1. Challenges faced by Zenigamecho Pumping Station

Zenigamecho Pumping Station of the Bureau of Sewerage, Tokyo Metropolitan Government (hereinafter referred to as the “Bureau”), located in Tokiwabashi District, on the northern side of the Tokyo Station, is an important pumping station in charge of sewage removal in a total area of 1440.19 ha basin including Chiyoda Ward, Chuo Ward (Figure 1).

Zenigamecho Pumping Station was first established with the pumping capacity of 4.26 m³/s in March 1931 and had been operating since then, however, as the volume of sewage inflow into the pumping station remarkably increased due to the increase of the population within the drainage area of the pumping station and verticalization of the buildings in the basin, the current Zenigamecho Pumping Station was re-established in July 1966 with the pumping capacity of 8.50 m³/s by sharing the premises with private buildings. Since the commencement of its operation, approximately 50 years have passed, and bodies of the facilities, conduits and equipment are considerably aged and thus, it became necessary to rebuild Zenigamecho Pumping Station in order to pump the sewage stably in the future.

There are the following challenges for rebuilding Zenigamecho Pumping Station:

Firstly, it is difficult to update the pumping station independently without affecting the structure of private buildings. Zenigamecho Pumping Station has its structure integrated with private buildings and uses a part from underground to the first floor of the whole building (Figure 2). Therefore, remodeling the existing facility structure will affect the structure of the
entire private buildings.

Secondly, it is difficult to secure a temporary alternative lot for rebuilding the pumping station without stopping its function. Since public facilities such as business commercial buildings, underground parking lots and underground electric transforming station are concentrated in the vicinity of Zenigamecho Pumping Station, it is impossible to physically secure a lot to arrange a new pumping station in advance.

【Figure 1】
2. Participation in City Planning around Tokiwabashi District and Chain Redevelopment Project

Located to the north of Tokyo Station, Otemachi area is the home of many office buildings of enterprises and has been playing the central role in Japan’s economy by functioning as one of the most important international business centers in the world. In recent years, aging has progressed in many buildings, and it has become necessary to promote redevelopment without interrupting business activities. Therefore, the Otemachi Chain Urban Renaissance Project (hereinafter referred to as the "Chain Redevelopment"), which reconstructs aged buildings in a chained way by using the former compound of the government joint office building as a temporary alternative lot, has been promoted as a land readjustment project implemented by UR, which started its first phase of the Chain Redevelopment in 2005 (Figure 3).

Tokiwabashi District was not initially included in the project area of the Chain Redevelopment. However, in order to respond to the challenges being faced by Zenigamecho Pumping Station as well as other challenges of the town such as aging of private buildings and complicated relation
of rights, the “Committee for Examination and Investigation on Redevelopment of Complex Facilities District (Tokiwabashi District),” consisting of land owners and leaseholders including the Bureau and academics, considered the participation in the Chain Redevelopment Project from FY2007 to FY 2010.

The Bureau agreed to participate in city planning as one of land owners in August 2012 and decided to promote rebuilding of Zenigamecho Pumping Station in cooperation with city planning of Tokiwabashi District. As a result, a decision on city plans was made to include Tokiwabashi District in the area of the Chain Redevelopment Project in December 2012.

Regarding the city planning of the Tokiwakabashi District, in the Guideline on City Development of Otemachi, Marunouchi and Yurakucho Districts (formulated in March 2002 and revised in May 2014), the creation of bustle that is the core of the city center community in line with the renewal of core infrastructure facilities such as sewage pumping stations, etc. and improvement of accessibility between Tokyo Station and surrounding areas were shown as the basic idea of establishment of the community base.
3. Rebuilding the Pumping Station in Tandem with City Planning and Contribution to the Community

The following is the description of the details of the rebuilding process and the contents of the contribution to the establishment of the community base shown in the Guideline on City Development of Otemachi, Marunouchi and Yurakucho Districts.

(1) Rebuilding Zenigamecho Pumping Station

Figure 4 shows the current layout of buildings and other structures in Tokiwakabashi District and the location of the project plan.

In the rebuilding procedure, a part of a private building of which the tenants were moved out by the chain redevelopment will be dismantled first in advance. Next, a new pumping station will be developed at the site created by dismantling in advance. Then, after switching the incoming
and outgoing conduits and starting the operation of the new pumping station, the existing pumping station will be dismantled.

