Use of Urban Planning Systems to Achieve Policy-Led Urban Development

Objective: To achieve a city that is attractive and has vitality
Through the appropriate regulation of land and buildings and guiding private sector development projects that utilize urban planning systems such as priority development areas for urban renaissance, Tokyo is working to enhance the attractiveness of the city, including bolstering international business functions, creating urban green spaces, and forming elegant cityscapes.

Overview: Guidance for proper land use and urban functions
Using methods such as urban planning regulations and guidance, Tokyo guides the creation of urban functions, greenery, and cityscapes, in order to achieve an attractiveness and vitality befitting a comfortable, international city.
• Reasonable land use through methods such as zoning and floor area ratio regulations
• Utilization of urban redevelopment systems (district plans that define areas for the promotion of redevelopment, etc.)
• Realization of projects that strengthen international competitiveness through the creation of special development areas for urban renaissance

Details: Examples of urban planning systems
Zoning districts and floor area ratio
• Zoning system that places certain restrictions on buildings to encourage reasonable land use

Urban redevelopment systems
• For development projects that contribute to the formation of a pleasant urban environment such as those providing space open to the public, these systems relax regulations such as those applying to floor area ratio and roof height and angle.

Special Development Areas for Urban Renaissance
• In priority development areas for urban renaissance, this system takes the place of existing regulations and sets building use and floor area ratios within the extent necessary to achieve redevelopment.

Example: GINZA KABUKIZA (Kabukiza Theater)
Floor Area Ratio: 1,220% (Previously 670%)
Building height: 145.5 m
Completed: February 2013
Contributions to urban renaissance: Creation of a basement level plaza with direct subway access, a public parking facility, and the rebirth of the Kabukiza Theater

Photo courtesy of Shochiku Co., Ltd., Kabukiza Co., Ltd.
Land Readjustment Projects, Urban Redevelopment Projects

Exchange with Asia, Africa, South America, etc.

**Objective: To improve urban functions and create highly convenient urban areas**
To implement comprehensive urban development in an integrated manner such as building roads, parks, and plaza, along with developing residential land and supplying quality urban housing.

**Overview: Integrated comprehensive urban development**
The TMG takes the initiative in implementing projects that are highly public in nature or those that are difficult for the private sector to execute, and projects such as the creation of a new transportation network. Land readjustment and urban redevelopment projects are also carried out by other entities, including municipalities, associations, organizations, and public corporations.

**Details:**

**(1) Land readjustment projects**
- The location and area of individual housing lots are changed and reallocated (i.e. replotted) for the new development or expansion of public facilities such as roads and parks.

- A part of the individual housing lots within the district may be reduced and consolidated as a contribution (land reduction) for creation of land needed to develop the public facilities and as reserved land that will be sold to cover the project costs.

**(2) Urban redevelopment projects**
- Utilizing schemes such as relaxing floor area ratio and subsidizing costs required for the communalization of land and buildings, construction of public facilities such as roads and the shared use of land is promoted to improve the environment of built up areas.
- Projects are implemented under the method of “rights conversion” in which the rights (original assets) of land and building ownership and lease prior to project execution are exchanged for equivalent rights to a portion of the land and building following project execution (resultant assets = entitled floors). A portion of the floors of the building to be constructed by the project are sold to help cover the costs of the project.
Public-Private Town Development Incorporating Local Color

Objective: To keep enhancing an area’s appeal after completion of urban development

Have private entities, including landowners, leaseholders and developers, take the initiative in efforts to continuously enhance the appeal of an area, such as maintaining and managing the area’s environment and creating vibrancy, and also reduce government burdens for public space maintenance and management.

Overview: Creating attractive neighborhoods through area management activities

The Tokyo Metropolitan Government supports the area management activities of local landowners, businesses and others that make the best of an area’s characteristics, by establishing guidelines for such efforts and easing regulations on the use of public space. This is aimed at sustaining vibrancy of the area after completion of the area’s urban development project, as well as reducing burdens on the government to maintain and manage public areas.

Formulation of urban development guidelines

• Guidelines include the future vision for the area, development policies, and rules on area management activities.

