

CHAPTER 6

STATION AND STATION PLAZA DESIGN STANDARDS

6.1 Necessity of Manual of Station and Station Plaza Planning

In the Study, in order to provide safety, comfortable and convenient railway services, guidelines are established for standardization of station facilities and station plaza.

6.2 Manual of Station and Station Plaza Planning

(1) Rationale for Station Standards

For maximum benefits from investments in railway transport, it must be integrated with other railway lines as well between the railway and other transport modes. Stations and station plazas provide the desired integrating elements.

Because the existing intersection and connecting stations of current operating lines, constructed lines and planned lines are inconvenient for transfers, planning shall be carried out with consideration given to the following in order to ensure smooth transfer between rail transport.

Through operations

Construction of stations in same place

Construction of adjoining stations

Furthermore, to ensure that rail transportation is easy to use, effort shall be made to plan stations close to areas of concentrated business, commercial and residential functions and bus and jeepney terminals, etc., and to improve the level of services by providing facilities which can be used by passengers in safety and comfort.

(2) Manual of Station Planning

1) Basic consideration for station planning

Basic consideration

As for the basic thinking to adopt when planning stations, plans shall be compiled based on the following eight clauses for station facilities with consideration given to simplicity, flexibility, and attention to the needs of disabled persons, etc.

Nine Articles for Station Facilities

Chapter I Overall Layout

Article 1 Secure easy to understand passenger flow

- Adopt simple traffic lines
- Secure visibility.

Article 2 Free corridors shall be provided not to cause division of the area along the line.

Article 3 Adopt a flexible layout which considers space for future expansion and addition of facilities.

- Adopt facilities which respond to increased numbers of users and business expansion, etc.
- Secure maximum width for ticket inspection.

Article 4 Adopt facilities which consider labor saving.

- Seek to integrate ticket inspection.
- Seek to integrate duties.
- Introduce automatic ticket inspection.

Article 5 Install escalators, elevators, slopes and passenger toilets (including toilets for physically challenged persons), etc. with a view to catering to physically challenged persons and promoting rail use.

- Install escalators and elevators both inside and outside station compounds.
- Install Braille information and Braille blocks for persons with impaired vision.
- Install continuous and smooth handrails.

Article 6 Install passenger toilets in inconspicuous but easy to find places.

- Remove height differences at entrances and also consider automatic washing.

Chapter II Platform level

Article 7 Do not install anything in addition to the minimum necessary facilities.

Chapter III Station offices, etc.

Article 8 Place offices on one floor.

Chapter IV Guide and information displays

Article 9 Make information displays easy to understand.

2) Computation of scale of facilities in the station facilities plan

Procedure for compilation of facilities plan

Station size is determined according to the number of using passengers, etc., and the procedure for compiling station equipment plans is indicated in the following flow diagram.

