

Parking Navigation System in the Kannai-Isezaki Zone

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INTRODUCTION

Yokohama has a population of 3.3 million, making it Japan's second most populous city (the capital Tokyo ranks first), and lies southwest of Tokyo, with a distance of about 30 km between its Kannai-Isezaki zone and the center of Tokyo.

Many extensive commercial and business functions are concentrated in midtown Yokohama, which is made up of three zones: the zone around Yokohama Station, which has the largest terminal in the city; the Kannai-Isezaki zone, which includes a cluster of government offices, bustling commercial streets, and tourist destinations; and the newly developed Minato Mirai 21 zone, where many tall buildings are under construction.

This has resulted in a large volume of traffic by commercial, sightseeing, and other vehicles, along with illegal on-street parking, cars wandering about aimlessly lost, and lineups of vehicles waiting to enter specific parking lots, all of which has impeded normal urban activities.

To relieve these problems, the Ministry of Construction (the Yokohama National Highway Construction Office), with the cooperation of parking lot operators, introduced a parking navigation system, which offers guidance to parking lots, in the zone around Yokohama Station in 1988, followed by introduction of this system in the Kannai-Isezaki zone in 1997 and in the Minato Mirai 21 zone in September 1998.

This report describes mainly this parking navigation system in the Kannai-Isezaki zone.

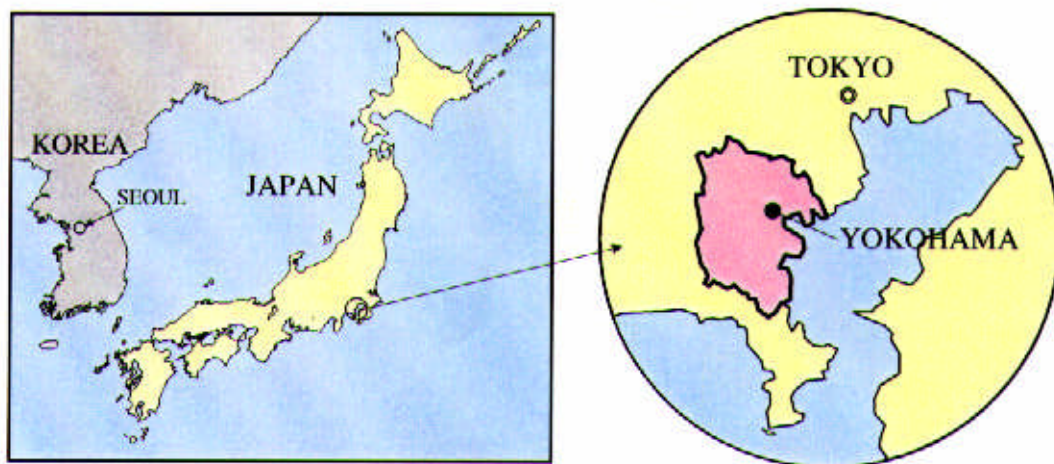


Figure 1: The location of Yokohama

OVERVIEW OF THE OPERATIONS

The Kannai-Isezaki zone where this system operates is full of both commercial and tourist activity, which creates great variability between zones and blocks and in the utilization of individual parking lots, and it has been found that as only certain lots are used and keep getting filled up, this will lead to illegal parking along streets and to wait queues, thereby causing traffic congestion and accidents.

Thus this parking navigation system provides information to drivers entering the Kannai-Isezaki zone from outside, telling them where the parking lots in the zone are located, how full they are, and what the road conditions are, guiding them appropriately to a suitable parking lot. The purpose of the system is to encourage efficient utilization of the parking lots in the zone, relieve traffic congestion on surrounding roads, discourage illegal parking, and enhance the activities and image of the city.

Upon completion, the parking navigation system in the Kannai-Isezaki zone will cover 380 hectares (940 acres) and be able to accommodate 6,000 vehicles in 40 parking lots. It currently is in operation with 31 parking lots holding 5,000 parking spaces.

This system comprises 51 variable signs of various types, 40 auxiliary signs, 31 parking information collection devices, and a control center. Its expenses, which total about 1.1 billion yen, are shared among the parking lot owners and the municipal and national governments with financial support from the Ministry of Construction in a joint public-and private-sector partnership.

