Guideline for the Planning and Design of Areas along Urban Rail Alignment

Ministry of Housing and Urban-Rural Development
People's Republic of China
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In Nov 18 2015, Ministry of Housing and Urban-Rural Development of People's Republic of China (MOHURD) issued the national "Guideline for the Planning and Design of Areas along Urban Rail Alignment ". The objective of issuing this guideline is to further strengthen and improve the planning and design work for urban areas along the rail alignment, to promote vertical integration and underground development at the rail stations, to coordinate transportation infrastructure construction and adjacent urban development, and to improve the operating efficiency of urban rail transportation. The Guideline will guide the implementation of TOD (transit-oriented development) through the overall urban planning review, urban rail transit network and construction planning review process in China.

This English version of the Guideline is prepared by China Sustainable Transportation Center (http://www.chinastc.org/), one of the main compilers of the Guideline.
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Foreword

The areas along urban rail transit are important areas to realize the concentration function of cities, provide support to public transport and pioneer urban development, as well as to promote green travels and enhance environmental quality in cities. The Notice of the General Office of the State Council on Strengthening of Administration on Urban Rapid Transit Development ([2003]No.81 Document of the General Office of the State Council) has required the cities to compile dedicated land administration plans during the planning stage of rail transit development, which will serve as vital documents for the evaluation of rail transit development plans. Yet for a long time, due to lack of clear planning requirements and technical guidance, in the various phases of urban planning, there has been a lack of effective coordination between urban function planning and the planning & construction of rail transit systems, resulting in problems such as inadequate guidance by rail transit to the general structures of cities, lack of transitions between rail transit stations and surrounding buildings & environments, spatial disorders, low transfer efficiency and waste of land.

In light of practical guidance on the planning and development of areas along urban rail transit, full utilization of the guiding role of urban rail transit on urban space, and development of intensive, highly efficient, humane urban environments and space with the stations as the core, the Ministry of Housing and Urban-Rural Development has organized and conducted the compiling efforts of the Guide on Planning and Design of Areas along Urban Rail Transit (hereinafter simply referred to as the Guide). The Guide not only takes into account both domestic and international advanced experiences, but also widely consults with different related parties while refers to existing standards and criteria. Consequently, it has developed specific planning rules, gists of administration and design methods on three levels: general urban planning, regulatory detailed planning and constructive detailed planning. The guidance on areas along rail transit specified in the Guide mainly covers aspects such as functional structure, land use and construction intensity, road networks, transfer facilities, entrances & exits of stations and pedestrian systems. It is of
significant guiding value for the integral coordination between different levels of urban planning and development of rail transit.

The Guide's main contents include eight chapters: General Issues, Terminologies and Definitions, Purposes and Principles, Basic Rules, Guidance on Urban Planning, Guidance on Route Planning, Guidance on Station Planning and Design and Execution Mechanism. Meanwhile, in order to facilitate guidance on the compiling of plans and administration practices, the Guide also includes three appendices, which provide respective guidance to the contents and depths of different levels of plans. The planning and development of areas along urban rail transit should not only comply to the Guide, but also follow the current related standards and criteria of the state.

The compiling of the Guide is organized by the Ministry of Housing and Urban-Rural Development. The primary entities to have participated in the compiling efforts are China Academy of Urban Planning & Design, China Sustainable Transportation Center, Shenzhen Urban Transport Planning & Design Center, Beijing Urban Construction Design & Development Group Co. Ltd., Guangzhou Urban Planning & Design Institute, Guangzhou Metro Corporation, Beijing General Municipal Engineering Design & Research Institute Co. Ltd., China Metro Engineering Consulting Corporation.
1 General Issues

1.1 Purposes of Compiling

1.1.1 The Guide is made according to laws such as the *Urban and Rural Planning Law of the People’s Republic of China*, regulations and technical standards, in order to strengthen planning and guidance for the areas along urban rail transit, realize integral development of city functions and traffic function along urban rail transit lines, promote supports for public transport and the planning mode of guiding urban development, establish sustainable transport development structures and encourage the comprehensive development mode for multi-functional, three-dimensional stations.

1.1.2 The Guide is to be used as a working guide for planning, construction and other administrative authorities to organize compiling, demonstration and investigation of related planning and design solutions. Meanwhile it can also be used as a technical manual for planning and design entities to compile associated plans and urban designs.

1.2 Level Classification

1.2.1 The first level is guidance on urban planning. Guidance is provided regarding the corridors of rail transit systems and transfer hubs. By coordinating relations between rail transit corridors and urban structures, road structures as well as major hubs, the supports for public transport are strengthened and the development mode for urban land use is guided, thus providing reference to the compiling and adjustment of both general urban planning and district-based planning, as well as to the macro-policymaking of the cities.

1.2.2 The second level is guidance on route planning. This is supposed to clarify the functional positioning, scope of development, establishment requirements for traffic facilities and other public facilities, guiding
requirements for public space systems etc. for the areas along rail transit and the surrounding areas of stations, so as to provide reference to the compiling and adjustment of related urban regulatory detailed plannings for the concerned areas.

1.2.3 The third level is guidance on station planning and design. This is supposed to establish three-dimensional linkage relations between rail transit stations and development of ambient communities, transfer space and urban space. Specific guiding requirements are set forth on the stations' arrangements of entrances & exits as well as pedestrian systems, and these guiding requirements are included into the regulatory detailed plannings. As attached conditions for land sales, they are also to provide guidance to the compiling of related constructive detailed plannings.

1.3 Scope of Application

1.3.1 The urban rail transit mentioned in the Guide specifically refer to different forms of high or medium capacity urban public transport vehicles operating on rails, and is an all-encompassing term for subways, light rails and other rail transport systems. Tram systems with low capacity are excluded.

1.3.2 The Guide is to be applied to cities with ongoing planning and development of urban rail transit.


2 Terminologies and Definitions

2.1.1 Planned land for urban development: the term refers to land designated by the general urban planning for urban development, such as living quarters, public administration and public services, facilities for commercial and service sectors, industry, logistic storage, facilities for roads and traffics, public facilities, greenbelts and squares.

2.1.2 Urban Population in the Planned Core Districts: the term refers to the urban population in the core districts as designated in the city size chapter of the general urban planning.

2.1.3 Rail Transit’s Zone of Influence: the term refers to the areas closely associated with rail transit’s functions and located about 500-800m from the stations, whose entrances can be reached by less than 15 minutes of walking. If a station’s location has not yet been confirmed, then the rail transit’s zone of influence is to be defined as the areas within 500-800m from the rail transit line in both directions. Under normal circumstances, a single urban rail transit line’s zone of influence can be considered as a belt area for unified planning and administration.

2.1.4 Core Zone of a Rail Transit Station: the term refers to the blocks or under development land parcels located about 300-500m from a station and directly adjacent to the station’s buildings and public space.

2.1.5 Land Parcel with Potentials: the term refers to either land within the rail transit’s zone of influence with low development intensity and simple land ownership, whose functions need upgrades, thus possessing potentials for further development and subjected to preferential procurement & reservation, or land through whose development the funds for rail transit development can be collected.

2.1.6 Public Transport Transfer Stations: the term mentioned in the Guide refers to public transport facilities primarily serving the transfer function and located beyond urban road redlines. Their functional space mainly include
starting lots, turnaround loops, waiting corridors, temporary parking zones, dispatching centers and others, but exclude night-time parking zones, maintenance stations, repair workshops and other facilities that do not directly serve passengers.

3 Objectives and Principles

3.1 General Principles

3.1.1 Meeting requirements of national laws, regulations, standards, criteria and related compulsory plannings.

3.1.2 Sticking to people-oriented, intensive and highly efficient sustainable urban development principles, promoting concentrated development of urban land, saving rail transit construction costs, enhancing operational efficiency and optimizing transfer conditions.

3.1.3 Sticking to the principle of simultaneous linkage between urban planning and rail transit planning, promoting supports for public transport and guiding urban development, realizing coordination between urban functions and rail transit.

3.2 Objectives of Guidance on Planning

3.2.1 Objectives of Guidance on Urban Planning:

Establishing supports for public transport and urban structures that can guide urban development by taking the opportunities presented by the planning and construction of urban rail transit.

Configuring different levels of urban public service centers by using the corridors and hubs of rail transit as frameworks and nodes.

Assigning urban living and working functions and construction intensity, according to the service levels of rail transit and other forms of public transport.
3.2.2 Objectives of Guidance on Route Planning:

Organizing urban life and building public space with the rail transit as the core, and enabling the rail transit' zone of influence to become the city’s center of public activities and the facilities-based supporting center that serves nearby communities.

Cultivating people-oriented, pedestrian- and cycling-leaning traffic environment in the rail transit’s zone of influence, and guaranteeing the density and inter-connectivity of auxiliary road networks and pedestrian pavements.

Exerting effective control and maintenance over the functional space of the beyond-the-road transfer facilities related to the rail transit.

Guaranteeing efficient administration and reasonable, highly effective utilization over the used land along rail transit lines, and securing effective control over public open space.

Strengthening administration over the land used for rail transit development and related rail transit facilities, ensuring its feasibility.

3.2.3 Objectives of Guidance on Station Planning and Design

Following the principles of ecological recovery and city mending, building people-oriented, environmentally friendly, sustainably operated and administrated city space with rail transit stations as the core.

Integrating entrances & exits of the stations and the land occupied by ambient buildings and public space, establishing all-weather, barrier-free transfer environments for the traffic hubs, with pedestrians separated from motor vehicles.

Promoting integrated utilization of surface and underground space in the core zone of the rail transit station, reasonably planning neighboring community function and land use intensity, and facilitating harmonious combination between transport function and urban life service function.
4 Basic Rules

4.1 Scope of Guidance on Planning

4.1.1 The scope of guidance on urban rail transit planning covers the land designated for urban development as defined in the general urban planning.

4.1.2 The scope of route planning covers the rail transit's zone of influence, whose specific boundaries can be adjusted by actual conditions such as landscapes, current land-use conditions, urban roads, river systems, the land parcel's functions and land utilization integrity etc..

![Figure 4.1 Example of the scope of a rail transit's zone of influence](image)

4.1.3 The scope of guidance on rail transit station planning and design covers the core zones of rail transit stations, whose specific boundaries can be adjusted by actual conditions such as station types, landscapes, current
land-use conditions and urban roads etc. Mountainous cities should define the boundaries for guidance on rail transit station planning and design according to local conditions.

4.2 Categories and Classification of Rail Transit Stations

4.2.1 Classification of urban rail transit networks: according to the planned size of urban population in the core districts defined by the general urban planning, the urban rail transit networks are classified into Level I and Level II. Level I represents the urban rail transit network with a planned urban population of over 5 million in the core districts, while Level II represents the one with a planned urban population between 1.5 million to 5 million in the core districts.

4.2.2 Station types: the land-use function of urban rail transit station should match with its corresponding traffic service coverage and service level. Hub stations and key stations with high-level of urban public transport service should be used as various levels of core business and commercial service centers of the cities.

Hub Stations (Class A): based on large-scale out-going transport facilities such as high speed rail stations, the hub stations are the key point for interchange within and without urban areas, as well as for supporting and guiding urban development through public transport within city-town clusters. It is encouraged to conduct planning on hub stations and regional and municipal business and commercial service centers together.

Central Stations (Class B): the central stations perform the function of urban center or sub-center. In principle these should be the stations on the intersections of multiple rail transit routes.

Cluster Stations (Class C): the cluster stations perform the function of shared public service center. These are intersection stations for multiple rail transit routes or key transfer nodes between rail transit and urban public transport hubs.

Special Control Stations (Class D): the special control stations are located in
special areas such as historic blocks, scenic spots and ecologically sensitive areas etc. which require special control measures.