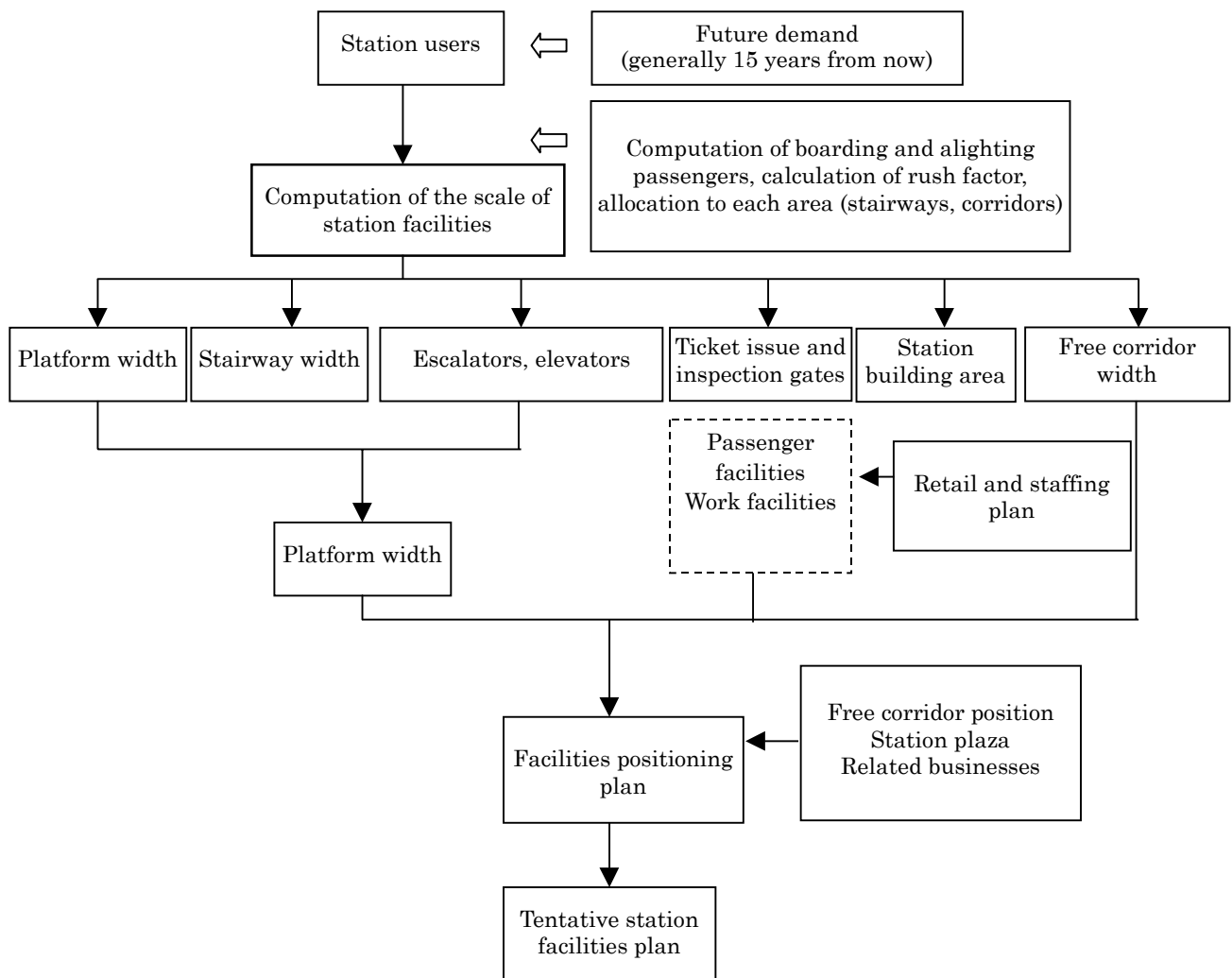


Fig. 6.2.1 Flow of Facilities Plan Compilation

Procedure of facilities planning

Composition of station facilities is classified into four such as flow facilities, passenger facilities, passenger handling facilities and station work facilities. Consideration of the facilities planning and compilation of scale of facilities are indicated for the station facilities plan.

a) Flow facilities

- i) Planning of free corridors, concourses, and passenger corridors, etc.(Refer to item 6.2.4(2)2 a) of the main text.)

Station corridors shall be placed so as not to be concentrated around main roads and station plazas.

Concourses shall be divided into interior and exterior facilities. The concourse is the center of passenger flow in the main station building; other facilities are placed around it; and it is often connected to free corridors.

Specific calculation methods shall be used in planning the size of free corridors ,concourse and so forth.

- ii) Planning of ticket issue and inspection barriers, and calculation of concourse area.(Refer to item 6.2.4(2)2 b) of the main text.)

The required area of concourses (outside inner station) is obtained from the following expression by totaling the area before ticket issue and the flow area.

The area before ticket issue is the space required for passengers to purchase boarding tickets, etc. It is retention area for waiting for purchase.

- iii) Stairway plan(Refer to item 6.2.4(2)2 c) of the main text.)

Base on standard of the calculation methods and reference maps, dimension of the width, landing and gradient are considered.

- iv) Escalators and Elevators, etc.(Refer to item 6.2.4(2)2 d) of the main text.)

Planning of elevator and escalator are designed based on characteristics of stations (new station and station to be renovated), installation place and structure of station.

