

Research on inside lining method for the sewerage shield tunnel

Period

2000.6~ 2002.3

67P~ 72P

(Purpose)

Though the concrete secondary lining is ever used for the shield tunnel of sewerage, that the anticorrosive function can not be fully expected for the corrosion of the concrete caused for the hydrogen sulfide was clarified. Therefore, "inside lining method" which uses anticorrosive lining of the thin wall for segment inside lining instead of concrete secondary lining is noticed, and the case of construction is also increasing. By inside lining method, that life-extension of sewer and the reducing of excavation cross section can be achieved. Thus, the cost reduction can be expected as well as the shortening of construction period.

In this study, the necessary function for the inside lining method was extracted, and that arrangement of the performance evaluation, evaluation of the performance, verification of the workability and cost comparison with traditional method are carried out. As result, the necessary items are summarized as technical data for applying the inside lining method to the sewerage shield tunnel.

(Result)

1. On reconsideration of the functions of concrete secondary lining

The functions that correction of meander and unevenness, security of the inside smoothness, water proof and water tight, corrosion prevention of the segment has been expected for the concrete secondary lining segment are given. With improvement of the recent shield construction accuracy and the water tight performance of segment, etc., it is possible to satisfy these functions by other methods except for "anticorrosive function of the segment".

2. On the performance required for the inside lining method

The necessary performance for the inside lining method that chemical resistance, integration of segment, watertightness, deformability, abrasion resistance, impact resistance can be listed, considering the anticorrosive lining of the thin wall is directly wrapped to outer segment instead of concrete secondary lining.

3. On evaluation method and evaluation criterion of performances of inside lining method

Evaluation method and evaluation criterion of the performances of inside lining method were selected by standards determined by 「 Concrete anticorrosive guideline (draft)-1997 June - 」 (Japan Sewage Work Agency) and JHS, etc. The mostly expected performance evaluation method of chemical resistance was made suit to the quality standard regulated the D kind in 「 The concrete anticorrosive guideline 」 (draft) as a principle, and infiltration condition of sulfuric to the inside lining layer by EPMA (electron micro analyzer) should be confirmed by 360 days' immersion test of sulfuric acid aqueous solution as a test for estimating more and more long-term chemical resistance.

4. On performance evaluation result of each method

On the inside lining method possessed by 6 companies, the cooperative research were carried out. As result of the performance evaluation, it was confirmed that all satisfied the functions required in inside lining method including the most important chemical resistance.

5. On applicability, workability, economical efficiency of each method

Workability and applicability were verified for applying each method to the shield tunnel of sewerage. And, on the economical efficiency, the 4~ 10% reduction became possible for construction expenses as a result of case study.

On the basis of above study, the necessary items, when the inside covering method is applied to shield tunnel of the sewerage, was coordinated and issued as technical data.

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Key Words

hydrogen sulfide , corrosion proof lining method, Shield tunneling.