Terminal Stations (Class E): the terminal stations are the beginning or ending stops on the rail transit routes. They should be established according to actual demands and functions of rail yards and public transport hubs etc. and can be utilized as public service centers and public transport transfer centers for suburban communities.

Common Stations (Class F): the common stations refer to stations other than the above-mentioned.

Table 4.2 Station Types

<table>
<thead>
<tr>
<th>Station Types</th>
<th>Route Network Levels</th>
<th>Type A</th>
<th>Type B</th>
<th>Type C</th>
<th>Type D</th>
<th>Type E</th>
<th>Type F</th>
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<tr>
<td></td>
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<td>I A Hub station</td>
<td>I B Central station</td>
<td>I C Cluster station</td>
<td>I D Special control station</td>
<td>I E Terminal station</td>
<td>I F Common station</td>
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<td>Level I</td>
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<td>II A Hub station</td>
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<td>II D Special control station</td>
<td>II E Terminal station</td>
<td>II F Common station</td>
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<td>Level II</td>
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5 Guidance on Urban Planning

5.1 Optimization of Urban Functions

5.1.1 Structures of Urban Centers:

The distribution of various levels of urban public service centers should be consistent with the distribution of rail transit’ corridors and hubs. In principle, municipal business and commercial service centers and centers of
employment should be located in areas with 2 or more rail transit corridors, while it is to be encouraged to use pedestrian systems to connect multiple transfer hubs, so as to form hub-dense areas with several transfer stations and support high-intensity mixed development of urban centers.

In the established urban districts, rail transit corridors and hubs should be planned and arranged according to existing municipal business and commercial service centers and residential areas. Provided that the needs for protection of urban history, culture and sceneries are fulfilled, urban renewal and renovation can be conducted based on rail transit hubs, while business and commercial centers as well as centers of employment can be established to serve the city, thus improving the quality and economic vitality of the urban
In the planning of new urban districts, urban space and functional structures should be developed according to rail transit corridors. New urban center is to be established in consideration of vital stations and hubs to effectively curtail pressure on development of the original urban center, avoid the urban development mode of single-spot-centered expansion, balance flow of rail transit passengers in both directions during operational hours, and alleviate traffic jams in rush hours resulted from the tidal traffic pattern.

5.1.2 Guidance on mixed functions: In the surrounding areas of rail transit stations, mixed development of land use functions is to be promoted, while land use with single function and large area should be controlled, so that the vitality of blocks can be maintained, and the reliance of tidal traffic and short-range traffic on motor vehicles can be mitigated. The residential function should take into account mixture of different social classes, families with different income levels, and groups with different ages.
5.1.3 Regulation on Construction Intensity:

In the compiling process of general urban plannings, regulatory detailed plannings and urban designs of all levels, the distribution of urban residential population and construction intensity of the regulated land parcels should be arranged proportionally to the service capacities and volumes of the rail transit, ensuring the spatial morphology of the cities and the districts.

Within the rail transit’ zones of influence, urban functions should be arranged based on the objectives of high density employment and residence. By regulating the lower limits of construction intensity and population density, the optimized matching of land use intensity and public transport volume can be realized.

In areas outside the rail transit’ zones of influence, upper limits should be imposed to regulate construction intensity, so as to realize differentiated regulations on urban construction intensity and population.
By imposing the abovementioned differentiated regulations on construction intensity and population, the target is that over 50% of urban population and traffic needs are to be located within the rail transit’ zones of influence in newly developed urban areas of level I cities.

5.1.4 Regulation on Commuter Distance: Through the establishment of multi-center urban structures closely integrated with rail transit and the promulgation of the mixed land use mode, the urban rail transit’ commuter time is securely within reasonable length. The commuter time by rail transit between clusters in city outskirts and urban centers, or between neighboring clusters in city outskirts, is advised to be controlled at less than 30 minutes.

5.2 Optimization of Urban Transport Systems

5.2.1 Urban rail transit routes should go through the centers of concentrated business zones, commercial zones and residential zones, and be arranged along roads with clustered employment and residential functions, while increasing service coverage of the stations.

5.2.2 The rail transit corridors should avoid overlapping with highways, urban
expressways and major traffic routes. This is beneficial to the optimization of pedestrian environment and reduction of mutual disturbance with rapid passing motor vehicles.

![Diagram](image)

Figure 5.4 Rail transit corridors should avoid overlapping with major traffic routes, and be arranged along less significant roads.

5.2.3 Structures of Urban Transport:

 Preferential plannings and policies for public transport are to be introduced, so as to develop multi-level, diverse urban public transport systems interlinked with rail transit, optimize integrated transport transfer systems, and ensure the diversity of travels by public transport and the convenience of transfers.

In the core zones of cities with level I route network, the percentage of green travels including public transport, pedestrian and cycling transport should reach over 70%, while the percentage of green travels in the rail transit' zones of influence should reach over 80%.

5.2.4 Rail Connection in the Urban Passenger Transport Hubs:

In principle, out-going urban passenger transport hubs with significant capacities, such as railway stations, coach bus stations etc. should be placed within the core zones of rail transit stations.

The development of passenger transport hubs and rail transit stations is advised to be conducted in an integrated manner, so as to realize seamless
transfers between different types of public transport within the hubs.

The transport capacity provided by a rail transit station is advised to reach over 50% of that of the out-going passenger transport hub connected to it.

5.3 The Guiding Policy of Public Transport First

5.3.1 The guiding policy of public transport first is to be implemented in the rail transit’ zones of influence through coordination of urban functions and transport facilities.

5.3.2 The rail transit’ zones of influence should be primarily used for residence, public administration and public service, and facilities of commercial and service sectors. Lands used for logistical storage, cargo transport, massive municipal utility facilities and non-construction purposes are not advised. Construction inside the rail transit’ zones of influence should be mainly based on mixed urban functions.

5.3.3 In principle, except historical blocks and other areas that require special protection, lower limits on floor area ratio should be imposed in the rail transit’ zones of influence. For ordinary urban areas outside the rail transit’ zones of influence, upper limits on floor area ratio should be imposed, and the upper limits should not exceed 60% of the lower limits in the rail transit’ zones of influence. The location of urban complex type development and construction should be selected within the rail transit’ zones of influence.

5.3.4 The development and utilization of underground space in the rail transit’ zones of influence is encouraged. Also to be encouraged is the connection of rail transit underground space and ambient communities.

5.3.5 The road planning form with small blocks and dense road networks is advised in the rail transit’ zones of influence.

Theoretically the density of side road networks should be over 6~8 km/km², and the road section width of the side roads is advised not to exceed 20m. Roads whose width exceeds 45m are advised to be divided into two single-direction roads to divert motor vehicle traffic.
If the rail transit’ zones of influence are located in the downtown, the size of blocks is advised to be within 120m. In areas where the circumstances are too complicated for renewal and renovation, the sizes of the land parcels can be reduced by building public pedestrian passes. If the rail transit’ zones of influence are located in the outskirts of the city, the blocks’ widths are advised to be less than 200m.

5.3.6 Within the rail transit’ zones of influence, administrative policies on traffic needs should be implemented. Regarding the construction standards for attached car parkings of buildings in the rail transit’ zones of influence, the original standards are theoretically subject to 15-20% deduction. The higher the floor area ratio, the bigger the deduction coefficient.

5.3.7 In the rail transit’ zones of influence, the spatial quality of pedestrian and cycling traffic should be guaranteed with priority. In the surrounding areas of hub stations and central stations with clustered motor vehicle and pedestrian traffic, both surface and underground space are advised to be fully utilized to establish public pedestrian systems. In cities with applicable conditions, the rail transit’ zones of influence are advised to be designated as low-speed blocks with the speed of motor vehicles set below 30 km/h.
6 Guidance on Route Planning

6.1 Development and Construction Mechanisms

6.1.1 In order to meet the demands on investment and financing for rail transit stations’ development and construction under the circumstances of market economy, research efforts on land ownerships and development costs in the rail transit’ zones of influence must be intensified in the Adjustment and Planning of Land Utilization along Rail Transit, so as to clarify the development and construction mechanisms in the rail transit’ zones of influence.

6.1.2 Reservation and development conditions: the reservation and development conditions of surrounding land parcels of the stations should be taken into consideration for rail transit routes’ positioning and stations’ locations, so that the construction of rail transit can guide the development of nearby regions and the financial sustainability of rail transit operations can be ensured from the increased volumes brought by the future development of cities.

6.1.3 The selection of land parcels with potentials should take into account the general planning of land use, the urban planning, the transport planning, the development trends of future urban real estates, and comprehensively analyze the relations between lands and transport systems, as well as land ownerships, buildings and other factors. In principle, the land parcels with potentials should be located within the rail transit’ zones of influence, and should maintain convenient, safe and high-quality pedestrian links with rail transit stations in future planning and design processes, so as to ensure that the development and construction of land parcels with potentials can join force with the development and operations of rail transit.

6.2 Functional Positioning

6.2.1 Under the guidance of Topic Study on Urban Development Guided by Rail Transit, the future urban spatial structures, the development directions,
the development sequence, and the development trends of future real estate industry should be analyzed. The lands along rail transit routes are to be divided into different development zones based on different development demands of old and new urban districts, with holistic study on the functions of the districts, so as to further clarify the functional positioning, spatial development gists and conceptual development scope of the zones along rail transit routes.

Figure 6.1 Example of Study on Zone Division and functional positioning along Rail Transit

6.2.2 Based on the comprehensive analyses on the development mode and prospect of rail transit stations, the urban functional positioning of the stations along rail transit routes is to be further clarified, with confirmation of the stations’ respective classification, level and main functions.

6.2.3 The demands by the development of commerce and service sectors on combined effect and economies of scale under market economy conditions
are to be fully considered to reasonably confirm the development demands of rail transit stations’ functions. Specialized development is the emphasis while homogeneous configuration is to be avoided.

6.2.4 The transport service function and service scale of stations along rail transit are to be fully analyzed from the perspective of developing urban and zone-based transport systems, so as to clarify each station’s position in transport development.

![Figure 6.2 Example of Confirming Stations’ Classifications and Main Functions](image)
6.3 Optimization of Route and Station Positions

6.3.1 When conducting optimization of route and station positions, the stability of key anchor points designated in the rail transit network plannings, such as urban transport hubs, commercial service centers, massive residential centers, network transfer nodes etc., should be ensured.

6.3.2 Rail transit routes and stations should be optimized according to distribution of potential customers, land resources available for development, current situation, the characters of planned land utilization etc..

In urban downtown areas, the selection of station sites should ensure that the stations’ core zones have relatively significant needs of rail transit passenger flows.

In city outskirts, the selection of station sites should be consistent with the land utilization plannings of the new districts, and enable the stations’ core zones to have a relatively large number of land parcels with potentials.

6.3.3 Crossroads, public transport interlink points etc. should be given priority to set up rail transit stations with comprehensive consideration of needs of passenger flows, requirements on distance between stations, external transport linkages, speed objectives and other factors.

6.3.4 Protected historical and cultural sites should be avoided by rail transit routes and stations, in order to reduce the risk of damage and interference by rail transit’ construction efforts.

6.3.5 Rail transit routes should be built along roads used for urban life, but should not be built along expressways and main roads.

6.3.6 Rail transit hub stations should be consistent with the functions of urban centers. The distance between municipal commercial centers, municipal business centers and rail transit hub stations should be less than 500m.
6.3.7 Rail transit stations should be closely linked with main railway passenger hubs and coach passenger hubs of the cities, with the distance between them being less than 500m.

6.3.8 Rail transit stations should be as close as possible to urban facilities that attract substantial human flows, such as stadiums, science museums, urban office and commercial core zones, transport hubs of various types etc..