Measures to create new vibrancy that is attractive to people visiting Tokyo

• Hold events in public open spaces (relax regulations to allow events that create vibrancy).
• Allow local groups to partially take on road management so that they can use revenues from outdoor cafés and advertising on roads to enhance the appeal of the area.

Details: Examples of area management activities

- Tokyo Station (Otemachi-Marunouchi-Yurakucho District)
  • Urban development guideline formulation
  • Renting advertising space on roads

- Roppongi
  • Event held in public open space

- Ring Road No. 2 (Shimbashi/Toranomon District)
  • Outdoor café on the road
Renewal of Large-Scale Housing Complexes in Tama New Town and Other Areas

Exchange with Gyeonggi-do Province (South Korea) and Edmonsberry (United Kingdom)

Objective: To revitalize the area through renewal of large-scale housing complexes

To improve the living environment at housing complexes and also create vitality in the community by providing appropriate support for the reconstruction or renovation of aging large-scale housing complexes.

Overview: TMG assistance for residents and local governments

The Tokyo Metropolitan Government works with municipalities to subsidize a portion of the design costs and common facility construction costs in order to reduce cost burdens on condominium associations. In addition, to promote the proactive efforts of local residents and governments, the TMG has issued housing complex renewal guidelines, and also offers technical support to local governments, including assistance with finalizing district plans. Through these efforts, the TMG is promoting the renewal of residential complexes.

Details: Example of a renewal project (Suwa 2-chome housing development, Tama New Town)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doubled the number of units by utilizing unused floor area ratio. Through the sale of new units, the cost burden on original residents for reconstruction was reduced.</td>
<td>- Doubled the number of units by utilizing unused floor area ratio. Through the sale of new units, the cost burden on original residents for reconstruction was reduced.</td>
</tr>
<tr>
<td>Attached facilities such as a daycare center, facility for seniors, café, and convenience store were incorporated in the development so that a multi-generational community would be formed and interaction within the community generated.</td>
<td>- Attached facilities such as a daycare center, facility for seniors, café, and convenience store were incorporated in the development so that a multi-generational community would be formed and interaction within the community generated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Before Reconstruction</th>
<th>After Reconstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of units</td>
<td>640 units</td>
</tr>
<tr>
<td>Number of floors</td>
<td>5 floors/23 buildings</td>
</tr>
<tr>
<td>Site area (m²)</td>
<td>About 64,400</td>
</tr>
<tr>
<td>Total floor area (m²)</td>
<td>About 34,050</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,100</td>
<td>2,900</td>
</tr>
</tbody>
</table>

The number of residents more than doubled, increasing from approx. 1,100 to approx. 2,900. There was a large increase especially in the number of young families with householders in their 30s and 40s.
Effective Use of Metropolitan Housing through Systematic Maintenance and Repair

Objective: To ensure effective long-term use of metropolitan housing stock
With approximately 260,000 units and 1,600 housing developments, Tokyo aims to effectively utilize this metropolitan housing stock through seismic retrofitting and efficient repairs, as well as improvements to make buildings more barrier free and eco-friendly.

Overview
Seismic retrofitting: Ensure the safety and peace of mind of residents
Renovation/repair of high-rise Residences: Renovate high-rise developments in an efficient manner
Barrier free: Install elevators at existing housing developments to facilitate the smooth movement of senior citizens, the disabled, and others
Eco-friendly: Help reduce CO₂ emissions through the installation of heat reflective/insulating roof coverings, solar power generation systems, and LED lighting

Details: Examples of renovations and repairs

Seismic retrofitting
• Installation of external bracing allows residents to live in the building during the seismic retrofitting work.

Heat reflective/insulating roof coverings
• Heat reflective/insulating coverings are used when roof waterproofing work is carried out, enhancing the level of comfort inside the building.
• Application of a highly heat reflective coating on the surface helps to reduce environmental impact.
• The name of the building is painted on the roof to make it easier to identify from a helicopter when a disaster strikes.

