

Study on the design and construction of a tunnel type sewage treatment plant

Whole term

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(Purpose)

One of the most important issues in planning a sewage treatment plant in a city where there is no existing sewage treatment plant is the acquisition of a land. In addition, many local governments face difficulties due to the insufficiency of the site-staff, the problems of maintaining the land of which the owner does not reside near the land, problems arising in case of the succession of the land not being properly arranged and the problems arising when the neighborhood of the land does not agree with the plan. There are also local governments who find it difficult to acquire a flatland to be used for construction of a sewage treatment plant because of the conditions related to terrains, the nature, the culture, environmental circumstances or the location of industries.

As a solution to such issues, the objective of this joint study was to provide systematic information about design and construction of a tunnel type sewage treatment plant which is an effective means to local governments who find it difficult to acquire sites for sewage treatment plants.

(Results)

Following is a summary of the results of the aforementioned study.

1. Definition of the tunnel type sewage treatment plant

The tunnel type sewage treatment plant is that most of the sewage treatment facilities are included in a tunnel buried in the underground.

2. Characteristics of the tunnel type sewage treatment plant

- ① Saving the land being flat in the limiting area of the sewage treatment plant.
- ② Giving more freedom to select the land area and for the land acquisition.
- ③ Reduction of the adverse environmental effects.
- ④ Operation and maintenance are easy due to being safe from the natural environmental conditions.

3. Service plan and the construction plan

When the plural tunnels are planned to be constructed gradually, if the economical efficiency of excavation as well as the influence on the existing tunnels is considered, it is desirable to initially dig the tunnel entirely.

4. Space for the maintenance inside the tunnel

It is necessary to guarantee a space of 4~5m on the top of the facility inside the tunnel for maintenance.

It is necessary to guarantee a space of 2~3m on one side of the facility for maintenance in case of the planned sewage quantity being 2,000~5,000m³/day. In addition, it is necessary to guarantee a space of 2~3m on both the sides of the facility for maintenance to be compatible with a sewage quantity of 5,000 m³/days or more.

5. Section and the length of the tunnel

When the nature of the facility inside the tunnel, the space for maintenance and the economical efficiency of the construction of the tunnel are considered, it is desirable to plan so as to install the facility over a cross-section with a height and width of 12 m and 10 m, respectively.

The length of the tunnel is set according to the quantity of sewage to be treated, the pollution load and the gradual scheme of execution of the sewer service and etc.

6. Ventilation system

The ventilation inside the tunnel is such that it guarantees the necessary sufficient air for ventilation.

The ventilation system is driven continually as much as possible. In addition, it is necessary to adopt natural ventilation and to install a device for the elimination of the temperature difference

between the air supplied and the air inside the tunnel; in order to prevent the dew condensation of the work space and the facility.

7. Content of the manual

On the basis of the research results mentioned above, the design of the tunnel type sewage treatment plant and the operation manual were prepared.

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Keywords

Tunnel, Sewage plant, Lack of site, Clean capsule