6.3.9 The selection of rail transit routes and stations should follow the principle of function first, and is not advised to solely consider the level of difficulty in project construction, land acquisition, demolition and resettlement. Under proper conditions, it can be considered to set up stations within residential blocks.

6.3.10 It should be subject to evaluation whether the rail transit routes, stations and construction methods are in conflict with big infrastructure, so as to ensure the feasibility of land utilization and construction of the rail transit routes, stations and related facilities.

6.4 Guidance on Land Functions and Construction Intensity

6.4.1 The configuration and adjustment of land functions in the rail transit’ zones of influence should take the organization of urban life as the purpose. The configuration of residential function in the rail transit’ zones of influence should guarantee fair access to commuting for residents of all classes. The rail transit’ zones of influence should preferentially meet the construction needs of indemnificatory housing.

The rail transit stations’ core zones should be given priority to arrange municipal and district commercial service facilities, in order to strengthen the vitality and attractiveness of rail transit stations.

The rail transit stations’ core zones should be given priority to arrange community-level public service facilities, so that the citizens can do shopping, recreation, picking up and delivering children, dining, continuing education and other daily activities in addition to transfers when commuting by rail
transit.

The configuration of various kinds of public facilities, business and service sectors in the rail transit stations’ core zones should be integrated with pedestrian systems, preferentially meeting the needs of rail transit and pedestrian transport users.

6.4.2 Hub stations (Type A) : designated to be integrated urban transport hubs and city portals, whose basic requirements are to guarantee safe and highly efficient transfer for transport within and without cities, and fully serve the cities’ integrated service function.

Functions: on the basis of fulfilling the integrated transport function, comprehensive development is to be encouraged, including commercial, office, meeting, hotel, recreation and other functions. Hub stations located in city downtowns should consider the development mode of urban complex.

Transport facilities: coach stations, bus stops, car parking zones attached to buildings, taxi parking zones, bicycle parking zones and other facilities should be arranged reasonably, so as to guarantee integrated linkage between urban rail transit and out-going transport hubs. Three-dimensional space is to be fully utilized for transport concentration and dispersion. Decentralized evacuation channels are to be provided while large sized squares are to be avoided.

Construction intensity: the principles of intensive land use and convenient transfer should be followed. By coordinating different development and construction entities, the construction intensity in surrounding areas of hub stations should be reasonably decided, and be subject to revisions&verifications according to the capacity of rail transit and ambient transport facilities.

Other factors: density of buildings, ratio of green space and other planning and administrative indices should be decided mainly according to the hub stations’ located areas and the actual needs of urban development in these areas, and should be adjusted through conceptual urban design plans. Mountainous cities should flexibly decide relations between different function units by fully
resorting to terrain features, and adopt flexible approach to calculation methods of building density, floor area ratio and ratio of green space.

6.4.3 Central stations（Type B）: designated to be regional public service centers. The development and construction of urban complex within the rail transit stations’ core zones are to be encouraged. It is encouraged to constitute city downtown areas with multiple central stations.

Functions: primary functions include commerce and service sectors, commercial office, public administration and public service etc.. Apartments and other intensively developed residential functions can be included. The residential development should not exceed 30% of total construction volume. It is encouraged to provide public open space through multiple forms. Scientific, educational, cultural, recreational, sports and other facilities with public welfare characters, as well as government offices, are encouraged to be set up within the complex.

Transport Facilities: central stations in super metropolitan cities are mainly characterized by rail transit and pedestrian transport, and should be augmented by bus stops. When necessary, bus stops can be arranged in urban lands outside road redlines. Central stations in big cities are advised to serve the main transfer hub function for both urban rail transit and public transport.

Construction Intensity:

1）The lower limit for floor area ratio is 6 for lands inside the stations’ core zones in cities with level I route networks, while that for lands inside the stations’ zones of influence is 4.

2）The lower limit for floor area ratio is 5 for lands inside the stations’ core zones in cities with level II route networks, while that for lands inside the stations’ zones of influence is 3.5.

3）If applied to the residential function, the floor area ratio of the residential function parts should still consider the upper limit to guarantee qualified habitat environment.
4) Urban renewal projects in a city’s established districts should comprehensively consider the requirements on transport and environmental capacity to decide actual construction intensity.

5) Mountainous cities can take measures according to local conditions, and further decide actual construction intensity on the basis of secured environmental quality.

Density of buildings: the density of buildings in the stations’ core zones is advised to be 60%~85%.

Ratio of green space: setting up three-dimensional green space is encouraged. The area of three-dimensional green space can be converted into area of green space by certain proportions, thus included into the calculation of green space ratio.

Underground space: the complex is encouraged to utilize underground space to set up underground commerce, recreation and other operative functions.

Parking facilities: relatively tight administrative policies regarding transport needs should be adopted. It is not advised to set up urban public parking zones, while the allowance for parking lots attached to the function units’ buildings should be reduced from the basis of urban allowance.

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>太古汇</td>
<td>74%</td>
</tr>
<tr>
<td>东京六本木</td>
<td>74%</td>
</tr>
<tr>
<td>香港 ICC</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 6.4 Density of Buildings in complexes above related subways

6.4.4 Cluster stations（Type C）: designated to be cluster-level public service centers, as well as life centers and public transport transfer centers for
surrounding communities. The development and construction of complex is encouraged in the core zones of the cluster stations.

Functions: the main functions include commercial and service sectors, public administration and public service, residence etc.. Flexible utilization of three-dimensional space through multiple means is encouraged in the core zones of the rail transit stations. Primary and secondary schools, kindergartens, public medical facilities, cultural facilities, senior nursing facilities, sports facilities and other public service functions that directly serve surrounding communities are to be provided. Also encouraged is flexible utilization of three-dimensional space through multiple means to provide public green space and squares.

Transport facilities: transport facilities should serve as main nodes for transfers between rail transit and community-serving pedestrian, cycling, bus transports. When the conditions of urban land utilization are allowable, it is encouraged to arrange bus hub facility function in the lands used for urban development outside road redlines.

Construction intensity:

6) The lower limit for floor area ratio is normally controlled at 5 for lands inside the stations' core zones in cities with level I route networks, while that for lands inside the stations' zones of influence is generally set at 3.5.

7) The lower limit for floor area ratio is normally controlled at 3 for lands inside the stations' core zones in cities with level II route networks, while that for lands inside the stations' zones of influence is generally set at 2.5.

8) If applied to the residential function, the floor area ratio of the residential function parts should still consider the upper limit to guarantee qualified habitat environment.

9) For stadiums and universities etc. arranged together with cluster stations, the floor area ratio can be decided based on actual conditions.
10) Urban renewal projects in a city’s established districts should comprehensively consider the requirements on transport and environmental capacity to decide actual construction intensity.

11) Mountainous cities can take measures according to local conditions, and further decide actual construction intensity on the basis of secured environmental quality.

Ratio of green space: setting up three-dimensional green space is encouraged. The area of three-dimensional green space can be converted into area of green space by certain proportions, thus included into the calculation of green space ratio.

Underground space: the complex is encouraged to utilize underground space to set up underground commerce, recreation and other operative functions.

6.4.5 Special control stations (Type D): the construction intensity, building density, building heights, ratio of green space etc. should be administrated according to related urban regulations.

6.4.6 Terminal stations (Type E): designated to be public service centers and transfer centers for suburban communities.

Functions: it is encouraged to conduct mixed development together with rolling stock depots in land utilization. Lands with single residential usage in the surrounding areas should be avoided wherever possible.
Figure 6.5 Example of Mixed Development of a Terminal Station and Rolling Stock Depot

Transport facilities: bus hubs, taxi parking zones, bicycle parking zones should be established. P+R parking zones can be arranged for areas outside city downtowns.

Construction intensity:

12) The lower limit for floor area ratio is 2.5 for lands inside the stations’ core zones in cities with level I route networks, while that for lands inside the stations’ zones of influence is 2.

13) The lower limit for floor area ratio is 2 for lands inside the stations’ core zones in cities with level II route networks, while that for lands inside the stations’ zones of influence is 1.5.

14) If applied to the residential function, the floor area ratio of the residential function parts should still consider the upper limit to guarantee qualified habitat environment.

15) Urban renewal projects in a city’s established districts should comprehensively consider the requirements on transport and environmental capacity to decide actual construction intensity.

16) Mountainous cities can take measures according to local conditions, and further decide actual construction intensity on the basis of secured environmental quality.

Ratio of green space: setting up three-dimensional green space is encouraged. The area of three-dimensional green space can be converted into area of green space by certain proportions, thus included into the calculation of green space ratio.

Underground space: it is encouraged to utilize underground space to arrange underground commerce, parking and other functions.

6.4.7 Common stations (Type F): designated to serve urban residential communities or industrial areas with high density employment and strong
Functions: functions are decided according to urban plannings, while mixed development is encouraged.

Construction intensity:

17) The lower limit for floor area ratio is 2.5 for lands inside the stations’ core zones in cities with level I route networks, while that for lands inside the stations’ zones of influence is 2.

18) The lower limit for floor area ratio is 2 for lands inside the stations’ core zones in cities with level II route networks, while that for lands inside the stations’ zones of influence is 1.5.

19) If applied to the residential function, the floor area ratio of the residential function parts should still consider the upper limit to guarantee qualified habitat environment.

20) Urban renewal projects in a city’s established districts should comprehensively consider the requirements on transport and environmental capacity to decide actual construction intensity.

21) Mountainous cities can take measures according to local conditions, and further decide actual construction intensity on the basis of secured environmental quality.

Other factors: administrative requirements such as density of buildings, ratio of green space, public attachments etc. should follow related municipal standards and criteria.

Transport facilities: bicycle parking zones should be set up, while bus transfer stations can be set up if so required.

6.5 Guidance on Planning of Transport Linkage

6.5.1 Planning of road systems in the rail transit’ zones of influence should comply with the following principles:

According to the locations of rail transit routes, the road functions along the rail
transit can be adjusted, verified and confirmed. The passage function should be arranged outside the rail transit stations’ core zones.

Among the horizontal roads positioned vertical to rail transit routes in the rail transit’ zones of influence, the general passage function or concentration/dispersion functions should be arranged with priority. Through these roads and micro-cycling service road systems, safe and smooth linking passages can be provided to vehicles of all types, especially those serving as public transport.

Surface bus systems along rail transit should be optimized. Bus routes parallel to rail transit routes should be properly preserved according to needs, so as to meet the demands of passenger flows with different distances and speeds, and realize the integrated functions of public transport corridors.

The connectivity of branch road network systems in the rail transit’ zones of influence should be enhanced, whose density should reach over 6~8 km/km² theoretically.

Figure 6.6 Improving Branch Road Network System in the Rail Transit's Zone of Influence in combination with Rail Transit Development

6.5.2 The planning of transfer facilities in the rail transit’ zones of influence should comply with the following principles and rules:

The route planning mainly decides the sizes and configurations of transfer facilities for surface buses, cars, bicycles etc. outside road redlines. In later
plannings, if the locations of transfer facilities are adjusted according to actual development needs, in principle it is not advised to relocate them out of their original land parcels. If cross-land parcel adjustments are indeed required, it is not advised to relocate them out of the stations’ core zones.

The sizes and configurations of stations should be decided by comprehensive consideration of general establishment standards and basic sizes, estimated scales of passenger flows for transfers outside stations, administrative policies on transport needs, current statuses of related stations and facilities and the situations of special plannings, as well as land utilization conditions and road conditions near stations. Out of these, the sizes of transfer facilities in hub stations and important stations should be decided through thematic studies.

The establishment standards for out-of-road transfer facilities in different types of stations are shown in Table 6.1.

