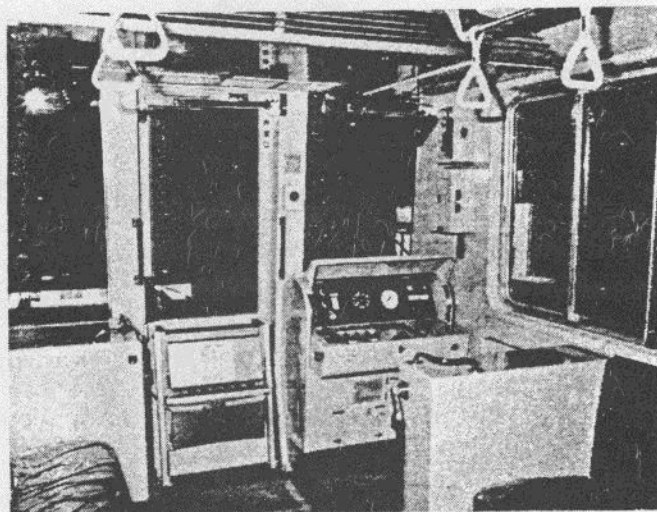
#### 5. Integrated Control System

The Integrated Control System essentially consists of six sections—operation control, power control, rolling stock base control, station control, disaster prevention control and data control. The system is operated by centralized control from the Central Control Room.

##### 1) Operation Control System

The Operation Control System performs two major functions—preparation of train running schedule and maintenance of automatic operation (train start control, door control, advance/reverse switching and announcements).

At normal times, train operation is performed by the entire-train automatic operation system. To cope with emergencies, an automatic processing function is provided, and operation of the train is also possible manually by remote control or by an operator on the train. Route control is also performed either automatically by Central-



Inside of KNT car.

ized Train Control or manually from the car by the operator.

The Central Control Room is provided with various items of related equipment such as the operation display panel, operation control panel, closed circuit TV monitor and operator's console.

##### 2) Power Control System

This system automatically controls the substations, power rooms and transit system by sharing the computer with the Operation Control System.

Related equipment provided in the Central Control Room consists of the power system display panel, control panel, operator's console, etc.

##### 3) Rolling Stock Control System

The principal functions of this system are rolling stock scheduling, inspection scheduling and automatic marshalling.

##### 4) Station Control System

Centralized control is performed of various operations such as ticketing, passenger services and control of station equipment.

##### 5) Disaster Prevention Control System

Information processing is performed automatically when disasters such as earthquakes occur, or in case of very strong wind.

##### 6) Data Control System

An office computer is used for recording and tabulating various kinds of data related to train operation, maintenance and other operations.

#### 6. Automatic Operation

Automatic train operation is performed by means of the train mounted automatic train operation system based on computerized instructions from the Central Control Room.



The principal control items are as follows:

- 1) Speed acceleration/deceleration control:  
With aid of load response system.
- 2) Fixed-speed operation control: Performed with reference to ATC speed signals.
- 3) Fixed-position stopping control: Performed with reference to ground point signals and distances.
- 4) Door opening/closing control: Interlocked switching of car doors and station platform doors.
- 5) Forward/reverse switching control: With aid of directional antenna and main circuit.
- 6) Station announcements: By means of car-mounted tape recordings.
- 7) Train trouble monitoring.

In addition, it is possible to operate the trains manually in the event of any trouble in automatic operation systems or signal systems.

## 7. Station Facilities

Glass screens are provided on the station platforms to prevent passengers and objects from falling on the tracks or coming into contact with the trains. In addition, platform doors are provided which are opened and closed in interlocked motions with the car doors.

Other equipment consists of the emergency announcing system, emergency telephone system, TV monitors, guide panels and automatic announcing system, which are directly connected to the Central Control Room and ensure the safety of passengers.

Ticketing operations are performed by means of automatic ticket vending machines and automatic ticket punching and collecting machines.

## 8. Track System

The track system consists of a pair of running rails and a pair of guide rails.

The running rails are made partly of concrete and their top surfaces are covered with a layer of epoxy resin to permit smooth running of rubber tires. The guide rails are made of steel and serve to guide the trains from both sides.

Located along the tracks are the high-voltage distribution and feeder cables, ATO loop cables and communications/signal cables, and a passageway to facilitate inspection and maintenance of these facilities and equipment.

The transit route has a standard breadth of 7.5 m at the double-track sections, and 4.25 m at the single-track sections. The maximum gradient is 50 per mill, and the minimum radius of

curvature is 30 m.

## 9. System Scale

Route length: Single-track section 3.5 km,  
double-track section 2.9 km

Number of stations: Single-track section 5,  
double-track section 4

Number of trains: 12 trains, each of six cars

Passengers per train: 450 passengers, 75 passengers/car

Designed transport capacity:

10,000 passengers/hour approx.

Minimum operating intervals: 2 min 30 sec

Rail type: U-shaped enclosed floor type using steel guide rails

Minimum radius of curvature: 30 m

Minimum gradient: 50 per mill

Turnout device: Floating guide rail type

Rolling stock: 4-wheel rubber tire coaches  
(with guide wheels)

Maximum running speed: 60 km/hour

Power receiving capacity:

20 kV, 9,000 kVA transformers×2 sets

Power feeding system:

AC 3-phase, 600 V rigid double-trolley system

Signal system: Fixed, enclosed ATC system  
and relay interlocking system of first kind

Operation control system:

Centralized control by computer

Automatic operation system: By car-mounted  
ATO system using running instructions from ground

Data transmission system:

By induction microwave system

Communications facilities: Telephone, emergency announcements, interphone, closed circuit TV, automatic announcing systems

Station facilities: Platform doors, automatic ticketing equipment

Rolling stock base: Centralized control and automatic marshalling with computer

The Kobe City New Transit System was designed and constructed by the Kobe New Transit Co., Ltd. with the cooperation of the following three corporations:

\* *Kawasaki Heavy Industries, Ltd.*

4-1, Hamamatsu-cho 2-chome, Minato-ku, Tokyo

Tel: 03-435-2971 Telex: J22672

\* *Kobe Steel, Ltd.*

8-2, Marunouchi 1-chome, Chiyoda-ku, Tokyo

Tel: 03-218-7111 Telex: 222-3601 KOBESTEEL TOK

\* *Mitsubishi Heavy Industries, Ltd.*

5-1, Marunouchi 2-chome, Chiyoda-ku, Tokyo

Tel: 03-212-3111 Telex: J22443 HISHIJU