Efficient renovation of a high-rise Residence
• In comparison to conventional suspended gondolas, gondola systems fixed to buildings using dedicated metal fixtures are resistant to strong winds and swaying to provide a safe working environment. With modules linked together to form a continuous work space, these systems also improve work efficiency.
• Portions of the building not subject to work carried out on the gondola remain uncovered, allowing for daylight and air circulation to be maintained in the units, reducing the burden on residents.

Barrier free renovation example
• By installing elevators at existing buildings, housing that offers peace of mind to all residents, including senior citizens and the disabled, will be secured.

Solar power generation system
• Installation of roof-mounted solar power generation systems helps to promote energy efficiency.
• Excess electricity generated is sold to TEPCO.

LED lighting
• LED lighting is installed in common areas, promoting energy efficiency.
Systematic Maintenance and Renewal of TMG-Owned Buildings

Objective:
Many of the metropolitan-owned facilities were built around 1970 or in the 1990s. Those built around 1970 are aging, and those built in the 1990s now require refurbishment. To ensure that such a situation would not affect metropolitan government services, the Bureau of Finance formulated the “10-Year Plan for Maintenance and Renewal of Major Facilities” in 2009 for well-planned maintenance and renewal, and has been steadily implementing the planned works. Six years have passed since the establishment of the 10-year plan, and new administrative challenges are arising, such as the need to extend the life of public buildings. To properly address these challenges, the Bureau formulated the “Second 10-Year Plan for Maintenance and Renewal of Major Facilities” in March 2015.

Overview:
Other than works carried on from the previous plan, facilities subject to the new plan were selected from buildings including metropolitan government offices, metropolitan schools, and police stations. Of these facilities, those meeting certain conditions, such as being about 35 years old or older and having a total floor space of at least 3,000 m² were screened according to such criteria as the future prospects of facility operations, the state of degradation, and how the TMG could effectively utilize the property. The Bureau has selected 356 facilities with a combined floor space of around 3 million m² (about 31 percent of the facilities covered by the general account).

- Key points in maintenance and renewal
  - Ensure safety and security
  - Reduce environmental impact
  - Reduce future costs
  - Ensure convenience
  - Use metropolitan-owned properties efficiently and effectively

- Project period
  Ten years from fiscal 2015 to fiscal 2024 (Phase I: four years, Phase II: three years, Phase III: three years)
  Note: Plans are to be reviewed for each phase.

Details:
- Specific measures to be taken under the new 10-year plan
  - Promote measures to extend the life of buildings
    - e.g.) Measures against concrete neutralization and rebar corrosion; materials and construction methods that can withstand degradation
  - Promote measures that reflect TMG policies, such as reducing environmental impact and adopting new technologies
    - e.g.) LED lighting and highly energy-efficient equipment; solar power generation equipment; new technologies that help extend the life of facilities and reduce environmental impact
  - Further promote measures in line with TMG policies to effectively use metropolitan-owned properties, such as combining facilities and leasing properties under fixed-term contracts

- Project costs (estimate)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>330 billion yen</td>
<td>190 billion yen</td>
<td>230 billion yen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Approximately 750 billion yen</td>
</tr>
</tbody>
</table>

Note: Costs for each facility will be estimated again in the process of compiling each year’s budget, with consideration given to the most appropriate method and scope of construction.
Making TMG-Owned Buildings Greener

Objective: To transform Tokyo into a smart-energy city

The TMG takes the initiative in incorporating energy-saving measures and use of various renewable energies in metropolitan-owned buildings on occasions such as the rebuilding of such facilities.

Overview: Practical use of energy

Using its guidelines, the “Tokyo Energy Savings & Renewable Energy Specifications,” the TMG works to make its buildings “green” and aims for the highest Grade 3 rating in the following three categories under the Tokyo Green Building Program*.