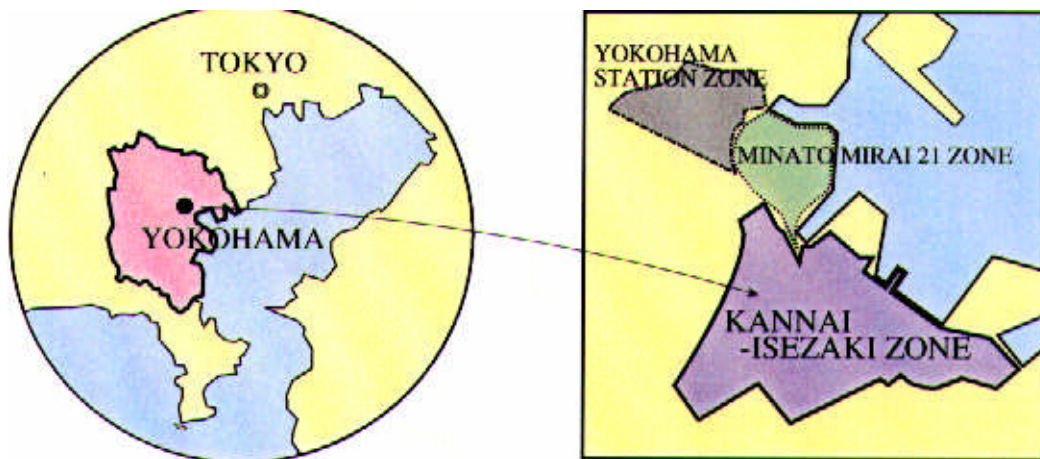


Figure 2: The location of the Kannai-Isezaki zone

OVERVIEW OF THE NAVIGATION SYSTEM

The parking navigation system offers the following four functions to efficiently guide traffic by means of road signs providing such information as how to get to parking lots in the city and how full they are at the moment.

