Stability issues at Intake UD

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SYNOPSIS. Intake UD in the New Territories of Hong Kong diverts water from a rocky stream into a tunnel system feeding into High Island Reservoir. The majority of the diversion structure is a siphon weir with a height of 9m above downstream ground level. The structure is constructed predominantly of mass concrete with reinforcement provided only in the siphon inlets and hood.

During a routine inspection, staff of the Water Supplies Department (WSD) noted relative movement of adjacent siphon blocks and horizontal cracking of the upstream face. The evidence was completely consistent with a stability failure at mid-height of the structure. However, stability analyses showed that the factors of safety for all load conditions were adequate and in line with normal design criteria.

The structure was designed with a hearting of 'Class C' concrete and 0.76m thick skin of 'Class B' concrete. Stability analyses for the skin concrete, assuming that it had separated from the hearting concrete, showed that the factors of safety reduced to only a little above unity for some possible loading conditions.

Investigations are still continuing but the preliminary conclusions may have implications for larger gravity dams of composite construction.