- Reduction of thermal loads
- Use of renewable energies
- Energy-saving system

Studies are also conducted to expand a building’s share of renewable energies to all possible extent by considering factors such as the characteristics and location of the building. (*See No. 52)


Image of application of the specs in a metropolitan government office with a floor space of 3,000 m²

<table>
<thead>
<tr>
<th>Energy-saving systems</th>
<th>Reduction of thermal loads</th>
<th>Use of renewable energies</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Power monitoring device</td>
<td>- Roof insulation (75mm)</td>
<td>- Geothermal heat pump*</td>
</tr>
<tr>
<td>- Cogeneration system*</td>
<td>- External wall insulation (50mm)</td>
<td>- Cooling/heating pit/tube/trench*</td>
</tr>
<tr>
<td>- Top runner (most efficient) transformer</td>
<td>- Double glass (Low-E)</td>
<td>(Energy generated from renewable source)</td>
</tr>
<tr>
<td>- LED lighting (base light)</td>
<td>- Airtight sash</td>
<td>- Solar heat equipment*</td>
</tr>
<tr>
<td>- Daylight-linked control system</td>
<td>- Sun shield (eaves, vertical louver, etc.)</td>
<td></td>
</tr>
<tr>
<td>- Task-ambient lighting (office space)*</td>
<td>- LED guide lights, LED lighting (exterior)</td>
<td></td>
</tr>
<tr>
<td>- Motion sensor (lighting),</td>
<td>- Standby power reduction system</td>
<td>- Separate sensible and latent heat (desiccant)</td>
</tr>
<tr>
<td>- LED lighting (downlight)</td>
<td>- Waste heat-powered water heating and</td>
<td>air conditioning*</td>
</tr>
<tr>
<td>- LED lighting (exterior)</td>
<td>- High-efficiency air conditioning</td>
<td>- Ice storage air conditioning*</td>
</tr>
<tr>
<td></td>
<td>- High-efficiency cooling tower/pump/fan</td>
<td>- Fresh air intake control system (CO₂ sensor)</td>
</tr>
<tr>
<td></td>
<td>- Variable air volume, variable water volume</td>
<td>- Fresh air cooling, pre-cooling/pre-heating control</td>
</tr>
<tr>
<td></td>
<td>- Large temperature difference air conditioning*</td>
<td>- Total heat exchanger (total heat exchanger unit)</td>
</tr>
<tr>
<td></td>
<td>- Floor outlet air conditioning system*</td>
<td>- DC motor ventilation fan*</td>
</tr>
<tr>
<td></td>
<td>- High-efficiency packaged air conditioner</td>
<td>- Water-saving equipment, flush sound effect device</td>
</tr>
<tr>
<td></td>
<td>- Motion, temperature, and other types of sensors*</td>
<td>- High-efficiency water heater</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Waste heat recovery water heater*</td>
</tr>
</tbody>
</table>

* To be introduced depending on the characteristics and location of each building

Building’s energy consumption cut by about 60% (compared to average office building consumption in Tokyo)
Development Policy for City-Planned Roads

Objective: To systematically and effectively develop city-planned roads

Roads designated for development under the City Planning Act (city-planned roads) play a crucial role in not only boosting transportation and logistics functions and thus revitalizing the economy, but in other capacities as well, such as supporting people’s daily lives and, in the event of a disaster, aiding rescue and relief efforts. The TMG formulated the “Development Policy for City-Planned Roads in Tokyo (4th Construction Plan)” in March 2016, and is proceeding with the systematic and effective construction of city-planned roads with the aim to achieve a smooth flow of people and goods by significantly alleviating traffic congestion, Tokyo’s greatest weakness.

Overview: Review of the future city-planned road network

Road projects for which work has not yet started were reviewed based on 15 criteria, from the standpoint of what kinds of city-planned roads will continue to be necessary. Those projects that did not meet any of the criteria were designated as “routes for review.” Also, areas where additional city-planned roads would be necessary to achieve Tokyo’s future vision were indicated. Among road projects that were confirmed to be necessary, those whose details, such as the width and structure of the road, need to be reviewed for various reasons were designated as “routes for re-examination of plans.”

Overview: 4th Construction Plan (selection of roads for priority development)

Of the city-planned roads confirmed to be necessary, 320 sections totaling 226 kilometers of roads were selected as roads that should be developed on a priority basis over the 10 years from FY2016 through FY2025. Six criteria were used in the selection, with both regional and local needs taken into account.