(2) Development of a Reservoir for Rain Water Storage, and Utilization of the Upper Space through the Use of Multi-level City Planning System

Together with rebuilding Zenigamecho Pumping Station, a reservoir for rain water storage will be developed to improve the combined sewer system by storing the sewage of initial rainfall. In order to pursue integrated and advanced utilization of the entire block of the district along with development of the reservoir for rain water storage, it is planned to construct a private building in the upper space of the reservoir for rain water storage by utilizing the multi-level city planning system provided in Article 11, paragraph 3 of the City Planning Act. Specifically, the city plan was revised so as to stipulate multi-level limits for approximately 1,530 m² within the site where the new pumping station is to be constructed (approximately 5,300 m²) and to set up the range of urban facilities only covering the necessary range for the reservoir for rain water storage (Figure 4).

As a result, it has become possible to allocate a private building from Tokyo Station side to Nihonbashi side. Shops, etc. in the lower level of the private building will be facing the adjacent large-scale plaza, and the bustling interchange space where the plaza and the buildings are united will be formed (Figure 5).

Furthermore, the private building to be constructed together with the reservoir for rain water storage is planned to become a new landmark of Tokyo as it will be the highest building (approx. 390 m) in Japan(Figure 6).

(3) Transfer of Floor-Area Ratio to Private Buildings, etc. in Tokiwabashi District
The floor-area ratio in Tokiwabashi District was set as 1,760% through the proposal to designate as a special zone, etc. The necessary floor-area ratio for Zenigamecho Pumping Station is 500% and thus, the remaining 1,260% is the surplus. Therefore, the surplus floor-area ratio is to be transferred to other buildings in the District by applying the Design System of Collective Buildings provided in Article 86, paragraph 2 of the Building Standards Act. As a result, floor area of the private buildings, etc. to be used for calculation of the floor-area ratio will be increasing and business and commercial functions of such buildings can be expanded further (Figure 7).
Figure 5

Private building is to be built in the upper space of the reservoir for rain water storage by stipulating multi-level limits (the reservoir for rain water storage is located underneath).

Figure 6

Building A
Building C
(The ground large scale plaza)

Building B
Building D
4. Benefits to the Bureau of Sewerage Brought by this Scheme

(1) Workability and Maintenance

By participating in the Chain Redevelopment Project, the pumping station can be rebuilt without suspending its function as a pumping station. In addition, by redevelopment of the buildings in the District, the structure of joint construction with private buildings will be dissolved, and the new pumping station will have a pumping facility and building with completely independent structure. As a result, it will become easy to conduct regular maintenance and improvement works, etc.

(2) Economic Efficiency

Compared to the case of rebuilding a pumping station independently, participation in the Chain Redevelopment can reduce the cost to acquire a temporary alternative lot. In addition, as the transfer of Zenigamecho Pumping Station is subject to compensation for land readjustment
project, cost for rebuilding the pumping station will be covered not by the budget for sewerage projects but by the budget for land readjustment projects. The costs for the land readjustment project shall be borne by relevant land owners and leaseholders and thus, the Bureau shall also bear some of the costs. However, the Bureau can rebuild the pumping station with a smaller amount of costs than that of the case of independent rebuilding. Furthermore, the Bureau can gain rent income by leasing out some parts of the upper part of the reservoir for rain water storage to private sectors.

5. Conclusion

Located in the center of urban areas, it is often difficult to acquire alternative sites necessary for rebuilding the facilities while maintaining their functions. If a new city plan is being considered around such sewerage facilities, it can be expected to facilitate rebuilding by participating in such city planning.

On the other hand, in order to realize appealing city redevelopment suitable for the city center, it is required not only to improve infrastructure as sewerage facilities but also to make advanced use of land and to coordinate with local characteristics and development plans of the area around such facilities. Therefore, it is important to formulate a rebuilding plan that will contribute to city redevelopment so as not to hinder the original business of the Bureau of Sewerage.

The redevelopment of Tokiwakabashi District started in FY2017 with rebuilding of Zenigamecho Pumping Station, and the project is to be implementer aiming for completion in FY2027.