Urban Disaster Prevention

By Bureau of City Planning Tokyo Metropolitan Government

( Urban Disaster Prevention Project )

Tokyo has a great concentration of population as well as political, economic and other functions, and its role is growing more and more important, both at home and abroad.
Therefore, protecting people's lives and property from disasters and keeping social assets safe are the basic issues for the development of the Metropolis and its international activities. For this giant city, disaster prevention is a theme that must not be neglected. In 1923, Tokyo was severely damaged due to disasters resulting from the Great Kanto Earthquake. Thus, an important problem is to make the Metropolis more resistant to big earthquakes and other natural disasters. Although the safety of Tokyo has gradually been improved as the ratio of fireproof buildings is increasing and a variety of preventive measures are being taken, much remains to be done. Densely built wooden houses and a shortage of open spaces, combined with diversifying household energy uses and weakening actions taken in the event of disasters resulting from the aging population, have been the major causes of the spread of fire, the secondary disaster of earthquakes.
In order to create a city for the 21st century where inhabitants can feel secure, all parties need to come together to promote disaster-resistant urban development through the mutual integration of livability.
In the January 1995 Great Hanshin-Awaji Earthquake, many buildings collapsed, fires raged through areas with densely packed wooden housing, and the lives of many were lost. In light of this lesson and the fact that an earthquake directly under Tokyo is expected in the near future, the "Promotional Plan for a Disaster-Resistant City" was formulated in March 1997 to overcome any latent weak points in Tokyo's disaster readiness. Based on this plan, the bolstering of buildings' earthquake resistance will be pursued and the multi-layered and comprehensive advancement of projects for development of a disaster-resistant city will be pursued in areas of densely packed wooden housing.

1. Promotion of the Creation of a Fire Resistant City

(1) Promotion of Fireproof Buildings

1) Designate key disaster prevention areas as fireproof districts. In principle, all areas inside the Loop Road No. 6 are to be designated as fireproof districts.

2) Make effective use of the Fireproof Promotion Program, and improve the subsidy system to make buildings fireproof and encourage joint construction of buildings.

(2) Promotion of Urban Redevelopment for Disaster Prevention

1) In accordance with the "Urban Redevelopment Master Plan," a master plan for the construction of a fire-resistant city, promote urban redevelopment for disaster prevention to, among other things, eliminate districts where firefighting activities are difficult, making use of a method suited to each district.

2) The system of designating an area for the promotion of redevelopment into a disaster-resistant
area has been given legal backing. As a result, it has become possible to take such measures as subsidizing the reconstruction of structures into fireproof ones under joint or coordinated planning and extending financial assistance for the reconstruction of old wooden, lease apartments into fireproof buildings.

The Tokyo Metropolitan Government will designate districts as districts where redevelopment for disaster prevention should be promoted.

3) Urban redevelopment projects for disaster prevention in the Koto area should stress the aspect of disaster prevention. Efforts should be made to create a town which is comfortable to live in, utilizing the vitality of the private sector.

(3) Securing Open spaces
Open spaces in urban areas, such as parks, green tracts and roads, have important functions in disaster prevention. Efforts to secure open spaces should give top priority to areas where they are lacking.

<table>
<thead>
<tr>
<th>Type of Open Spaces</th>
<th>Roles in Disaster Prevention</th>
<th>Direction of Improvement</th>
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<tbody>
<tr>
<td>Large Scale Parks (metropolitan, etc.)</td>
<td>Refuge base, Disaster recovery bases</td>
<td>Improvement and construction of metropolitan parks.</td>
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<tr>
<td>Smaller Parks (ward, city, town, etc.)</td>
<td>Disaster resistant activity bases, Rendezvous sites</td>
<td>Secure a park for every town block.</td>
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<tr>
<td>Roads (city planning roads)</td>
<td>Firebreaks, Refuge roads</td>
<td>Improvement of roads in high-risk areas.</td>
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2. Improvement of Earthquake Safety of Districts
(1) Development of a Disaster-Proof Living Zone

1) To build firebreaks which make up disaster-resistant urban areas, improve roads, parks, rivers, etc., and promote fireproof measures for areas along roads.

2) Projects for creating disaster-resistant living zones being roughly the size of an elementary or junior high school district, which are surrounded by firebreaks, should be carried out first in those areas where the risk is greater, and needed guidance and subsidies should be provided.

3) Within each disaster-proof living zone, make use of the district planning system to better public squares and minor roads and to improve the living environment and its capacity to fend off disasters.

