ABSTRACT

The pipe-jacking method using a specialised mechanised jacking machine for laying of pipelines is a relatively new technique first introduced into Singapore about a decade ago. Since its introduction, a substantial proportion of sewer pipelines and tunnels have been laid by this method. It has been claimed that this method is both effective and economical in our local context. Actually how economical is this method? What are the main criteria and justification for its selection and usage?

This dissertation attempts to provide an economic evaluation of this method of construction of sewer and to determine its practical application as compared with some conventional methods. The study shall focus mainly on local experiences. All the types of jacking machine used here would also be introduced and discussed.

Singapore, in general, is highly urbanised, with a high population density. Coupled with land scarcity, there is a pressing need to seek less disruptive methods of installation than the conventional open trench method which would permit more effective and economic utilisation of land. In urbanised locations of adverse soil and water conditions the conventional open trench method usually gives rise to high social and economic costs. The effects of construction works are usually significant and can result in serious impact on
existing services, amenities, properties and especially traffic conditions with associated lengthening of travel times. Such intangible losses were often unaccounted for in the past. The emerging environment consciousness is having an increasing impact both through changes in basic attitudes and through tougher legislation. Is the pipe-jacking method an answer to all these new challenges?

A cost comparison study for four different methods of installation is also carried out. A computer programme "Sewercal" is also developed for the computation of the basic cost of sewer installation for the four different methods. Due to the uniqueness and diversity of project characteristics, constraints and conditions, the programme developed is limited to the certain conditions and assumptions stated therein. Nevertheless, despite its limitation, the programme will provide an useful and convenient mean to determine the cost estimates for the four different methods of installation.

This dissertation demonstrates that there is real economic advantage in applying pipe-jacking technology when all the social and other intangible benefits are taken into consideration and will also provide the first detailed study of local pipe-jacking experiences.