### Table 6.1 Establishment Standards for Out-of-Road Transfer Facilities

<table>
<thead>
<tr>
<th>Station Types</th>
<th>Type A</th>
<th>Type B</th>
<th>Type C</th>
<th>Type D</th>
<th>Type E</th>
<th>Type F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I A/II A</td>
<td>I B/II B</td>
<td>I C/II C</td>
<td>I D/II D</td>
<td>I E/II E (Downtown)</td>
<td>I E/II E (Outskirt)</td>
</tr>
<tr>
<td>Types of Transfer Facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bus Transfer Stations</td>
<td>★</td>
<td>☆☆☆☆☆</td>
<td>☆☆☆☆☆</td>
<td>☆☆☆☆☆</td>
<td>☆☆☆☆☆</td>
<td>☆☆☆☆☆</td>
</tr>
<tr>
<td>Taxi Parking Zones</td>
<td>★</td>
<td>×××/☆☆</td>
<td>/</td>
<td>☆☆☆☆☆</td>
<td>☆☆☆☆☆</td>
<td>☆☆☆☆☆</td>
</tr>
<tr>
<td>Car Parking Zones</td>
<td>★</td>
<td>×××/☆☆</td>
<td>/</td>
<td>×××☆☆</td>
<td>×××☆☆</td>
<td>☆☆☆☆☆</td>
</tr>
<tr>
<td>Bicycle Parking Zones</td>
<td>☆☆☆☆☆☆☆☆☆☆</td>
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</tr>
</tbody>
</table>

Note: 1. ★ means general establishment, ☆ means optional establishment, / means establishment is not needed usually, × means usually there should be no establishment. Each station should decide on an individual basis according to actual needs, and apply specialized adjustments if needed.

2. Of the car parking zones in this table, those mainly with P+R functions should only be set up in
Regarding general reference values on key indices of size control and facility sizes for transfer facilities in different types of stations, refer to Table 6.2.

### Table 6.2 Reference Values on Control Indices and Facility Sizes for Stations’ Out-of-Road Transfer Facilities

<table>
<thead>
<tr>
<th>Station Types with Different City Levels</th>
<th>General Reference Values on Key Control Indices for Arranging Transfer Facilities</th>
<th>General Reference Values on Facility Sizes for Transfer Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typ e A</td>
<td>The bus transfer station usually has no less than 15 starting channels. Theoretically the get-on/get-off areas for taxi passengers should be separated. The number of get-off lots should be decided by actual conditions, while the number of get-on lots should be generally no less than 10. Usually there should be no more than 200 queue lots. The attached car parking zone usually has no more than 500 parking lots.</td>
<td>The size of the bus transfer station generally should be between 15,000 and 20,000m². The size of get-on and queue areas for taxis usually should not exceed 6000 m². The size of the attached car parking zone usually should not exceed 25,000m², and should be decided according to administrative policies on transport needs.</td>
</tr>
<tr>
<td>II A</td>
<td>The bus transfer station usually has no less than 10 starting channels. Theoretically the get-on/get-off areas for taxi passengers should be separated. The number of get-off lots should be decided by actual conditions, while the number of get-on lots should be generally no less than 6. Usually there should be 100 queue lots. The attached car parking zone usually has no more than 350 parking lots.</td>
<td>The size of the bus transfer station generally should be between 10,000 and 15,000m². The size of get-on and queue areas for taxis usually should be 4000 m². The size of the attached car parking zone usually should not exceed 15,000m², and should be decided according to administrative policies on transport needs.</td>
</tr>
<tr>
<td>Station Types</td>
<td>Station Types with Different City Levels</td>
<td>General Reference Values on Key Control Indices for Arranging Transfer Facilities</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Type B</td>
<td>I B</td>
<td>Usually a bus transfer station with no less than 6 starting channels should be arranged.</td>
</tr>
<tr>
<td>Type B</td>
<td>II B</td>
<td>Usually a bus transfer station with no less than 6 starting channels should be arranged. If bicycle parking zones are needed, parking lots are advised to be arranged in a scattered manner, with a total number of no less than 500 units.</td>
</tr>
<tr>
<td>Type C</td>
<td>I C</td>
<td>If a bus transfer station is needed, generally it should have no less than 6 starting channels. If bicycle parking zones are needed, parking lots are advised to be arranged in a scattered manner, with a total number of no less than 500 units.</td>
</tr>
<tr>
<td>Type C</td>
<td>II C</td>
<td>The bus transfer station usually has no less than 6 starting channels. If a taxi parking zone is needed, it usually constitutes 1 harbor channel and turnaround loop in out-of-road area. The channel should be able to park no less than 5 vehicles. If bicycle parking zones are needed, parking lots are advised to be arranged in a scattered manner, with a total number of no less than 500 units.</td>
</tr>
<tr>
<td>Type D</td>
<td>I D/ II D</td>
<td>To be decided according to special control requirements.</td>
</tr>
<tr>
<td>Station Types</td>
<td>General Reference Values on Key Control Indices for Arranging Transfer Facilities</td>
<td>General Reference Values on Facility Sizes for Transfer Facilities</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td>Type E</td>
<td>Refer to the principles for Type B and Type C.</td>
<td>Refer to the sizes for Type B and Type C.</td>
</tr>
<tr>
<td>I E/II E</td>
<td>Usually a bus transfer station with no less than 8 starting channels should be arranged.</td>
<td>The size of the bus transfer station generally should be no less than 8000 m².</td>
</tr>
<tr>
<td>(Downtown)</td>
<td>If a taxi parking zone is needed, it usually constitutes 1 or 2 harbor channels and turnaround loops in out-of-road area. Each channel should be able to park no less than 5 vehicles.</td>
<td>The size of the taxi parking zone, if needed, should be generally no less than 500 m².</td>
</tr>
<tr>
<td></td>
<td>If the P+R parking function is needed, it is advised to be arranged together with the attached parking zone, generally with no more than 200 parking lots.</td>
<td>If the P+R parking function is needed, it is advised to be arranged together with the attached parking zone, whose size usually does not exceed 6000 m².</td>
</tr>
<tr>
<td></td>
<td>Parking lots in each bicycle parking zone are advised to be arranged in a scattered manner, with a total number of no less than 800 units.</td>
<td>The size of the bicycle parking zone generally should be no less than 1600 m².</td>
</tr>
<tr>
<td>Type F</td>
<td>If a bus transfer station is needed, generally it should have no less than 4 starting channels.</td>
<td>The size of the bus transfer station, if needed, generally should be no less than 4000 m².</td>
</tr>
<tr>
<td>I F/II F</td>
<td>If bicycle parking zones are needed, parking lots are advised to be arranged in a scattered manner, with a total number of no less than 500 units.</td>
<td>If bicycle parking zones are needed, they should be arranged in a scattered manner, with a combined size of no less than 1000 m².</td>
</tr>
</tbody>
</table>

Note: the area sizes in this table refer to floor areas that can fulfill the transport facility function. They do not represent the facilities’ independent occupied areas.

The lands used for transfer facilities should be arranged close to rail transit stations. The priorities for transfers from rail transit should be by succession: pedestrian, bicycles, surface buses, taxis, cars; The distances between
various types of facilities and the entrances&exits of rail transit stations should comply with the following requirements:

22）The pedestrian distances between bicycle parking zones and entrances&exits of rail transit stations should be arranged within 50 m;

23）The pedestrian distances between bus transfer stations and entrances&exits of rail transit stations should be arranged within 150 m;

24）The pedestrian distances between get-on/get-off areas for taxis and entrances&exits of rail transit stations should be arranged within 150 m;

25）The pedestrian distances between car parking zones and entrances&exits of rail transit stations should be arranged within 200 m;

It is encouraged to provide transfer facilities by adopting integrated development and attached establishments, so as to intensively utilize urban lands and shorten transfer distances.

It is not advised to arrange P+R exclusive parking zones at downtown stations. If they are needed at outlying stations, the P+R parking zones are advised to share attached establishments and public parking zones, yet should not independently occupy lands.

6.6 Guidance on Planning of Pedestrian Systems

6.6.1 Rail transit’ zones of influence should plan and construct highly dense and continuous pedestrian systems to integrate surrounding commercial and service facilities, green space, squares etc., as well as to promote convenient concentration and dispersion of rail transit, expand service coverage of rail transit stations, and enhance the quality of urban public space.

6.6.2 The pedestrian systems in the rail transit’ zones of influence should meet using needs 24 hours per day.
6.6.3 The planning contents of pedestrian systems in the rail transit’ zones of influence should be reflected as urban design and administrative conditions for the land parcels.

6.6.4 The density of pedestrian road networks in the rail transit’ zones of influence is advised to be twice that of the motor vehicle road networks. The widths of walking space in independently established pedestrian roads generally should be greater than 3 m.

Note: the blue lines in the picture represent inter-connected pedestrian and cycling roads, while the yellow lines represent roads for motor vehicles.

Figure 6.7 Structure of road networks in the rail transit station’s zone of influence

6.6.5 In the commercial and business core zones, it is encouraged to form pedestrian areas separated from motor vehicles through three-dimensional street-crossing facilities. Entrances and exits for motor vehicles of land-occupying units should be merged and reduced in pedestrian areas.
Figure 6.8 Establishing underpasses to cross streets, and serving neighboring blocks in combination with underground commercial development.

6.6.6 It is encouraged to plan green channel systems to connect residential community-level public buildings, lands used by primary and secondary schools, commercial facilities, parks and green space, so as to form pedestrian areas with environment as the priority.

6.6.7 In established districts, it is encouraged to work in connection with internal renovations of enclosed yards and large residential areas to increase pedestrian passages, entrances and exits, thus improving the density of pedestrian systems.

6.6.8 The guidance on planning of public pedestrian systems for various types of rail transit stations should comply with the following principles:

Hub stations（Type A）.

26）May establish three-dimensional transfer platforms, transfer halls or
squares to connect entrances & exits of rail transit stations and those of out-going transport forms.

27) Should make predictions according to transport needs, provide public channels for transfers between rail transit stations and other forms of transport, so as to establish convenient multi-way transfer systems; the transfer space should realize all-day-round service, separation of pedestrians and vehicles, and barrier-free service.

28) It is encouraged to set up pedestrian passages spanning across railway routes to connect transport functions and public space at both sides of the routes.

![Figure 6.9 Transport facilities at both sides of the railway station and surrounding areas are connected by public corridors to realize multi-way transfer.](image)

Central stations (Type B).

29) It is encouraged to plan and establish integrated three-dimensional public pedestrian systems, which can simultaneously enable easy
transfers and expand the service coverage of rail transit.

30) When station clusters are formed in core areas of cities, underpasses and underground streets should be established between stations, which can form continuous commercial pedestrian systems together with commercial development, and realize transfers between multiple stations.

31) In other urban areas, it is encouraged to combine station and commercial developments to build underground pedestrian systems for street-crossing, thus extending rail transit services to neighboring blocks.

32) Together with the rail transit' zones of influence, it is encouraged to develop and set up 2nd floor catwalk systems to cross urban roads, which can extend rail transit’ service coverage; when establishing the 2nd floor catwalk systems, the integrity and accessibility of on-the-ground pedestrian systems should be guaranteed.

Figure 6.10 Extending rail transit stations’ service coverage together with development of underground streets between stations.
Figure 6.11 Constructing catwalks on 2nd floors to extend rail transit stations’ service coverage and optimize pedestrian environment.

Cluster stations (Type C).

33) It is encouraged to set up three-dimensional pedestrian systems according to the directions of major concentration and dispersion of passenger flows, with the rail transit stations as the core, in order to connect the entrances and exits of the stations and main ambient buildings. In combination with these systems, three-dimensional street-crossing pedestrian facilities should be set up at the intersections of major roads.

34) It is encouraged to properly arrange commercial service facilities that serve clusters alongside the three-dimensional pedestrian systems.
Figure 6.12 Example of mainstay pedestrian systems near a cluster station.