1. Installation place of Escalators

In new stations or stations undergoing major renovation, escalators are installed as basic station facilities on graded passages between

walkways and free corridors, between free corridors and platforms, and between platforms, etc., in order to assist users with impaired mobility and to promote use of railways.

2. Installation place of elevator

In new stations or stations undergoing major renovation, where height differences cannot be overcome by means of slopes, at least one elevator each shall be installed between walkways and free corridors, between free corridors and platforms, and between platforms.

v) Platform Planning(Refer to item 6.2.4(2)2 e) of the main text.)

Since it is necessary for large numbers of passengers to safely and rapidly board and alight trains during limited train stop time, straight lines are desirable and designated height, width and length are required.

1. Platform dimensions

The effective length of platforms shall be calculated by using a specified formula, giving due consideration to the reference map the platform width shall be obtained by using a formula for size calculation.

In the calculation, the maximum width of facilities on the platform shall also be considered, paying due attention to the reference map.

b) Passenger Facilities(Refer to item 6.2.4(2)2 of the main text.)

Facilities of passenger waiting rooms and toilets are planned based on important notices of the facilities.

c) Passenger handling facilities

i) Required number of ticket barriers(Refer to item 6.2.4(2)2 a) of the main text.)

Since ticket barriers often create bottlenecks in the flow of passengers in stations, the number of ticket barriers shall be determined so as not to hinder passenger flow.

The required number of ticket barriers is calculated based on the number of boarding and alighting passengers at congested times and speed of passage.

d) Ticket Issue Facilities(Refer to item 6.2.4(2)2 b) of the main text.)

Ticket issue facilities are divided into ticket windows and automatic ticket vending machines. It is desirable that boarding tickets for short distance sections (inexpensive tickets) be sold through vending machines.

Required number of ticket barriers shall be calculated based on the formulas of automatic ticket barriers and automatic vending machines.

e) People Friendly Station Building

Since stations are constructed over multiple levels, height differences with outside footpaths are large, and vertical movement can be a burden, boarding and alighting passengers including those with impaired mobility are discouraged from using railways. Therefore, it is becoming more and more important to provide station areas that are safe and pleasant for all station users to utilize.

1. Facilities for aiding persons with impaired mobility (see Appendix7)

Facilities for aiding various kinds of persons with impaired mobility are as follows.

Facilities for persons with impaired sight

- Guide and warning blocks
- Braille tape
- Guide chimes
- Fall prevention fences

Facilities for persons with impaired hearing

- Station information signs as fixed information
- LED displays which enable variable information (effective at times of accident or emergency) to be provided
- Train approach indicators, etc.

Facilities for wheelchair users

- Wheelchair toilets
- Handrails, etc.
- Slopes (1/12 or less indoors)

- Escalators (for wheelchairs) and elevators
- Securing of corridor width (ticket barriers 900 mm)
- Non-slip finishing
- Height of counters, etc.

Elderly persons and children

- Hand rails, etc.

ii) Thinking behind station sign systems

Since passengers using stations for the first time experience difficulties, a sign system, which includes pictographs, shall be proposed (refer to Appendix7).

(3) Manual of Station Plaza Planning

1) Basic Principles of Station Plaza Planning

Station plazas serve two roles: first of all they are transportation zones for allowing changeover with road traffic such as buses and jeepneys, etc., and secondly they are environmental zones for supporting activities and exchange of shoppers and waiting passengers and contributing to the urban landscape, etc. In addition to laying out facilities for fulfilling these roles in a manner which enables them to function organically, it is necessary to secure a scale that can be used smoothly and in comfort when planning station plazas.

Planning procedure of station plaza development

Planning procedure of station plaza development is shown in Fig. 6.2.2.

Standardization of station plaza development

Facilities, which should be introduced to station plazas, are roughly divided into transportation facilities, landscape enhancing facilities, and convenience facilities. As station plaza functions, the necessity of each facility in cases where stations are classified as inner in CBD stations, outside CBD stations, multi-function stations, and ordinary stations are as shown in the following table.

