

## Study on revision of Area-Saving system of shield departure shaft lot

Period

July 2003 – March 2004

Text 56P-64P

( Purpose )

Recently, when shield tunnel is constructed in the urban district ,it is becoming difficult to ensure enough space for departure shaft lot . And, even the lot is able to be ensured, the case which it is difficult to arrange facilities by conventional standard is increasing because of small area or various shapes.

To deal with such situations, the cooperative research on Area-Saving of the shield departure shaft was undertaken from 1993, and the Area-Saving system was established.

By attempting efficient improvement of the facilities and effective utilization of the space, this system as one technology enables departure shaft lot. decrease to  $1/3 \sim 1/2$  of required area.

As a result of cooperative research, 「 Design manual (Slurry shield method edition)and(Earth pressure balanced shield method edition)of Area-Saving system for shield departure shaft lot 」 was issued in March, 2001. Since then, this system is promoted, and till May, 2003, 25 cases were constructed by using it . However, in repeatedly results, due to the needs such as generation controlling and resource recycling of the construction sludge, extension of the application range, improvement of the workability, improvement of economics increase, the new and efficient technology is tend to be adopted.

In this study, as things especially requested for this system, efficient improvement of solid recovery facility and recycling of the construction sludge, correspondence of surplus muddy water to the large scale treatment, segmental stock system and extension of application range of gravel storage transport system are examined, as well as the cost reduction and environmental countermeasure are verified without spoiling safety and workability of these systems. As a research result, the manual is revised as the purpose of this study.

(Result)

About the following four addition systems, workability and economical efficiency based on data of the demonstration construction were verified.

### (1) Solid recovery system

The effect of solid recovery system was verified by the comparison of solid recovery rates on the basis of the construction results. For 11.1% without solid recovery system, the mean value of solid recovery rate became 15.5% after the solid recovery system was adopted , and the effectiveness about  $4 \times 10\%$  was confirmed .

And, when solid recovery rate increased by solid recovery system for  $4 \times 10\%$ , as a result of estimating the economical efficiency, that the cost reduction of 7% becomes possible by the adoption of solid recovery system was confirmed .

### (2) Muddy water concentration system

By the muddy water concentration system, that the change to the concentration press which need not add additives from the belt press as a correspondence of recycle of the construction sludge, and the change to concentration decanter for the large-capacity treatment from the concentration cyclone as a correspondence to large-capacity treatment etc. were conducted.

#### 1) Concentration press (Recycling of the construction sludge)

As the result which compared installation necessary areas of belt press and concentration press by the model study from construction results, it became possible about 20% of reduction of concentration press, and that the estimated economical efficiency of concentration press being 11.2% economical was confirmed. In addition, it was confirmed that there will be 28% economical in general, if the generation soil is recycled by the fluidization process of soil.

#### 2) Concentration decanter ( the large-capacity treatment )

As the result of comparison of installation areas of concentration cyclone and concentration decanter by the model study from the test data, it is possible the about 35% of the reduction of concentration press, and

the effectiveness of concentration decanter was confirmed. As estimated result of economics, the use of concentration decanter reduced 4.5% of cost.

(3) Segmental stock system

The standards in correspondence to steel segment and RC segment of over f2550mm was added

(4) Gravel storage transport system

By setting drive- connecting axles and giving the power to the screw from multiple driving transmission division, the driving force of the screw was improved.

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Key Words	Area-Saving, solid recovery, recycling
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