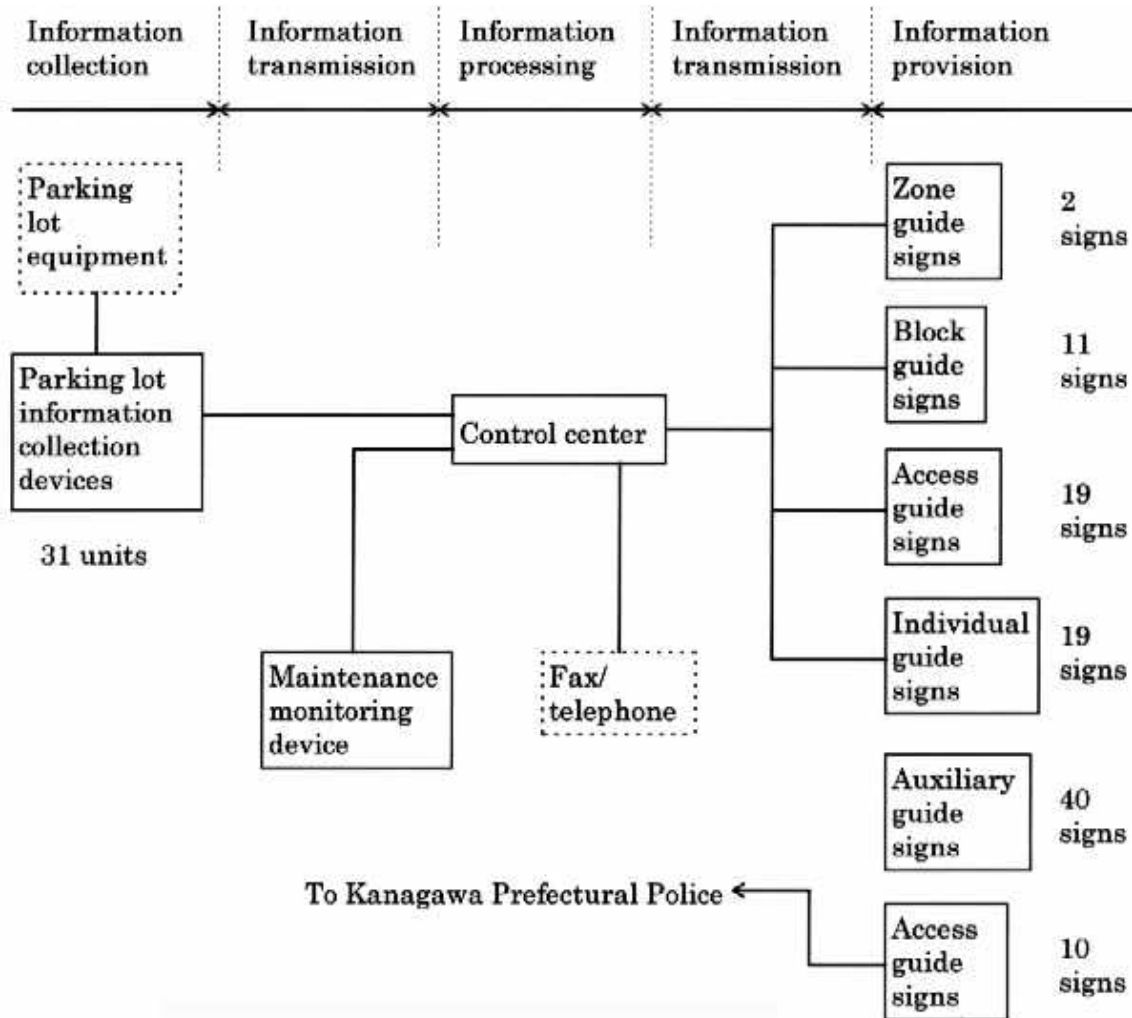


Figure 3: Basic composition of the system

Information Collection

Parking information collection devices that gather basic data for drivers play a key role in this system. Although most of them are automatic, some of these 31 devices are operated manually because data cannot be obtained from the parking lot equipment. Data such as the parking lot capacity, the number of vehicles presently in the parking lot, and the number of vehicles entering and leaving is automatically collected and sent to the control center in real time.

Information Transmission

Various information is sent and received between the control center and the various parking lots and guide signs via dedicated 50-bps lines, which provide the lowest operating cost.

Information Processing

The various information that is gathered is automatically processed at the control center and provided to the various guide signs. The decision of whether a lot is full, near capacity, or vacant is made according to the number of vehicles it holds. Threshold values can be freely set, as can lot closing times and holidays, allowing the system to be operated in fully automatic mode.

In addition, devices are twinned so that if one system is down it is automatically switched to its twin, for stable operation 24 hours a day.

Information Provision

Information processed at the control center is provided in real time via guide signs of various types positioned along the roads leading from around the zone to midtown, divided into four stages according to distance from midtown. This system is also linked to the parking meter signs previously installed by the Kanagawa Prefectural Police and provides parking lot information as block information.

Information is provided mainly via signs but also via fax and by voice via answer phone, to improve the service by use of a variety of media.

MEANS OF GUIDANCE

This system covers a much wider geographic area than other cities, encompassing many more parking lots and access routes, leading to the conclusion that the guidance system described below is optimum for Yokohama as an international tourist destination.

This is a driver-friendly guidance system that provides information about parking lots by means of guide signs in five stages, each linked to the next: zone guide signs, block guide signs, access guide signs, individual guide signs, and auxiliary guide signs.

[First-Stage Guidance] ... Approach to Providing Information by Zone Guide Signs

This type of sign is positioned at the roadside immediately before one enters the Kannai-Isezaki zone. It provides to drivers who are unfamiliar with the area various regional information about three zones, including the Kannai zone and the Isezaki zone, such as how crowded they are, the shape of the region, the layout of the roads, and traffic conditions.

Variable information and congestion information is displayed as "full," "crowded," or "vacant" in LEDs on fixed guide signs that display a map.

[Second-Stage Guidance] ... Approach to Providing Information by Block Guide Signs

This type of sign is positioned at the roadside immediately before one enters each of the three zones. It divides the zone into blocks and provides information on each block, including how crowded they are, the shape of the region, and the layout of the roads. Variable information is displayed as "full," "crowded," or "vacant" in LEDs on fixed guide signs that display a map.

[Third-Stage Guidance] ... Approach to Providing Information by Access Guide Signs

This type of sign is positioned along the periphery within each block. It provides, as access information, information on crowdedness from the present location to nearby parking lots (a summary of the information on individual parking lots displayed on individual guide signs) as well as route guidance. Variable information is displayed as "full," "crowded," or "vacant" in LEDs on fixed guide signs that display a map.