Table 6.2.1 Necessity of Station Plaza Facilities in terms of Station Character

Zoning and Facilities		Station pattern		In CBD Multi-function station	In CBD Ordinary station	Outside CBD Multi-function station	Outside CBD Ordinary station
Transfer zone and Transportation facilities	Footpaths						
	Roadways						
	Boarding and alighting areas	Bus			-		-
		Jeepney, taxi, tricycle					
		Private vehicle					
	Parking areas	Bus			-		-
		Jeepney, taxi, tricycle					
		Private vehicle					
	Various signs						
	Traffic directing islands, etc.						
Bus stop shelter				-		-	
Environment zone	Landscape enhancing facilities	Flower beds, planters					
		Monuments					
		Street lights					
	Convenience facilities	Telephone boxes					
		Benches, stools					
		Post boxes					
		Information boards					

: Indispensable : Generally necessary items : Install where necessary

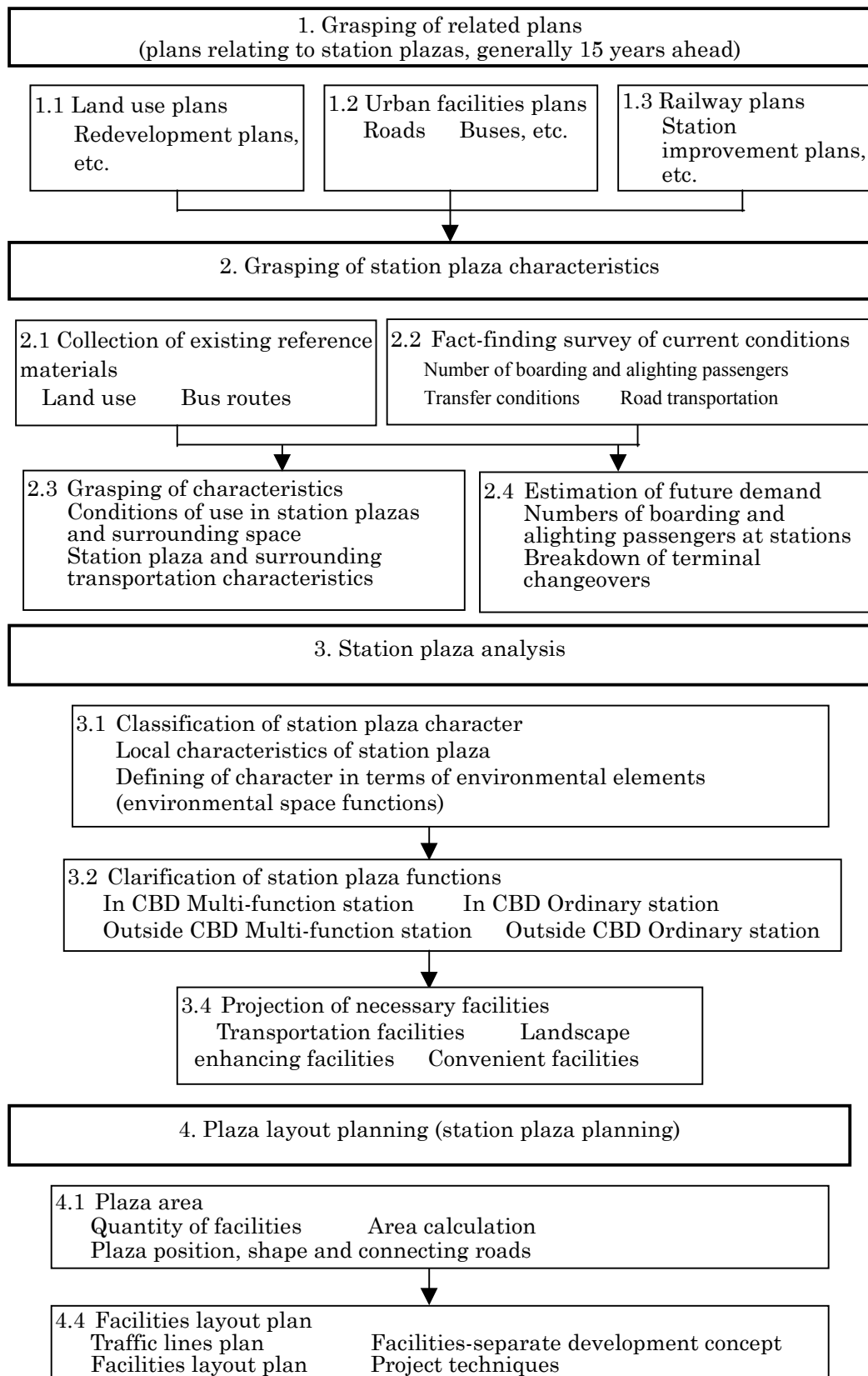


Fig. 6.2.2 Planning Procedure of Station Plaza Development

Determination of scale of station plaza

Transportation facilities are basic facilities necessary for station plazas. Based on the peak demands for each transportation facility to be introduced to the corresponding station plaza, calculate the quantity and area of each transportation facility.

a) Environmental facilities

The station plaza will have potential to create new urban core and should include the transportation facilities, landscape enhancing facilities, service facilities and disaster prevention facilities. These facilities should not be the same for each station plaza, but indispensable facilities should be determined for each station plaza considering the features of the corresponding station and urban structure.

b) Total area required

For each station pattern and number of berths, determine the total area necessary for the station plaza as shown in the following table. Note that these values are reference values.

Table 6.2.2 Total Area Necessary for Station Plaza for Each Station Pattern and Number of Facilities
(If all the facilities should be gathered into the station plaza)

Station pattern	Number of station plaza users (persons/day)	Number of bus berths	Number of Jeepney berths	Number of taxi berths	Number of tricycle berths	Approximate area (m ²)	Remarks
Multi-function station In CBD	375,000	2	10	2	(None)	11,000	The area of the transfer deck should be separately estimated.
Ordinary station in CBD	75,000	(None)	6	(None)	(None)	1,400	
