論 文 の 内 容 の 要 旨

論文題目　Behavior of Flexible Liner in Buried Double-layered Pipe by Trenchless Renewal
（老朽埋設管の非開削更新における二層構造管のライニング挙動）

氏　名　高　東熙

Causing some problems during the operation (i.e. traffic congestion, inconvenience in daily life, and waste of social cost by frequent road excavations and pavement works), open trench method which has been used for rehabilitation of deteriorated sewer pipe for long times is being replaced by trenchless rehabilitation methods. One of the most common techniques for trenchless renovation of deteriorated host pipes is the cured-in-place pipe method (CIPP) by direct casting a polymeric pipe lining against the wall of a deteriorated pipe. However its liner design has been conducted based on buckling equation by external hydrostatic pressure without considering soil load and traffic load because the behavior of liner in double-layered pipe subjected to cyclic loading (i.e. load transfer to CIPP liners, interactions with the host pipe and the surrounding soil, effect of deterioration of host pipe etc.) has not been fully understood yet.

In this thesis, a series of model tests to investigate the behavior of liner in buried double-layered pipe under cyclic loading have been conducted by using deteriorated host pipe model (i.e. a four-segment and a eight-segment model host pipe) which can deform or keep its shape during the test to model the effects of host pipe deterioration and PVC pipe as the CIPP liner. As a preliminary test of flexible liner, single flexible pipe tests which would be compared with result of double-layered pipe test were performed changing the backfill density. Distribution of acting stress on the CIPP liner was measured by eight internal two-way load cells installed in the PVC pipe, while the CIPP liner deformation was investigated by strain gauges attached in outer and inner surface of pipe and vertical and horizontal potential transducer. Effect of surrounding soil was investigated by tests with backfill soil of different densities. Cyclic load was applied through a rigid plate by stress control to the surface of model ground, so that the model ground was subjected to one dimensional compression. In order to validate effect of host pipe deterioration for more various types, a numerical analysis was conducted as well, and compared the

behaviour of liner in each deterioration type. Host pipe coefficient obtained by model test, which meant the contribution of host pipe in load transfer to the liner was introduced. Finally new design approach supplementing the present design method of JIWET was proposed using host pipe coefficient.