Special control stations (Type D). It is suggested to set up pedestrian systems together with green channels, and guide area-based activities to preferentially utilize rail transit as the means of transport for arrivals and departures.

Terminal stations (Type E). It is suggested to work together with surface building development, and connect surface building platforms or transfer platforms through connection portals of pedestrian corridors. On the basis of this, entrances and exits connecting stations and ambient communities, transfer points and outskirts can be arranged.
Common stations (Type F). It is encouraged to establish pedestrian catwalks on 2nd floors so as to extend service coverage. By setting up continuous pedestrian passages on 2nd floors, underpasses etc. to connect buildings and transfer facilities, together with the establishment of green channels, the coziness and safety of pedestrian systems can be enhanced.

6.7 Administration of Rail Transit Facilities and Lands for Rail Transit Routes

6.7.1 The optimization of routes and constructing methods should comply with the following principles:

The directions of routes should give priority to realize urban functions and meet the needs of rail transit passenger flows. Inchoate, short-term and long-term operational demands of the routes should be fully considered, instead of only considering the level of difficulty in construction, demolition and relocation.

The directions of routes should avoid environmentally sensitive areas and protected historical sites. If these can not be avoided, then they should be
subject to specific assessments and related protective measures.

The directions of routes should avoid large-scale housing demolition and relocation, fulfill the needs of environmental protection and integrate with ambient scenery.

The constructing methods of routes should be linked with the integrated development and utilization of urban space, while coordinating the elevation relations between rail transit space and linked external space.

The construction of routes should make effective utilization of investments, and control construction costs. It is encouraged to adopt new techniques to lower noises and vibrations of rail transit, and scientifically decide the construction ratios of underground routes, ground routes and elevated routes so as to intensively utilize land resources.

6.7.2 The administration on land utilization of rail transit stations should meet the following demands:

For rail transit stations located in newly developed urban areas, in connection with the planning of land utilization near the stations, lands used for entrances, exits and ventilating pavilions of the stations within road redlines and surrounding areas should be respectively allocated in advance. The entrances, exits and ventilating pavilions of the stations should comply with local urban planning and administrative authorities’ regulations on setbacks; when the conditions are satisfying, it is advised to arrange them together with buildings.

For transfer stations, it should be taken into consideration to shorten pedestrian distances for transfers when utilizing lands in controlled stations. Under the circumstances of dense stations in urban downtowns, it should be considered to establish pedestrian systems inside rail transit pay zones, as well as about the possibility to link multiple stations’ halls together.

6.7.3 The planning and land utilization control of train depots and parking zones should comply with the following demands:

The selection of train depot sites should comprehensively consider the
demands on the functions of planned urban land use and the features of rail transit systems to ensure operational efficiency. The site selection ad land utilization of train maintenance bases, train depots and parking zones are to be planned and realized from the perspectives of networked operations and resource-sharing.

The principle of intensive land utilization should be realized. Scale-downs on train depots should be conducted from the aspects of enhancing technical levels and optimizing structural selection etc..

Integrated utilization of urban space should be conducted by making full use of the train depots, so as to realize land saving, energy efficiency, environmental protection and sustainable development. Based on the development status and planning for surrounding areas of the train depots, the development planning for surface buildings above the train depots should be conducted in a pertinent manner to ensure proper development of the surface buildings.

6.7.4 The site selection and land utilization for connecting lines (联络线) and turn lines in front of or behind stations（站前站后折返线）should be planned and executed. It is encouraged to share resources and intensively utilize land resources; when the conditions are feasible, it is advised to prepare in advance the conditions for integrated development of them and their surrounding space.

6.7.5 The administration of land utilization by main electrical substations should comply with the following principles:

The site selection of main electrical substations and branches should follow the principles of “power supply first” and “nearby power supply”, secure double power sources and power supply corridors, and stay close to designated power supply points and nodes of rail transit networks in urban planning, so as to facilitate multi-line usage.

The usable areas of electrical substations and branches, as well as the their locations, should be decided according to volumes and methods of establishment.
In sensitive scenic regions, the electrical substations and branches should be designed as underground establishments or joint establishments with surrounding buildings.

6.7.6 The functional demands of other manufacturing facilities such as whole network control centers, operation control centers, whole network logistical allocation centers (including materials warehouses) etc. should be comprehensively considered.

**6.8 Administration of Utility Pipeline Planning**

6.8.1 When conducting route planning, the planning on utility pipe networks, utility tunnels and underground space should proceed simultaneously.

6.8.2 It is encouraged to plan and set up utility tunnels in connection with planning along rail transit. Of the utility pipelines lying parallel to rail transit routes, those with feasibility should be all included into the utility tunnels. As for the utility pipelines lying vertical to rail transit routes, it is advised to set up utility tunnels with lengths of no less than 100m at their junctions with rail transit routes.

6.8.3 Utility pipe networks should avoid development of rail transit routes and stations’ underground space.

Main utility pipeline corridors (especially gravity flow conduits whose buried depths are greater than 4m) and rail transit routes are advised to be arranged on different roads.

The roads along rail transit are advised to be placed on regional heights to enable rainwater on the roads above the rail transit to be discharged to neighboring roads, so as to eliminate the need of deep rainwater pipelines for the roads along rail transit.
Figure 6.15 Demonstration of the relations between a rail transit route and utility pipelines

Rail transit routes and overhead high voltage transmission line corridors should avoid each other, so that the high voltage transmission lines will not affect the arrangement of entrances&exits of stations and construction efforts of rail transit routes.

Pipelines lying vertical to a rail transit route with buried depths of greater than 5m are advised to avoid the intersections where the rail transit stations are located, instead choosing lying vertical to the intervals of the rail transit route.

The buried depths of pipelines vertically crossing with rail transit routes' intervals are not advised to exceed 10 m. For pipelines whose buried depths are greater than 10m, detailed designs on interval and pipeline elevation nodes (区间与管线标高节点) are required. The results of the design efforts require signatures by both the rail transit authorities and pipeline planners.

Pipelines lying vertical to transfer stations with buried depths of greater than 3m require simultaneous study on the relations between pipelines and the transfer line's one station&two intervals (换乘线一站两区间).
7 Guidance on Station Planning and Design

7.1 Planning on Coordination of Functions

7.1.1 Functional consistency: the functional planning of rail transit stations' core zones should be consistent with the contents regarding functional positioning in the Adjustment and Planning of Land Utilization along Rail Transit, and should comply with its compulsory items about arrangements for public and transport facilities.

7.1.2 Operational planning: the commercial functions, development scopes and functional proportions in the rail transit stations’ core zones should be decided through detailed industrial analyses and planning as well as analyses on related investment and financing, after having considered the investment and financing mechanisms for urban rail transit development and administration in the concerned cities as well as any override planning. Table 7.1 provides the operational matching degrees for different types of stations.

Table 7.1 The Function-Operation Matching Degrees of Different Types of Stations

<table>
<thead>
<tr>
<th>Station Types</th>
<th>Types of Operation and Matching Degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transp</td>
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<tr>
<td>Type A</td>
<td>Hub</td>
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<tr>
<td>Stations</td>
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<tr>
<td>Type B</td>
<td>Central</td>
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<tr>
<td>Stations</td>
<td></td>
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<tr>
<td>Type C</td>
<td>Cluster</td>
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<td>Type D</td>
<td>Special</td>
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<td>Control Stations</td>
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<td>Type E</td>
<td>Terminal Stations</td>
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<td>-------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Type F</td>
<td>Common Stations</td>
</tr>
</tbody>
</table>

Note: bigger numbers suggest greater matching degrees.

7.1.3 Construction intensity: the construction intensity of rail transit stations’ core zones and land parcels with potentials related to financing for rail transit construction should be decided through detailed investment and financing calculations; the construction intensity of other land parcels within rail transit’ zones of influence should be consistent with the Adjustment and Planning of Land Utilization along Rail Transit; the holistic construction intensity in a region should be subject to revisions&verifications based on the result of assessment on the impact of regional transport.

7.1.4 Mixture of functions: reasonable mixture of functions is encouraged in rail transit stations’ core zones so as to guarantee 24 hours of vitality in station areas.

7.1.5 Level-based control: given the needs to identify ownerships and process planning procedures by each level, detailed rules should be provided in a level- and region-based manner regarding the functions and operational configurations of rail transit stations’ core zones. The requirement on time sequence should be fully considered, in order to provide guidance on level-based development.

Public space mainly serving pedestrian concentration&dispersion and transfer function should be arranged consistently on ground floor, B1 and B2 floors, and 2nd floor based on the development needs of stations. Barrier-free design standards should be adopted, while integrated vertical transport systems should be established.

Transfer stations linked with rail transit should be arranged on ground floor, B1 floor or 2nd floor. Fast and convenient transfer can be realized through vertical transport.
Commerce together with public facilities, underground space and transfer space should be arranged from B2 floor up to 4th floor; it is encouraged to arrange underground commercial service facilities in combination with rail transit stations and surrounding functions. Hotels, offices and other space that require relatively tranquil environment are advised to be arranged on 3rd floor or above.

Cultural and recreational facilities, sports facilities, educational facilities and their attached open space which are in service of communities can be arranged from B2 floor up to 4th floor on the basis of fulfilling usage demands.

Primary and secondary schools, senior nursing facilities and their attached open space can be arranged from ground floor up to 4th floor on the basis of fulfilling usage demands.

Parking facilities are advised to be arranged on B2 floor or below.

Figure 7.1 Level-based vertical demonstration of the functions in a rail transit station’s core zone

7.2 Guidance on Integrated Organization of Space
7.2.1 The organization of space for rail transit stations’ core zones should regard the stations as the core, while surrounding development projects should establish spatial connections with rail transit stations with priority. Rail transit are to become the first means of transport to reach surrounding functions with convenient and comfortable spatial arrangements.

7.2.2 Land parcels inside rail transit stations’ core zones directly neighboring the stations should be considered the keys of the integrated organization of space. Their organization of space should fully consider the usage demands and administrative demands by different ownership entities. Ownership boundaries and administrative boundaries should be clarified in different elevation spaces, while the linkage demands of different ownership spaces should also be identified.

7.2.3 The organization of space in different types of stations is advised to take the following approaches:

Hub stations: it is encouraged to arrange public open space like squares, atrium, sunken squares or elevated platforms etc. in connection with the transfer function, so as to adapt to the function of concentration&dispersion of massive passenger flows in a short time.

Central stations, cluster stations: it is encouraged to arrange public space like atrium, sunken squares or elevated platforms etc. in connection with rail transit stations, so as to serve as the visual center of spatial organization and increase the radiated attractiveness of rail transit stations to surrounding areas.
Figure 7.2 Forming a public center through elevated platforms

Special stations: spatial structures are to be organized according to the demands of holistic spatial organization for the bases.

Terminal stations: it is encouraged to use the stations as the visual centers of spatial organization. Through the arrangements of green space, green channels and open space with reasonable scales, the stations and the development space for surface buildings above train depots can be closely linked. Three-dimensional configurations are to be adopted to separate pedestrians from vehicles, while the relations between transfers and concentrated & dispersed transports for surface building development should be properly handled.
Figure 7.3 Three-dimensional Configuration that separates pedestrians from vehicles is encouraged.

Common stations: it is encouraged to utilize linear pedestrian routes to connect the stations’ ambient functions, integrate transfer facilities, and extend the stations’ commercial service interfaces, so as to create all-weather, highly qualified pedestrian space.

Figure 7.4 Extending service interface through linear space

### 7.3 Guidance on Design of Transport Linkage

7.3.1 Complete pedestrian and cycling lanes should be attached to primary and secondary trunk roads as well as branch roads inside the core zones of rail transit stations. The single-side respective widths of the pedestrian and cycling lanes are not advised to be less than 3 m.