(2) Earthquake-resistance Building Diagnosis
Based on the Tokyo Metropolitan Earthquake Disaster Countermeasure Ordinance and the Tokyo Metropolitan Earthquake Disaster Prevention Plan, the earthquake resistance of public buildings constructed before 1981 is being diagnosed in order to ascertain the earthquake resistance of buildings such as fire stations, police stations, schools and hospitals that will serve as bases for information, rescue, and relief in the event of a major earthquake. In addition, a consultation system for private buildings has been established and introductions to technical organizations are being provided through a "Building Earthquake-resistance Diagnosis System".
(3) Securing Safety and Refuge and Victims

1) Step up the improvement of refuge bases, refuge roads and bridges to secure the safety of victims. Replace distant refuge bases with nearer ones, and promote fireproof and safety measures for areas near refuge bases and along refuge roads.

2) In principle, a refuge base that the Metropolitan government broadly designates should have an area of at least 10 ha. Secure and effective area of at least one square meter for each refugee. For areas where fire-resistant buildings are concentrated, and free from the danger of a major fire in the city, the government designates these as areas where people can remain, and takes appropriate measures.

3) In improving the refuge system, take measures for a safe refuge in cooperation with citizens, taking the old and handicapped into consideration. Consideration should also be given to foreigners; for instance, provide public relations activities and bulletin boards in foreign languages.

4) Instruct owners to take safety measures and tighten regulations on building standards to prevent the danger of concrete block walls, precipices and retaining walls from being broken. In particular, tighten regulations and guidelines on the structure of these buildings, including those on the design of the building and the minimum open spaces to be secured to eliminate the danger of falling objects from tall buildings.

(4) Measurement of the Vulnerability of Districts

For the purpose of introducing an indicator for the development of disaster-resistant cities, the Tokyo Metropolitan Government measures the vulnerability of each district for the danger of an earthquake under the anti-earthquake regulations, and announces the results to Tokyo citizens. The English-language version of "Earthquake Area Vulnerability Assessment" was published with the fourth announcement.

Promotional Plan for a Disaster-Resistant City

Development of Disaster Preventive Bases in Koto District

Tokyo Metropolitan Urban Recovery Manual

Post-quake Grand Design

1 Promotional plan for a disaster-resistant city

Drawing lessons from the Great Hanshin/Awajishima Earthquake, which occurred in January, 1995, a fundamental plan was organized in March, 1997 for more effective and concentrated
development of a disaster-resistant city. Targeted districts cover areas with closely packed wooden houses and their outskirts in the 23 Wards and in 8 Tama cities.

The plan aims at completion in 20 years, but in districts in urgent need of development completion in ten years is required.

Designated in this plan are closely-packed wooden housing districts, particularly in 25 high-risk districts designated as key development areas where development of infrastructure and restoration in those areas must be pursued to create disaster-resistant urban areas through multi-layered, intensive implementation of such works.

Among the key development districts, 11 have been designated as key districts for fireproofing and emergency development.

Work in these 11 key districts should be actively promoted through multilayered, concentrated work according to a Development Plan.

2. Development of Disaster Prevention Bases in Koto District

The Tokyo Metropolitan Government in 1969 formulated the Basic Plan for the Redevelopment of Koto District for the purpose of making the district a safer place for its residents and improve its living environment.

Under the plan, public land, factory sites, etc., were to be used as places of refuge in the event of a disaster, such areas and surrounding districts were to be redeveloped, anti-disaster measures were to be strengthened, the living environment was to be improved and the economic foundations were to be reinforced.

Six areas were selected as the sites for disaster-prevention bases under the plan. They are the Shirahige Nishi district and Shirahige Higashi district, Yotsugi, Kameido-Oshima-Komatsugawa, Kiba, Ryogoku and Chuo (the Sarue and Sumida areas). They were selected because they met conditions (1) to (4) for disaster-prevention bases as mentioned below.

The policy for establishing disaster-prevention bases

(1) The distance of a disaster-prevention base should be 1.2 kilometers so that residents can get there on foot within 30 minutes.

(2) The number of people who take refuge should be one person or less per square meter in terms of effective space of refuge.

(3) The minimum size of a disaster-prevention base should be about 50 hectares so that the refugees may be given adequate protection from radiation heat and hot air currents.

(4) Disaster-prevention bases should be located in districts where there is much land space that can be purchased, such as factory sites and large factories that can be moved, as well as public land.

Disaster-prevention bases are being developed by methods that meet the characteristics of each
3. Tokyo Metropolitan Area Urban Revival Manual

Swift and systematic urban restoration following a major earthquake is an extremely important issue that will decide the future course of the city and the lives of the people who live in the area. Therefore, it is necessary to study plans and procedures to rebuild the city before a major disaster strikes.

Toward this end, the "Tokyo Metropolitan Area Urban Revival Manual" was drafted in May 1997 as a guideline for the procedures and planning the administration must follow to ensure the swift and systematic revival of urban areas.

From FY1998, we have conducted urban revival simulation training with this manual as a guide, with the aim of strengthening our staff's existing skills and teaching them new methods.