<table>
<thead>
<tr>
<th>Project undertaken by</th>
<th>No. of sections</th>
<th>Length (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMG</td>
<td>139</td>
<td>146</td>
</tr>
<tr>
<td>Special ward</td>
<td>92</td>
<td>42</td>
</tr>
<tr>
<td>City/town</td>
<td>72</td>
<td>33</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>320</td>
<td>226</td>
</tr>
</tbody>
</table>

Projects undertaken by “other” include land readjustment projects by associations.
Undersea Tunnel (Immersion Tunnel Method)

Objective: To build a road network connecting reclaimed land
In the Port of Tokyo, the immersed tunnel method was used to construct undersea tunnels in order to deal with restrictive conditions at the site, such as height limits due to Haneda Airport and the need to secure passage for large ships.

Overview: Immersed tunnel method
In this method, boxes for the tunnel are prepared at the dry dock, towed and lowered into a trench dug on the ocean floor, and then joined together in the water.
This method has advantages such as reducing the total length of the tunnel because of the shallow earth covering, and its suitability for soft ground conditions.

Details: Example of Rinkai Tunnel (total length about 2km, immersed section 1.3km)

Construction process
1. Boxes for the tunnel are prepared at the dry dock

2. Towed to the site

3. Sunk and joined

· The boxes are constructed at the dry dock
· The size of each box is: W30m x H10m x L120m
· Weight 40,000 t

· Towed to the tunnel construction site by a placing barge.
· Ballast tank of the floating box is filled with water and submerged.
· Boxes are joined by using water pressure.

Inside view of immersed units
Life Extension of Bridges

Objective: To spread out bridge renewal periods and reduce total costs

Many of the bridges managed by the TMG were built during Japan’s rapid economic growth. They are aging and will reach their period of renewal at the same time in the near future.

Overview: Life extension through the latest technologies

After checking the seismic resistance, load-bearing capacity, durability and other conditions based on the latest technical standards set forth in the “Specifications for Highway Bridges,” the Bureau of Construction combines advanced technologies to repair and reinforce bridges with the aim to extend their lives for another 100 years after implementation of measures.

Details: Examples of life extension measures

- Reinforcement of footing
- Installation of additional piles
- Deck slab replacement (from reinforced concrete to steel)
- Main girder replacement
- Connecting girders together to make the structure continuous
- Bearing replacement
Preventive Maintenance of Road Tunnels

Objective: To secure the safety of road tunnels

• With the goal of having all tunnels in sound condition without need of renewal for the next 100 years, the TMG takes proper measures before damage and deterioration progress so as to ensure the safety of facilities. The systematic implementation of such measures also aims to spread out repair work and costs and reduce total cost.

Overview: Systematic life extension measures based on inspection using the latest technologies

• The Tunnel Preventive Maintenance Plan was formulated upon the results of regular inspections (once every five years) and studies employing the latest technologies.
• The TMG implements measures such as filling cavities appearing behind tunnels built in mountains and enhancing the durability of cut-and-cover tunnels.

Details: Examples of life extension measures

The tunnel is lined with carbon fiber sheet panels to strengthen it (mountain tunnel).

Workers repair a deteriorated concrete surface by spraying (cut-and-cover tunnel).
**Assessment of Road Surface Temperature Reduction Performance**

**Objective: To help reduce the heat of metropolitan roads**

By installing solar heat-blocking pavement and water-retaining pavement materials, the daytime rise in road surface temperatures can be curbed.

**Overview: Method of assessing the road surface temperature reduction performance of pavement materials**

The TMG has been promoting the development and use of solar-heat blocking pavement and water-retaining pavement materials that curb the daytime rise in road surface temperatures. We established a method to assess their performance in order to stipulate the performance benchmarks of the materials.

**Details: Development of technology for assessment through indoor irradiation tests**

Assessment of pavement performance

Indoor irradiation test to measure the reduction in road surface temperature

Example of road surface temperature measured by thermography

- a: Solar heat-blocking pavement 48°C
- b: Dense-graded asphalt pavement 56°C

Solar heat-blocking pavement is 8°C cooler than dense-graded asphalt pavement.

Solar heat-blocking pavement

Some of the sun’s rays are reflected to curb the rise in road surface temperature.