7.3.2 Street-crossing facilities for pedestrians and bicycles within the rail transit stations’ core zones are advised to be arranged at intervals no longer than 200m. Even with the three-dimensional street-crossing passages, means of surface crossing should still be ensured. Where the lengths of zebra lines exceed 16m, refuge islands should be established for street-crossing.
pedestrians.

7.3.3 Cycling lanes and motor vehicle lanes should be physically separated inside the rail transit stations’ zones of influence, while non-continuous physical separation can be adopted on the branch roads.

7.3.4 The arrangements of transfer facilities in the rail transit stations should comply with the following principles:

Transfer facilities should be reasonably configured in coordination with station designs, so as to ensure the total transfer time is within rational scopes. Where pedestrian distances are too long, automatic passenger conveyors and escalators can be established.

Transfer-induced streamlines should be comprehensively considered from the aspects of time, space and administration in order to mitigate conflicts between passenger flows and vehicle flows, and reduce mutual interference between different motor vehicle streamlines. This together with reasonable configuration of stations can ensure formation of smooth transport streamlines.

The transfer distances of various means of transport should comply with the regulations in 6.5.2-5.

7.3.5 The planning and design of bicycle parking facilities should comply with the following principles and requirements:

Bicycle parking zones should follow the principle of mixing scattered and concentrated configurations based on the characteristics of customers and land utilization conditions. Bicycle parking zones with concentrated configuration should be equipped with pedestrian corridors for transfer.

Bicycle parking zones can be established on the outer sides of pedestrian pavements or greenbelts, but occupation of road space by bicycle parking should be avoided.

Attached establishments should be increased in connection with ambient
building development, or bicycle parking zones can be configured by utilizing rail transit stations and facilities. Bus stops and buildings should set up bicycle parking facilities in close proximity.

For stations located near residential communities, it is advised to subject the station- and community-based bicycle lane systems, transfer-based bicycle parking zones and community parking areas to integrated planning.

Cities with public bicycle systems are advised to preferentially provide services inside rail transit stations’ core zones. When setting up public bicycle renting points near stations, the transfer-based bicycle parking zones are advised to be integrated into public bicycle parking zones.

![Figure 7.5 Examples of cycling parking zone arrangements](image)

### 7.3.6 The planning and design of bus transfer stations should comply with the following principles and requirements:

Bus transfer stations should be equipped with functional spaces for bus starting, bus stopping, passenger get-on and get-off, transfer, operation control&management etc..

The ways of vehicle parking in the parking lots inside bus transfer stations can adopt parallel parking and parastichy parking, while the general distribution usually can adopt linear type, sawtooth type, parastichy type, central split island type (中间分割岛式) etc..
In bus transfer stations, the entrances & exits for pedestrians should be separately arranged from those for vehicles. Pedestrian entrances & exits should be connected with the squares in front of rail transit stations or pedestrian pavements, whose widths should be consistent with those of pedestrian transport facilities. Inside the stations pedestrians are to be separated from vehicles whereas possible.

The entrances and exits of bus transfer stations should be set on secondary trunk roads or branch roads, while avoiding zebra lines, bus stops and approach roads of bridges and tunnels.

Special-purpose lanes or signals for preferential passage should be provided whereas possible to vehicles entering and leaving bus transfer stations.

Vertical control requirements should be noted for site configuration, the slopes etc. of entrances and exits should meet the requirements in related standards. Rubble pavings or other anti-slippery materials are to be used on the surfaces.

Bus transfer stations generally should adopt open or semi-open sites. For bus transfer stations arranged in combination with buildings, the spatial heights generally should be more than 5m, while ventilation facilities for eradicating pollution of bus exhaust should be fully considered. It is encouraged to introduce natural lighting into the transfer core zones by building designs.

Small sized bus transfer stations should be arranged by fully utilizing block space or ambient branch roads.

7.3.7 The configuration of transfer facilities and traffic organization for taxis should comply with the following principles and requirements:

The vehicle entrances & exits of taxi transfer facilities are advised to be arranged on secondary trunk roads or branch roads, while impact on road traffic by vehicle entries and exits should be reduced as much as possible; special pedestrian passages connecting with rail transit stations are advised to be arranged when there are massive transfer-induced passenger flows.

Taxi transfer facilities can be arranged by utilizing sunken space in connection
with comprehensive development, or the three-dimensional configuration can be adopted to arrange taxi transfer facilities beneath bus stops, thus forming three-dimensional transfer.

7.3.8 The configuration of parking zones and traffic organization for cars should comply with the following principles and requirements:

Three-dimensional configuration in combination with other station facilities and space should be conducted whereas possible.

It is advised to set up pedestrian passages to connect with parking zones and entrances&exits of rail transit stations.

Parking lanes inside parking zones should face stations’ entrances&exits. Pedestrian safety within parking zones should be guaranteed. Parking lanes in the parking zones should be able to accommodate two-way traffic.

The numbers of entrances&exits for parking zones should be consistent with related standards and design requirements on entry&exit. Clustered entry and exit activities on a single road should be avoided. Main pedestrian entrances&exits as well as passages should be separated from those for cars. Surface vehicle flows such as buses, taxis etc. should also be separated from to avoid crossed streamlines whereas possible.

Enough space for vehicle queues should be provided at the entrances&exits of parking zones. Reversible lanes can be set up to meet demands from different directions during morning and evening rush hours.

7.3.9 The configuration of temporary parking facilities should comply with the following principles and requirements:

Temporary parking facilities refer to various types of transfer facilities located inside road redlines and configured by utilizing roadside space, including bus stops, temporary taxi parking points and temporary car parking points.

The configuration of temporary parking facilities should emphasize the safety and convenience of pedestrians. Passenger get-on and get-off areas should
be arranged whereas possible in locations where there is no need for passengers to cross vehicle lanes to reach. The net widths of pedestrian space in the get-on and get-off areas should comply with related standards and the needs to maintain smooth pedestrian passage.

The transport streamlines of temporary parking points should be subject to unified planning, in order to mitigate mutual interference with motor vehicle transport; temporary parking points are advised to adopt the harbor shape to lower impact on other vehicles’ passage; the distances between entrances&exits of temporary parking points and intersections as well as other relations should be consistent with the requirements set in related standards; the number of parking lots in a temporary parking point should be decided based on comprehensive consideration of calculation results for passenger flows and commonly arranged numbers.

The pedestrian distances between bus stops and entrances&exits of rail transit stations are advised to be arranged at 50-100 m; normally 3 parking lots are to be set up for each bus stop. For bus stops with significant passenger flows or many bus routes, it is advised to divide the bus stop platforms, or adopt deep harbor-shaped bus stops etc..

Figure 7.6 It is encouraged to configure bus stops together with building sites to shorten transfer distances.

Temporary parking points for taxis and cars can be integrated, and should be separately arranged from bus stops. They are advised to be set up at least 50m away from bus stops. In case of mutual interference, bus stops would be given priority in configuration.
Clear signs are required at places where pedestrians inevitably need to cross bus lanes, while zebra lines are to be arranged at the end of bus stops.

For rail transit hub stations and out-going urban passenger stations whose entrances and exits adopt separated arrangements, the bus stops need to set up passenger get-on and get-off areas. Bus lanes passing station interiors should adopt one-way or special purpose lanes whereas possible. Temporary parking needs of taxis and cars should be arranged inside stations. Only under limited space can passenger get-on and get-off areas be arranged in surrounding roads.

7.4 Guidance on Design of Pedestrian Space

7.4.1 The designed coverage of pedestrian systems should be expanded to a rail transit station’s core zone entirely.

Figure 7.7 Designed coverage of pedestrian systems should be expanded to rail transit stations’ core zones

7.4.2 Pedestrian flow charts should be drawn for rail transit stations’ core zones. The transitional relations between pedestrian spaces on different elevations should be clearly demonstrated. The scope of 24/7 pedestrian space should be clarified to serve as the guiding reference to decide administrative conditions for land parcel development.

7.4.3 The design of pedestrian systems in rail transit stations’ core zones
should clarify the widths, heights, elevations and set-up methods of pedestrian street-crossing facilities.

7.4.4 The design of pedestrian systems in rail transit stations’ core zones should be integrated into the design of transfer facilities and surrounding buildings in order to facilitate the linkage between pedestrian systems and rail transit stations and avoid detours by pedestrians.

Figure 7.8 The linkage between pedestrian systems and rail transit stations should be as convenient as possible

7.4.5 The design of pedestrian systems in rail transit stations’ core zones should separate pedestrians from motor vehicles, and work in connection with public space to comprehensively consider the arrangements of shading and rain shelter facilities, street furnitures, pavements, signs etc., in order to guarantee the environmental quality of pedestrian space and meet the needs on all-weather usage.
Figure 7.9 Ground or elevated pedestrian passages are advised to be equipped with rain shelter to meet the needs on all-weather usage.

7.4.6 Enclosed courtyards and green space should be opened up whereas possible so as to avoid forming spatial barriers for pedestrians to enter and exit rail transit stations, thus enabling pedestrians to reach the stations by the shortest routes.

7.4.7 All pedestrian pavements should maintain smooth, continuous and barrier-free surface. Slopes are to be utilized in case of elevation difference.

Rail transit stations’ core zones should reduce the curb stone’s turning radius based on local conditions. At intersections with bicycle lanes, the radius of curb stones can be 5 m; at intersections without bicycle lanes, the radius of curb stones should be no bigger than 10 m.

Figure 7.10 Big curb stone radius is changed into small curb stone radius.

There should be a curb stone slope for every zebra line within rail transit.
stations’ core zones.

Figure 7.11 Every zebra line has a curb stone slope

Vertical curb stone slopes are to be preferentially adopted at zebra lines (the direction of the slope lies vertical to the curb stones). At places with narrow pedestrian pavements, parallel curb stone slopes can be adopted (the direction of the slope runs parallel to the curb stones). Where the elevation difference between pedestrian pavements and motor vehicle roads exceeds 15cm, the road sections close to intersections should be subject to flattening and slope easement works in advance.
a) Vertical curb stone slope                             b) Parallel curb stone slope

Figure 7.12 Basic forms of curb stone slopes

The elevation of pavements at entrances & exits for motor vehicles should stay unchanged, while adopting differentiated pavement forms as a reminder. Curb stone slopes are advised to be arranged inside facility space.

Figure 7.13 Proper handling of entrances & exits for motor vehicles

If the lengths of zebra lines exceed 16 m, or there is a need to enhance crossing safety at zebra lines shorter than 16 m, refuge islands should be established in the middle of zebra lines. Multiple refuge islands can be arranged if feasible.

Figure 7.14 Examples of refuge islands

7.4.8 The design of pedestrian space inside rail transit stations’ core zones should comply with the following requirements:

a) Arrangement of a refuge island by using traffic installations separating motor and non-motor vehicles                             b) Tilted refuge islands

Figure 7.14 Examples of refuge islands
If a station’s entrances and exits are arranged on branch roads or small alleys, the said branch roads or alleys should be renovated into shared pedestrian roads whereas possible. If the entrances and exits are arranged inside the road redlines of secondary trunk roads or roads of higher levels, the widths of pavements on the main roads connecting with the entrances&exits should be no less than 5 m. Pavement spaces are not advised to be occupied to arrange transfer facilities or commercial stands.

The structural heights of pedestrian spaces inside transport facilities usually should be set at over 5m. Visual openness and easiness of direction identification are to be guaranteed provided ventilation and other equipments can be arranged.

During transfers between rail transit stations and out-going transport hubs or bus stations, pedestrian passages should connect with passenger service halls of said out-going transport facilities or bus stations whereas possible. Pedestrians should be kept clear of motor vehicles. The widths of transfer passages are not advised to be less than 10 m. Vehicle exhaust-induced pollutions should be contained by fully considering the utilization of air exhausting facilities, shielded gates etc..