Multi-function station Outside CBD	180,000	2	5	7	(None)	7,000	The area of the transfer deck should be separately estimated.
Ordinary station outside CBD	55,000	(None)	4	(None)	(None)	1,000	

Note:

- Considering the future use, the peak rate shown in the research result was used.
- The rate of passengers getting on trains to getting off trains at the peak was determined while referring to the reference values in Japan.
- The service time of each facility at the peak was determined as follows while referring to the reference values in Japan and current conditions in Manila:
 Bus: Getting on = Every 3 minutes (20 buses/hr for each berth) / Getting off = 2 sec/person
 Jeepney : Getting on = Every 1.5 minutes (40 Jeepneys/hr for each berth) / Getting off = 1.5 sec/person
 Taxi: Getting on = Every 1 minute (40 taxis/hr for each berth) / Getting off = Every 1 minute (40 taxis/hr for each berth)
 Berth area: Bus = 70 m²/berth / Jeepney = 30 m²/berth / Taxi = 20 m²/berth
 Passengers' waiting area: 1 m²/person
- Environment space rate: Determined to 20 to 30% while referring to the example in Japan (included in the total area)

Draft of Design Standard

Draft of Design Standard by type of station plaza is as follows.

a) Layout

As a traffic nodal point, the layout of the station plaza should be carefully determined. Since people and various vehicles, such as buses, gather at the station plaza, the traffic circulation lines should be simplified and smooth traffic should be ensured at the station plaza. In addition, to ensure safety and convenience of the aged people or physically handicapped people, traffic on the street should be improved and the plaza should command a fine view.

b) Multifunction station

i) Scheme for urban multifunction station plaza

Since an urban multifunction station is a main station in the business area at the center of the city and connected to the other railroad lines, a large number of people use the station.

For the railroad users and nearby business facility users, ensure safe and comfortable walking at the station plaza, and be sure to secure a gathering space and pedestrian space to ensure smooth flow.

If two or more stations gather at the same place, many people will walk between the stations to change the lines. In addition, many people will walk between the stations and nearby buildings. In this case, construct multi-level passages (consisting of an overpass and underpass) to ensure smooth flow for the pedestrians.