Water-retaining pavement

The evaporation of water that is retained within the pavement curbs the rise in road surface temperature.
Sinkhole Prevention and Repair

Exchange with Seoul

Objective: To prevent sinkhole accidents and secure road safety

Sinkholes and other road surface irregularities on trunk roads with heavy traffic, such as metropolitan roads, can lead to serious accidents with great social impact. These include cars caught in sinkholes or huge traffic jams. The road administrator conducts inspections to prevent sinkholes from appearing and to ensure road user safety.

Overview: Void detection and emergency response

A subsurface void can cause a sinkhole. On metropolitan roads, a vehicle-mounted radar system is used to detect subsurface voids. When a large void is detected in such a survey or when any irregularity is found during a patrol, the cause is investigated and emergency work is carried out to quickly repair the road and prevent the formation of a sinkhole.

Details: Detection methods and response measures

• Radar surveys are performed to detect subsurface voids without digging up roads.
• When a subsurface void is detected, the cause is investigated and emergency work is carried out to repair the road.
• When a sinkhole appears, repair work is conducted swiftly.
Traffic Congestion Measures

Objective: To implement comprehensive measures to ease traffic congestion
TMG bureaus responsible for road management and logistics measures work with the Metropolitan Police Department, which is responsible for traffic enforcement and control, to implement fast-acting measures to ease traffic congestion where it is most pronounced.

Overview: A combination of approaches to address traffic congestion causes

<Examples of measures>

• More sophisticated and optimized traffic signal control
  Introduction of traffic control systems that predict incoming traffic demand

• Traffic dispersion
  Installation of traffic information signs that display the time required by each route to reach a point

• PTPS (Public Transportation Priority Systems)
  Detects public vehicles such as buses and performs traffic signal control including extending green lights and shortening red lights

• Upgrades to road facilities
  Intersection improvements, construction or extension of right-turn lanes
  (Before) (After)

  By installing red-colored pavement to show no parking zones, these zones are clearly indicated to drivers.
  (Before) (After)

• Space for delivery trucks to load/unload goods
  To prevent delivery trucks from parking on the road to pick-up or deliver goods, space is secured for these activities in pay parking facilities.

Measures are implemented through collaboration between the Bureau of Urban Development, Bureau of Environment, Bureau of Construction, Metropolitan Police Department, and Tokyo National Highway Office.
Comprehensive Measures for Parking

Objective: To ensure a safe and pleasant road traffic environment
• Promote comprehensive measures for parking through means such as having car owners secure a place to keep their car, promoting the development and use of parking facilities, and cracking down on illegal on-street parking.

Overview: Initiatives to reduce on-street parking
<Securing a place to keep a car>
• Mandatory for an owner of a car to first secure a proper place to park it

<Development of parking facilities>
• Development of parking facilities capable of meeting a specific area/building’s demand for parking
• Responding to a range of parking problems

<Promotion of the use of parking facilities>
• Effective use of existing parking facilities

<Crackdown on illegal on-street parking>
• Entrusting matters related to the enforcement of illegal on-street parking to a private company

Details: Development of parking facilities
Development of parking facilities capable of meeting a specific area/building’s demand for parking
• The TMG supports municipalities in the formulation of parking facility development plans so that facilities meeting the demand for parking in an area are developed.
• In line with the Tokyo Metropolitan Parking Ordinance, when a building is constructed, the creation of parking facilities capable of meeting the demand that will be generated is mandatory.

Responding to a range of parking problems
• As a measure to address the issue of delivery vehicles parking on the street to process the delivery packages, the TMG is promoting the dedication of space at pay parking lots for this purpose.
• The TMG has formulated guidelines for the development of public parking facilities that can accommodate motorcycles and is encouraging the creation of such facilities.

Details: Promotion of the use of parking facilities
Effective use of existing parking facilities
• The Tokyo Metropolitan Public Corporation for Road Improvement and Management provides parking information through the “s-park” application.

Via its website, smartphones, and IT car navigation systems, the “s-park” service provides information on the locations of approx. 21,000 parking facilities in Tokyo and the current availability status of approx. 7,200 parking facilities, mainly in busy business and shopping areas.