During transfers between rail transit stations and bus stops, pedestrian systems should be convenient, smooth and highly instructive. Multi-direction spatial connection by several passages should be avoided whereas possible. It is encouraged to use three-dimensional transfers to enhance transfer efficiency. The widths of transfer passages should be 3m, based on calculations of 5000 people/mh for one-way traffic and 4000 people/mh for two-way traffic.

Rail transit stations with excessive passenger flows are encouraged to adopt transfer halls to organize pedestrian transfer systems. The usage area of a transfer hall should be calculated by the highest number of gathered passengers, each person should have no less than 2 m². The spatial heights of transfer halls are advised to be over 5 m.

**7.5 Guidance on Design of Entrances and Exits of Rail Transit Stations**
7.5.1 The designed coverage of rail transit stations’ entrances&exits should be extended to entire core zones of the rail transit stations.

Figure 7.15 The designed coverage of entrances&exits of a rail transit station should be extended to its entire core zone

7.5.2 Rail transit stations should increase the number of entrances&exits as many as possible in order to establish integrated connection with ambient roads, buildings and public space.

Figure 7.16 Increasing the number of entrances and exits in a rail transit station
7.5.3 The entrances and exits of a rail transit station should be arranged in full connection with surrounding branch roads. It is advised that every branch road in the station’s core zone should have entrances&exits directly connecting with it.

Figure 7.17 Arrangement of entrances&exits of a rail transit station by a branch road

7.5.4 Rail transit stations’ entrances&exits should be closely linked to ambient buildings.

For the newly constructed buildings with underground commercial functions in rail transit stations’ core zones, theoretically there should be entrances&exits to directly connect with the buildings’ underground space. When constructing rail transit stations in established areas, renovations should be implemented to enable rail transit stations’ entrances&exits to directly connect with the original underground commercial spaces in the core zones.
Figure 7.18 Connecting a rail transit station’s hall level with underground spaces developed by proprietors at both sides of the road

Figure 7.19 Connecting underground spaces developed by the rail transit station and proprietors through extended entrances&exits

Figure 7.20 Improving spaces and optimizing connection by adjusting linkage methods

Entrances&exits of rail transit stations should be arranged within land redlines
whereas possible, so as to avoid occupying pedestrian space inside road redlines. It is encouraged to design entrances&exits of stations together with ambient buildings and consider building design plans in an unified manner.

Figure 7.21 Entrances&exits of a rail transit station are arranged together with buildings

If rail transit stations are directly linked to buildings, actual administrative conditions in nearby communities should be fully considered. The requirements on evacuation should be fulfilled. Auxiliary entrances&exits directly linked to surface should be arranged near entrances&exits of rail transit stations.

7.5.5 The arrangements of rail transit stations’ entrances&exits should be subject to integrated design with public space.

If there are trestle bridges, water bodies and other surface barriers between rail transit stations and urban functions, the passages for entering&exiting the stations should be lengthened, while entrances&exits should be increased to stride over barriers, so as to provide passengers with comfortable environment where pedestrians are separated from motor vehicles.
Figure 7.22 Entrances&exits of a station should stride over barriers such as the expressway to connect various urban functions

The requirements on environmental sceneries and ecological protection of surrounding areas should be met, thus continuing the original structures and historical heritages of the areas.

Excessively close proximity to key sceneries and places with dense people gatherings should be avoided whereas possible. In connection with surrounding open space and ecological green space, squares in front of stations can be arranged based on local conditions in order to guide crowds to evacuate easily and speedily.
Figure 7.23 Entrances&exits of a rail transit station can simultaneously connect buildings and public space such as sunken squares.

Figure 7.24 Rail transit stations should be subject to integrated design with public space.

7.5.6 Entrances&exits of rail transit stations should preferentially guarantee convenient transfers with transport facilities such as surface buses. Continuous pedestrian passages and clear transport guiding signs are to be set up.
7.5.7 The minimum widths for entrances&exits of rail transit stations should be no less than 2.5 m, while eye-catching, unified rail transit signs are to be set up. If the lengths of underground passages for entering&exiting stations exceed 100 m, necessary fire evacuation measures should be introduced. Automatic passenger conveyors are to be established when feasible.

7.5.8 If the entrances&exits of rail transit stations are serving as pedestrian underpasses at the same time, the width design for corresponding parts of the passages and station halls should also take into consider the number of street-crossing passengers, and should establish barrier facilities needed after cessation of rail transit operations at night.

7.6 Integrated Administration of Underground Space

7.6.1 In the phase of integrated design of rail transit stations, the planning on underground space should be conducted simultaneously. Integrated design is to be conducted on rail transit stations, commercial development, utility pipelines, underpasses etc.. The size and construction sequence of underground space should be decided, as should the areas designated mainly for commercial development. The design results should be included into the planning&administrative conditions during land transactions.

7.6.2 Concurrent design and construction of rail transit routes and underground utility tunnels are encouraged.

Utility tunnels located in the parallel segments of rail transit space are advised to be arranged beneath non-motor vehicle lanes at one side of the rail transit, so as to facilitate the arrangements of access openings, air exits, feeder noses etc. by utilizing the greenbelts.
Utility tunnels located in the parallel segments between rail transit stations are advised to be arranged beneath non-motor vehicle lanes at one side of the rail transit. In case of concurrent development of a utility tunnel and a rail transit, the utilization of spaces above entry&exit passages can be considered, but air ducts and underground development should be avoided. If a utility tunnel and a rail transit can not be developed concurrently, the said utility tunnel can be arranged beneath entry&exit passages, while the rail transit's structural design should conduct structural reinforcements or preservations at related locations.
Figure 7.27 Demonstration of positioning relations in non-concurrent development of a utility tunnel and a rail transit

7.6.3 If gravity flow pipelines can not evade rail transit routes, while the elevation is in conflict with entrances&exits of rail transit stations and development space, the gravity flows can take a detour to avoid the entrances&exits of rail transit stations and ventilation pavilions. The lands used for detour should be subject to preliminary planning and administration as utility lands. Meanwhile, one side of the stations are to be considered as concentrated pipeline area, leaving the other side for ventilation pavilions and development of underground space.

Figure 7.2 Demonstration of positioning relations between gravity flow pipelines and a rail transit station

7.6.4 For rail transit stations not designated for major development, pipelines
whose buried depths exceed 3m are not advised to be planned above main structures of the stations (including the areas within 5m from each side of a station). Pipelines whose buried depths exceed 4.5m are not advised to be planned between the main structures of stations and entrances&exits (ventilation pavilions).

Figure 7.29 Cross-section demonstration of utility pipelines and a rail transit station
8 Implementation Mechanisms

8.1 Suggestions on Plan Compiling Procedures

8.1.1 When compiling general urban plans, cities should conduct studies, revisions&verifications on urban structures, functional configurations, construction intensity etc. in connection with the plannings on urban rail transit route networks. The contents and depths of the said studies, revisions&verifications should refer to chapter 5 of this Guide: Guidance on Urban Planning, and complete the Topic Study on Urban Development Guided by Rail Transit. The various contents of urban planning in it should be included into the results of general urban planning. For those without compiled plannings on urban rail transit route networks, it is advised to commence the compiling efforts of the plannings on urban rail transit route networks simultaneously with general urban plannings. If the plannings on urban rail transit route networks are to be compiled alone, then the Topic Study on Urban Development Guided by Rail Transit should be compiled concurrently.

8.1.2 In the compiling phase of the Planning on Short Term Development of Rail Transit, the Topic Study on Urban Development Guided by Rail Transit should be used as a reference, while the Adjustment and Planning of Land Utilization along Rail Transit is to commence concurrently, whose planning depth should refer to chapter 6 of this Guide: Guidance on Route Planning, with the results included into the compiling or revise of related administrative detailed planning to be realized.

8.1.3 In the compiling phase of the Feasibility Study on Rail Transit Project, the Adjustment and Planning of Land Utilization along Rail Transit is to be used as a reference. At the same time, the Integrated Planning and Design of the Rail Transit Station should be compiled for every station along rail transit, whose planning depth should refer to chapter 7 of this Guide: Guidance on Station Planning and Design. The main purpose is to clarify the three-dimensional linking relations between rail transit and surrounding community development,
transfer space and urban space, so as to provide detailed planning and administrative conditions to land utilization and development in related areas as well as to provide guidance to the compiling of related constructive detailed planning.

8.1.4 The relations between the *Topic Study on Urban Development Guided by Rail Transit*, the *Adjustment and Planning of Land Utilization along Rail Transit* and the *Integrated Planning and Design of the Rail Transit Station* are of level-based progression. When compiling the next level planning, the results of the last level planning should be subject to assessments and feedbacks. If the last level planning is missing, then supplementary compiling should be conducted based on current situations.

8.2 Suggestions on Plan Administration Procedures

8.2.1 In the process of general urban planning, the various adjustments on functions and configurations, such as planning of new districts, planning on urban transport hubs, site selection for massive high-intensity development projects etc., should be subject to revisions & verifications according to the planning on rail transit route networks. The *Topic Study on Urban Development Guided by Rail Transit* is to be subject to adjustments and revisions organized by governing bodies on urban planning. If needed, adjustments on the compiling of the planning on rail transit route networks should be initiated.

8.2.2 It is suggested that during the different phases of assessments on the *Planning on Short-Term Development of Rail Transit* and its results, urban planning experts should be invited to use the requirements on results in chapter 6 of this *Guide* as a reference and conduct dedicated acceptance check on the *Adjustment and Planning of Land Utilization along Rail Transit*.

8.2.3 It is suggested that during the compiling of the *Feasibility Study on Rail Transit Project* by cities, the *Integrated Planning and Design of the Rail Transit Station* should be delivered for examination. Urban planning experts should be invited to use the requirements on results in chapter 7 of this *Guide* as a
reference and conduct dedicated acceptance check on the *Integrated Planning and Design of the Rail Transit Station.*
Appendix 1 Guidance on Compiling of Urban Planning

Part I Collection List of Basic Materials for *Topic Study on Urban Development Guided by Rail Transit*

1. Five-year plans for national economy and social development, and five-year plans for municipal economy and social development compiled by provincial, regional (municipal) people’s governments.

2. General planning on land utilization.

3. Historical editions of general urban planning (including those under compiling), urban district planning (including those under compiling).

4. Historical editions of planning on rail transit route networks (including those under compiling).

5. Plannings on integrated urban transport systems and special planning on transport.

6. Topographic maps (1:10000~1:500000), related aerial photos, satellite remote sensing images, materials on natural conditions and ecological environments such as landscapes and land features, rivers and water bodies, plants etc., especially materials on distribution, affected extents and scopes of geological disasters.

7. Urban administrative divisions, materials on historical evolution of urban development, as well as urban population sizes, land utilization scopes, land use extents and land utilization structures in major development phases of downtown districts.

8. Current & planned populations, and spatial distribution.
9. Materials on current status of land utilization, including areas and distributions of different types of residential lands, current distribution of various types of main public service facilities, distribution of major public green space and squares etc..

10. Related materials on locations, extents, protection and administrative regulations etc. of world cultural heritages, historical and cultural conservation areas, famous scenic areas, water conservations and other special areas.

11. Current statuses and planning materials of roads and transport facilities.


14. Examination materials of key land utilizations in downtown districts, plans on newly built and revised projects.

**Part II Compiling Outline of *Topic Study on Urban Development Guided by Rail Transit***

1. Essentials of urban economic and social development

2. Analyses on related plannings

3. Analyses on current status of urban land utilization and trend of structural development

4. References of domestic and international examples

5. Plannings on rail transit route networks and analyses on execution conditions
6. Integrated structural optimization of city and rail transit

7. Suggestions on adjustments to rail transit corridors

8. Plannings on structures of urban public service centers

9. Plannings on adjustments to distribution of urban employment and population based on rail transit corridors

10. Plannings on urban construction intensity

11. Plannings on urban passenger transport hubs

12. Guiding policy of public transport first in rail transit’ zones of influence

Appendix 2 Guidance on Compiling of Route Planning

Part I Collection List of Basic Materials for Adjustment and Planning of Land Utilization along Rail Transit

1. Ratified general urban planning, short-term development plannings, detailed plannings and special plannings.

2. Administrative documents such as rules of implementation for compiling local urban planning, administrative regulations on technology, standards on attachments to residential areas, standards on attached parking zones etc..

