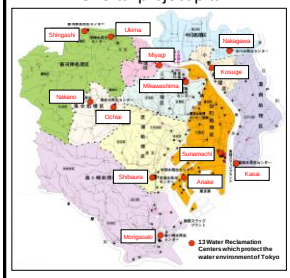
Sewerage in Tokyo

Contents

1 Outline of Sewerage in TOKYO

Sewerage of the 23 wards in Tokyo

Overall project plan



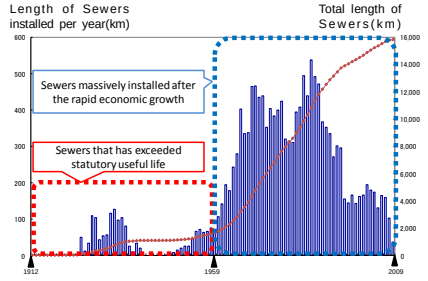
Item	23 wards
Total sewered area (Planned)	57,800ha
Sewered population	8.859million
Percentage of sewered population	100%
Sewerage system	Mainly a combined system
Capacity	6.224 million m^3/day
Total amount of water treated per day	4.635 million m^3/day
Total length of sewers	15,800km
No. of water reclamation center	13
No. of pumping stations	83

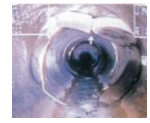
2 Major Policies of the Bureau of Sewerage

- Reconstruction Works
- Inundation Measures
- Earthquake Countermeasures
- Improvement of Combined Sewer Systems
- Advanced Treatments
- Utilization of Resources
  (Reclaimed Wastewater, Sludge, Heat)

Reconstruction works

An increasing number of facilities





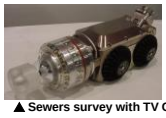
▲Deteriorated Sewers

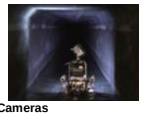
Reconstruction works

Under Reconstruction

After Reconstruction

▲SPR(Sewage Pipe Renewal)Method



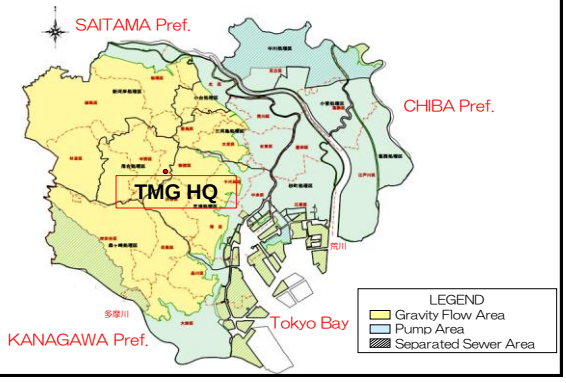


▲ Sewers survey with TV Cameras

SPR Method adopted in many countries

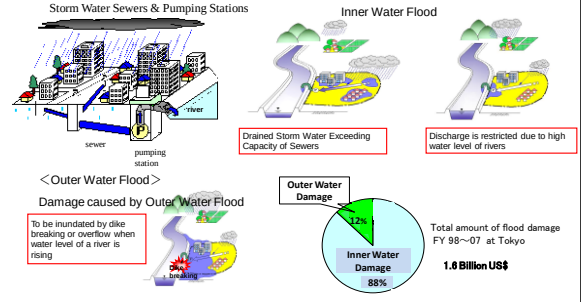
3 Inundation Measures in TOKYO

Gravity Flow & Pump Drainage Area



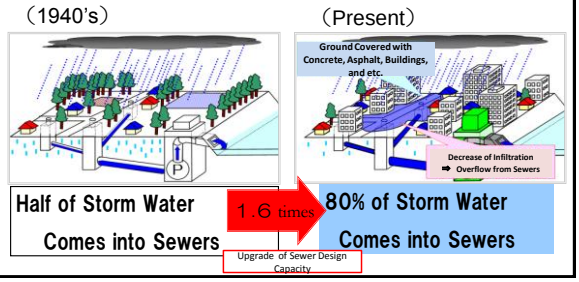
3-1 Inundation and Role of Sewerage

- Role of sewers : To prevent cities from inundation by collecting all rain water fallen in cities and discharging to rivers
- Inundation caused by inner water flooding : Lack of capacity of sewers or receiving rivers