At such a station, many people use Jeepneys and buses. For this reason, many berths are necessary for these terminal transportations. To ensure smooth getting on and off for the passengers, properly locate the berths considering the destinations, etc. Construct sidewalks between the station and the roadways to ensure pedestrian safety. Also construct roadways having enough number of lanes to ensure smooth flow of vehicles. In addition, install signals to ensure safety and smooth flow.

If there are many pedestrians around the station, install escalators, etc. to ensure smooth flow and to relieve the congestion. Also install guide plates and nameplates so that people can easily go to the desired facilities or roads

ii) Scheme for suburban multifunction station plaza

Since a suburban multifunction station is a main station in the outskirts or suburb of the city and connected to the other railroad line, a large number of people use the station.

If there is a station near this station, many people will walk between the stations to change the lines. In this case, secure a gathering space and pedestrian space to ensure smooth flow of people.

If the stations are separated from each other, construct a multi-level passage between the stations in addition to the multi-level passage between the station and nearby area.

At such a station, many people use buses, taxis, and Jeepneys. For this reason, properly locate the berths considering the destinations, etc. so that people can easily use these transportations.

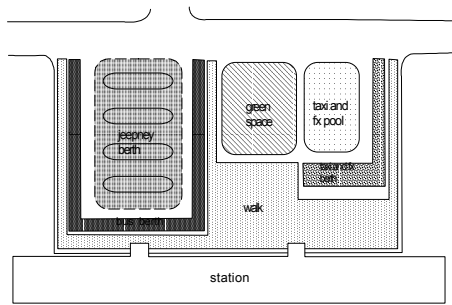
Since many people walk between the station and the berths for terminal transportations, install escalators, etc. to ensure smooth flow.

c) Ordinary station

An ordinary station in the city area or suburban area does not have many passengers, and does not have many facilities around the station. For this reason, a small number of people use the station plaza..

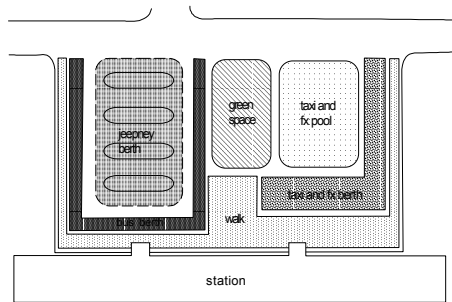
Jeepneys are the most popular vehicles, but they are small. For this reason, construct a Jeepney berth that can be used for both purposes; getting on and off. If the road is narrow, partially widen the road to construct the berths so that smooth flow of vehicles can be ensured.

For the pedestrians, install escalators or elevators to ensure easy walking.



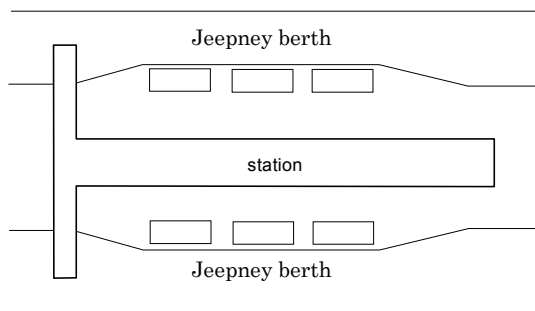
Urban multifunction station

■ Multi function station's plaza inside of CBD



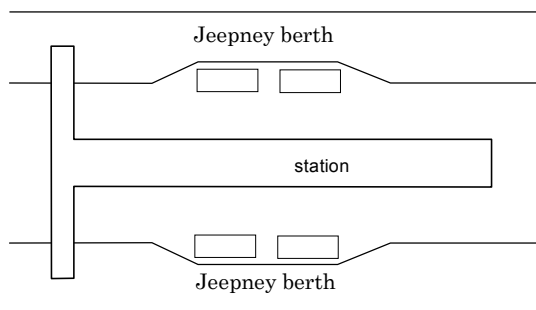
Suburban multifunction station

Fig. 6.2.3 Standard Design for Multifunction Station Plaza
(In CBD and outside CBD)



(Urban ordinary station)

● Ordinary station's plaza inside CBD



(Suburban ordinary station)

○ Ordinary station's plaza outside CBD

Fig. 6.2.4 Standard Design for Ordinary Station Plaza