3. Ratified plannings on rail transit route networks, and plannings on rail transit development under compiling.

4. Current topographic maps (1:500 ~ 1:5000), remote sensing information maps, image maps, materials on natural conditions and ecological environments such as landscapes and land features, rivers and water
bodies, plants etc., especially materials on distribution, affected extents and scopes of geological disasters.

5. Materials on historical and cultural blocks, protected historical sites etc. along rail transit.

6. Materials on current status of land utilization (1:500 ~ 1:5000), planning extents and status of surrounding land utilization, materials on land ownerships and cadastral data, including materials on allocated urban lands, ratified land utilizations with ongoing constructions, transferred and ratified land utilizations without ongoing constructions, green space and lands utilized as squares etc..

7. Current status of planning extents, detailed materials and residential materials on planned population, including sizes of population, population density, distributions, compositions, residential configurations etc..

8. Current statuses and planning materials of public administrative & public service facilities and facilities of commercial & service sectors.


12. Materials on current statuses of buildings (buildings’ types, distributions, characters of buildings, quality, numbers of floors etc.).

13. Materials on current status of land economy (land differentials, price levels, ways of development, real estate indices) etc.
Part II Compiling Outline of Adjustment and Planning of Land Utilization along Rail Transit.

1. General principles
   Clarifying references for compiling plannings, planning objectives and principles.

2. Planning coverage
   Clarifying coverage and boundaries of rail transit' zones of influence and rail transit stations’ core zones.

3. Area division and functional positioning
   Clarifying ways of division of urban functional areas along rail transit and functional positioning of each area.

4. Functional positioning of stations
   Clarifying each station’s functional positioning and main function composition.

5. Confirmation of land parcels with potentials
   Clarifying extents and scales of reserved lands in connection with stations’ development needs.

6. Adjustments and plannings of land utilizations
   Clarifying land utilizations’ functions and compatibility within planning coverage.

7. Adjustments and plannings of public service facilities
   Clarifying construction scales, locations and extents of service facilities such as educational, medical, cultural&recreational, sports facilities, as well as primary&secondary schools and senior nursing facilities etc. attached to residential communities within planning coverage. Giving suggestions on
ways of construction.

8. Adjustments and plannings of green space systems

Clarifying the structures, functions, construction scales and construction methods of different types of green space within planning coverage.

9. Adjustments and plannings of construction land intensity

Clarifying floor area ratio-based divisions of construction lands in rail transit’ zones of influence and rail transit stations’ core zones, while also clarifying control values of floor area ratios in different zones.

10. Adjustments and plannings on road-based transport

Clarifying road levels, functions and road section types within planning coverage. Clarifying structures and rules of establishments of pedestrian and non-motor vehicle transport systems within planned areas. Clarifying density of road networks, while providing guiding provisions to road designs at key nodes. Clarifying indices and requirements of attached parking zones.

11. Plannings on transfer facilities

Clarifying sizes and configuration requirements of rail transit transfer facilities. Providing plannings and arrangements to organization of pedestrian streamlines for transfer with rail transit.

12. Plannings on pedestrian systems

Clarifying configurations, key linking points, ways of construction and requirements on spatial sceneries for pedestrian systems within planned areas.

13. Plannings on underground spaces

Clarifying functions, sizes and administrative requirements of underground spaces within planed areas.
14. Administrative plannings on lands used for rail transit facilities

Clarifying boundaries and administrative conditions of rail transit facilities such as parking zones, train depots, turn lines, connecting lines etc..

15. Adjustments and plannings on utility facilities

Clarifying administrative requirements of construction of massive utility facilities and basic ways of project arrangements within planning coverage.

16. Administrative gists for urban designs

Clarifying structures, sizes, locations and administrative requirements of urban public spaces within planned areas. Providing conceptual solutions to building forms and scenic environment designs within planned areas.

**Part III Key drawings for Adjustment and Planning of Land Utilization along Rail Transit.**

The *Adjustment and Planning of Land Utilization along Rail Transit* includes two types of drawings: administrative drawings and analytic drawings.

Administrative drawings include: chart of planning coverage, adjustment and planning chart of land utilizations, division chart of construction intensity, planning chart of roads, planning chart of transport facilities, planning chart of public facilities, planning chart of green space systems, planing chart of pedestrian systems, administrative chart of rail transit facilities, comprehensive solution chart of utility pipeline designs.

Analytic drawings include but are not limited to the following types: analytic chart of current status （could be multiple charts）, analytic chart of land utilization potentials, general plan for urban design in core zones, spatial map of intent for urban design in core zones, analytic chart of spatial sceneries etc..
Appendix 3 Guidance on Compiling of Station Planning and Design

Part I Collection List of Basic Materials for Integrated Planning and Design of the Rail Transit Station

The collection list of basic materials for Integrated Planning and Design of the Rail Transit Station should supplement the following materials on the basis of the collection list of basic materials for Adjustment and Planning of Land Utilization along Rail Transit.

1. Ratified General Planning on Land Utilization and distribution status of land quotas within planning coverage.

2. Related contents of Feasibility Study on Rail Transit Project under compiling. If it concerns renovations in the station’s surrounding areas, materials related to current status of the rail transit route, the station and attached facilities should be collected.

3. Completed Adjustment and Planning of Land Utilization along Rail Transit; administrative detailed plannings of related areas; constructive detailed plannings for ratified land utilizations within planning coverage; guide on urban design in related areas and other special plannings related to planned areas.

4. Plannings on integrated urban transport hubs, general planning for linkage between rail transit and other ways of transport and plannings of integrated linking facilities in related stations etc..

5. Detailed topographic maps within planning coverage (in dwg format, drawing scale: over 1:300 for core zones, over 1:500 for zones of
influence), which should include information about elevations of roads and land parcels, road section forms etc..

6. Details about each building’s characters, number of levels, coordinates etc. should be kept.

7. Five-year plans for municipal economy and social development, planning on the configuration of urban commercial networks, development status of real estate market in planned areas, urban land prices, development costs and selling prices for related types of real estates.

8. Technical rules on planning and administration of local cities related to the project, related technical standards on plan compiling and guiding opinions and other documents of policies and regulations. Examples include temporary provisions for urban design work in transferred land parcels, technical standards on urban design plans etc..

9. Current statuses and planning solutions of related utility facilities; detailed statuses of civil air defense projects and various types of facilities that require underground space; locations, sizes and utilization statuses of various types of in-road transport facilities; detailed current statuses of various types of pedestrian underpasses and overpasses etc..

**Part II Compiling Outline of Integrated Planning and Design of the Rail Transit Station**

1. Comprehensive analysis on current statuses

   Should include planning’s background introduction, urban background introduction, planned locations, planning coverage, planning and construction statuses of rail transit etc., and conduct analyses on characters of current land utilizations, ownerships, building quality, land procurement and reservation,
distribution of land parcels with potentials, ratified development projects, statuses of roads and transport facilities, important utility facilities etc. within planning coverage.

2. Override planning and related planning interpretation

The requirements and execution progress of this planning’s override planning, *Adjustment and Planning of Land Utilization along Rail Transit*, should be subject to assessments and feedbacks.

3. Planning orientation and planning of business development

On the basis of making interpretations over related urban development background and plannings, in connection with the investment and financing mechanisms for rail transit development, market research and calculation of investment profits should be conducted over possible commercial and service business types within planned areas. The nature of business development for rail transit stations and the functions, sizes, constitution percentages of different types of business should be clearly planned.

4. Planning ideations and design concepts

Proposing planning ideations and design concepts in connection with planning orientation.

5. Planning structures and functional configuration

Clarifying the functional structure, public space structure and scenic structure in the planned areas. Making arrangements to the various functions in the planned areas, while clarifying construction scopes of the functions.

Through the general layout for all levels, confirming the locations and extents of various functional spaces in a detailed manner, as well as confirming the ownership boundaries and administrative boundaries of different proprietor entities.

6. Construction intensity and revision & verification of transport volume
Calculation should be conducted on different types of transport needs and transport capacities in the planned areas. Revising & verifying based on the results of assessment for impacts on local transport, while clarifying construction intensity.

7. Design of transport linkage and improved transport

Realizing the functional configurations of various types of rail transit transfer facilities (including in-road facilities). Designing detailed streamline organization plans. Arranging in a detailed manner the passages, transfer halls, squares and other facilities related to motor vehicle streamlines, bicycle streamlines and pedestrian streamlines. Arranging in a detailed manner the locations and ways of establishment of entrances & exits for motor vehicles.

Revising & verifying current statuses and planning solutions of urban road systems while proposing improvement plans. Revising & verifying the sizes of transfer facilities and pedestrian spaces while proposing improvement plans. Clarifying in a detailed manner the ways of arrangement for road sections, intersections, pedestrian street-crossing passages, bus stops, temporary parking lots and taxi parking lots within planned areas.

8. Design of pedestrian space

Confirming the locations and forms of establishment for the various types of pedestrian spaces within planned areas in a detailed manner, while providing detailed designs to the three-dimensional linking methods of pedestrian spaces.

9. Linkage design of entrances & exits of the station

Confirming the locations and forms of establishment for entrances & exits of rail transit stations within planned areas in a detailed manner.

10. Guidance on land parcel control
Detailed design should be conducted on the three-dimensional linkage relations between different functional spaces, and should be expressed through cross-sections, node cross-sections, cross-section effect charts and other forms.

11. Conceptual solutions to urban design

Proposing conceptual solutions to building morphology and design of scenic environment within planned areas. Building appearances, scenic impressions of public spaces and skyline contours etc. are to be expressed by holistic or partial effect charts.

12. Administrative gists of urban design

Clarifying the structures, sizes, locations and administrative requirements of urban public spaces within planned areas; clarifying buildings’ setback distances, building near-line rates, street wall control etc.; raising administrative suggestions to the locations and heights of high-rising tower buildings, while proposing administrative suggestions to the sizes and heights of skirt buildings.

13. Planning on utility facilities

Clarifying the locations, sizes and configurations of utility facilities related to rail transit, such as utility tunnels, within planned areas.

14. Linkage with Feasibility Study on Rail Transit Project

Revising&verifying related contents in the Feasibility Study on Rail Transit Project, while realizing configurations of related facilities in different rail transit projects.

15. Administrative guide

Clarifying through words and plans the locations, configurations and administrative conditions of related rail transit facilities, public facilities, transfer facilities (including in-road facilities) and municipal infrastructure;
clarifying administrative conditions of pedestrian systems and public space; clarifying the rules of establishment for road sections, intersections and other facilities, as well as the locations and conditions for establishment etc. for entrances&exits and auxiliary entrances&exits of the land parcel’s parking zones, and include into the administrative detailed planning for related areas, while also serve as attached conditions for land transactions.

**Part III Key drawings of Integrated Planning and Design of the Rail Transit Station**

The scale of working maps is advised to be 1:500.

Including general plan, level-based plans, functional cross-sections, building height control charts, planning maps of transport facilities, organization charts of transport streamlines, planning and design charts of pedestrian spaces, organization charts of pedestrian streamlines, design charts of entrance&exit linkages, planning maps of underground space utilizations, cross-section effect charts of integrated designs, guide charts for attached conditions of regulatory plannings etc..