In January 1998, we drafted the "Manual for Restoring Living Standards in the Tokyo Metropolitan Area," an administrative guideline outlining policies to be implemented after an earthquake to quickly rehabilitate and stabilize the lives of the people who live in the metropolitan area.

4. Grand Design for Recovery after an Earthquake

To quickly and systematically revive the Tokyo Metropolitan Area following an earthquake, in May 2001 we drafted a broad-ranging recovery plan entitled "Grand Design for Recovery after an Earthquake." This plan is based on the awareness that the vision of an ideal approach to urban restoration as well as the procedures themselves must be conveyed to metropolitan residents.

The elements of this Grand Design will be incorporated in the "Tokyo Metropolitan Area Urban Revival Manual."

(1) Premise of Study
Four themes, including the "existence of areas with a high concentration of wooden buildings," were defined as issues that need to be resolved during the restoration process following an earthquake with a magnitude of 7.2 that occurs directly under Tokyo's 23 wards, with 9,600-ha destroyed by fire.

(2) Objective
The objective was defined as "building Tokyo as an international city that coexists with the environment and is designed to avoid the repetition of calamitous damage."

(3) Development of Recovery Strategy Projects
Seven strategy projects, including reconstructing safe and peaceful urban areas and the building of green ring urban areas, will be developed for task solving.

(4) Broad Infrastructure Development, Including Arterial Roads
The basic policy consists of development that is integrated with the restoration of urban areas, with emphasis placed on the environmental infrastructure.
Moreover, in areas where major damage is anticipated, a "green corridor" will be developed as a green network by building roads, parks, waterways, etc., based on a universal design.
(5) Development of Urban Areas

Environmentally rich urban areas designed to avoid calamitous damage in a future quake will be developed to the extent possible.

(6) Implementation

It will be necessary to enact legislation allowing the government to acquire land and reinforce building restrictions during an emergency, as well as secure financial resources for construction projects, and create a division of labor among the national government, wards and cities, and cities in neighboring prefectures.

(7) Sharing with Metropolitan Residents

To ensure the effectiveness of the Grand Design, we will attempt to work together with metropolitan residents in seeking an ideal approach to urban restoration.

Disaster Prevention Bases in the koto District

Areas where redevelopment has top priority and key districts

Image of a green corridor from the "Grand Design for Recovery after an Earthquake"

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**Comprehensive Flood Control Measures**

Along the small and medium-size rivers in the Yamanote area (Tokyo's hilly residential section) and the Tama area, the basins' water-retaining and flood-retrarding capacity have declined due to the increasing number of residential development in the existing urban areas and surrounding areas, and the water inflow into the rivers has increased. In addition, the need for measures to prevent floods has increased as a result of the high incidence of local torrential rains and the increase in underground spaces in recent years. In the lowland area east of the Sumida river, there is a danger of floods due to high tides and earthquakes.

1. Increased Safety Against Floods

We will take measures, such as the repair of river embankments, to make rivers capable of disposing of rainfall of up to 50 millimeters per hour, and improve and expand adjustment reservoirs, diversion channels and sewerages to eliminate the danger of floods quickly. Moreover, in order to promptly and correctly counter local changes in precipitation and the danger of high tides, we will make effective use of the information transmission functions of the comprehensive flood prevention information system, etc.
2. Stronger Measures to Improve the River Basins

Concurrently with the expansion and improvement of rivers and sewerages, the Tokyo Metropolitan Government is constructing facilities to store rainwater and make it permeate the ground, particularly in such public spaces as roads and parks and large-scale private facilities, for the purpose of reducing the flood prevention load on river basins. There is also a subsidy system to help individuals improve the drainage of their home lots.

3 Promotion of Facilities that Harmonize with Regional Characteristics

1) To protect the eastern lowlands and waterfront areas from water damage due to high tides and earthquakes, the construction of tide dikes, coastal embankments, water gates and waste water treatment facilities will be promoted.

2) In the western part of the wards area, underground rivers will be constructed, for example under Loop No. 7, based on a comprehensive flood control measures plan which includes measures for each river basin. In addition, the installation of adjustment reservoirs along rivers will be promoted to improve flood safety.

3) In the Tama area, the construction of protective embankments will be promoted with emphasis on areas with frequent water damage. In addition, measures to improve food safety are carried out in conjunction with measures for sewerage and watershed control.

4 Promotion of Super Dike Construction

Along large rivers such as the Tamagawa, Arakawa and Sumidagawa, the construction of super dikes, having superior earthquake resistance and flood control ability, will be promoted as a part of overall urban renewal.

5 Development of Plans to Improve the Waterside Environment

In promoting flood control projects, efforts will be made to create an attractive waterside environment, with a good balance between economic water utilization and the use of waterside areas for rest and recreation, by planting greenery on dikes and constructing walking paths.

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