[Fourth-Stage Guidance] ... Approach to Providing Information by Individual Guide Signs

This type of sign is positioned along the periphery within each access area. It provides guidance by such individual information as the names and crowdedness status of individual parking lots.

The status of parking lots is shown in text-type fixed guide signs in LEDs. The general direction is shown by green arrows if vacant or by orange arrows if crowded, a full lot is marked as "full," a closed lot as "closed," and a lot not in service as "out of service."

[Fifth-Stage Guidance] ... Approach to Providing Information by Auxiliary Guide Signs

This type of sign quickly guides a driver to the desired parking lot by providing auxiliary information about multiple routes to individual parking lots by means of fixed information such as the names of lots, arrows, and route numbers.

Figure 4 appears on the next page.

EFFECTS OF THE SYSTEM

Parking lot guidance systems are in operation today in many places around the world, but they cover a relatively small area and operate by a relatively simple method of guidance.

But this Kannai-Isezaki zone covers a large area, about 380 hectares, in which parking lots are scattered about in widely dispersed locations. In the realization that conventional methods are incapable of providing the kind of detailed information that is required, and noting the effect of the parking navigation system the city introduced in 1989 in the area



Figure 4 : Flow of means of guidance according to site installation conditions

around Yokohama Station, which led to an increase in the number of vehicles using the lots amounting to 21% on weekdays and 5% on holidays, a decrease in on-street parking of 18% on weekdays and 15% on holidays, and a decrease in traffic volume of 5% on weekdays and 10% on holidays, it was decided to adopt an even more detailed multi-stage system.

But since this system went into operation in this zone, there has been a great improvement in the variability of parking lot utilization. The utilization between different lots has evened out, average parking lot utilization has increased by 3%, parking along the streets has been reduced, and there is less vehicle loitering. This improves the image of the city and contributes to greater activity midtown.

FUTURE DEVELOPMENT

In our car- and information-oriented society, relieving urban traffic problems and encouraging urban activity are very important challenges faced by cities.

Thus it is essential for urban activity to provide information about parking lots, and the importance of this system has been recognized.

We plan to recommend the following future developments.

Expansion of the Parking Navigation System

Study is being given to expanding and speeding up the following functions in order to improve the parking lot guidance service.

<1> Installing more guide signs of various types

It is planned that 11 more guide signs will be installed.

<2> Introduction of a forecasting system

The intent here is to collect and analyze various data from the system in its present state and improve its precision for providing information, such as ascertaining quantitative data.

<3> Introduction of streetside broadcasting in the city

Information about parking lots will be provided to car radios. This information is available to almost all drivers, but in terms of information level, zone and block information is provided in about stages 1 through 2.

<4> Linkage with the VICS (Vehicle Information and Communication System) system

Information about the use status of parking lots is transmitted to automobiles, but only those automobiles that carry the required on-board equipment.

<5> Linkage with local cable television

The service will be enhanced by providing not just information about the use of parking lots in the Kannai-Isezaki zone but also information of local interest, such as information about public events, traffic information, and weather forecasts.

Expansion of Parking Lot Equipment

The service of the parking navigation system will be improved by expansion of the equipment at each parking lot.

<1> Introduction of new parking lot entrance guide signs

Uniform parking lot entrance guide signs (bearing the Parking Information Pi logo) will make it clear that the parking lot is affiliated with this system, providing greater added value to both drivers and parking lot operators.

<2> Introduction of ATMs and CD

Use of parking lots will improve with the introduction of equipment that provides the convenience that parking lot users want.

Systematic Improvement

Service will be improved by systematic enhancements in how drivers make use of the parking lots.

<1> Precision of local information provided concerning the Kannai-Isezaki zone, etc.

Service will be improved by having an information gathering network and using pamphlets and posters to present information that meets the needs of users.

<2> Introduction of a common parking coupon system

Service will be improved by introducing a system whereby parking coupons will be valid at any participating parking lot.

<3> Introduction of a common parking coupon discount system

Service will be improved by issuing parking discount coupons, valid at any participating parking lot, at all shops, facilities, and events in the service area.

Environmental pollution is an issue all over the world, and the carbon dioxide and nitrogen oxides that cause air pollution as vehicle traffic grows are on the increase. This system contributes to the reduction of vehicle traffic, and in the future we will work to expand it to many other zones and encourage more parking navigation systems.