

Slurry Dewatering in the Pipe Jacking Industry

Shih-Yun Liu, University of Leeds School of Civil Engineering

Abstract

Pipe jacking is a trenchless technique for installing underground pipelines, ducts and culverts. The spoil handling system plays a main role in the whole process since slurry system involves in the pipe jacking process. The solids within the slurry need to be separated out during the process. Without separation, the density of the slurry will increase, hence harder to carry out further excavation.

The main waste produced from pipe jacking industry is slurry, which is not allowed for landfill as it is a liquid waste. Therefore, slurry must be pre-treated to become solid before being sent to landfill. In the current practice, slurry is pumped to the centrifuge to produce cake. The centrate is returned to the slurry system. However, cake may not be accepted for landfill disposal as it could be classified as liquid waste. Also, using additives in the separation process has not been defined as hazardous or non-hazardous.

This thesis presents experimental investigations of slurry dewatering by sedimentation, centrifugation and clarifier separation on slurry. The relationship between solid concentration and turbidity has been studied to assess the quality of the separated liquid.

Coagulant did not have an obvious effect on settling behaviour in most slurries, however, flocculant (polymer) did. In centrifugal separation, adding polymer into the slurry increased its liquid limit and water content. When a certain centrifugal force was supplied; the water content of cake may be lower than its liquid limit. The usage of flocculant, water content of cake and the quantity of slurry feeding to the centrifuge reduced when a clarifier was employed. There is a good relationship between turbidity and solid concentration for a given sample. The supernatant and centrate can be returned to the slurry tank to supply the water needed in the slurry system.