3-2 Present Situations & Tasks
～ Decrease of Infiltration by Expansion of Urbanization

Inundation Damage Occurs even in Sewered Area
・・・"Urban Inundation"



Enhancement of inundation measures

Frequent urban flood disasters

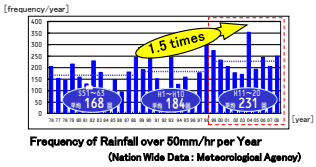
- The amount of storm water running off has increased due to ongoing urbanization.
- Super typhoons and localized torrential rains frequently occur.
- Hollows or the base of hills are subject to being inundated whenever it rains heavily.

Date	Meteorological phenomenon	Maximum hourly rainfall (mm/h)	Above and below floor level inundation (No. of buildings)
Oct. 13, 2003	Heavy rain	62	253
Oct. 9, 2004	Typhoon No. 22	73	993
Oct. 20, 2004	Typhoon No. 23	45	402
Aug. 15, 2005	Heavy rain	79	191
Sep. 4, 2005	Heavy rain	112	5,048
Aug. 5, 2008	Heavy rain	59	171

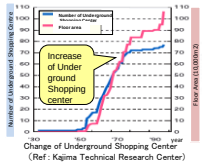
～ Current Increase of Inundation Risk ～

Increase of Risk on Inundation
- Urbanization Expanding to the Area Vulnerable to Inundation such as Low Land and Hollows
- Frequent Occurrence of Rainfall over Design Rainfall Intensity in Recent Years
- Multiple Land Use such as Underground Shopping Center, Basement, and so on.

■ Recently rainfall over 50mm/hr , which is the design rainfall, is increasing !



Frequency of Rainfall over 50mm/hr per Year
(Nation Wide Data : Meteorological Agency)



Change of Underground Shopping Center
（Ref : Kajima Technical Research Center）

3-3 Comprehensive Inundation Measures

Construction of Facilities

1 To Drain as fast as possible
Increasing Capacity
(50mm/hr-50% ⇒50mm/hr-80%)
Pumping Stations
Sewers (Trunk Sewers, Branch Sewers)
2 To introduce Infiltration system
3 To Reserve Storm Water
Construction of Storm Water Reservoirs
4 To Upgrade Capacity to Protect Underground
Rainfall Intensity 50mm/hr ⇒75mm/hr

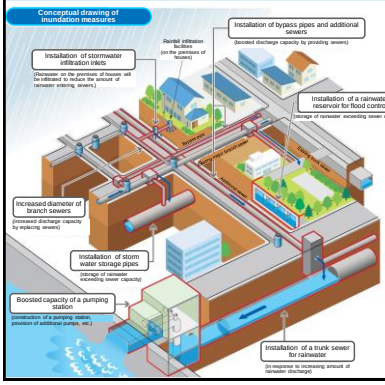
Preparation against Disaster by Residents or Manager

1 To Stop Storm Water Coming into Underground Space
・Preparation of Stop Log or Sandbag

Risk Communication

1 Announcement of Risk Information
Publication of Hazard Map
Warning Water Level of Trunk Sewers
" AMESH" Rainfall Information System by Combination of Rader and rainfall Gauge

Enhancement of inundation measures



▲ Wada Yayoi Trunk Sewer
provided along the Kanda River, which floods extensively (inner diameter of 8.5 m; storage capacity of 150,000 m³)

▲ Minamisuna Rainwater Reservoir
with multiple residential units above for the effective use of space
(storage capacity of 25,000 m³)

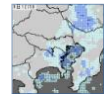
Reinforcement of risk communications concerning inundation

■ Provision of information on rainfall

AMESH： http://www.gesui.metro.tokyo.jp/

Year	No. of access
2005	About 6.5 million
2006	About 7.6 million
2007	About 9.6 million
2008	About 15.7 million

○ Information accessible via mobile phone



○ Distribution of information on trunk sewer water levels to the wards via an optical fiber network

Water level indicator for the Momozono-kawa trunk sewer which used to be a river ▶

○ Preparation and publication of hazard maps

▲ Hazard map of drainage areas of the Kanda River