SEEPAGE PHENOMENON CONTROL BASED ON ELECTRICAL RESISTIVITY METHOD CASE STUDY: THE MIRROR LAKE, NH

B. FATEHI NOBARIAN[1] & N. BEHESHTI ROUY[2]

[1]Associate Member of ASCE, Assistant Research of Department of Civil Engineering, Bostanabad Branch, Islamic Azad University, Bostanabad, Iran

[2]Assistant Research of Department of Electronics Engineering, Bostanabad Branch, Islamic Azad University, Bostanabad, Iran

ABSTRACT

The results of electrical resistivity surveys using cables both surface-towed and stationary (lake bottom)at Mirror Lake, NH suggest that resistivity surveying can be useful for characterizing geologic heterogeneities that control groundwater-surface water interaction, as well as for imaging road-salt contamination. In-situ measurements of seepage coincident with resistivity surveys suggested relationship between resistivity values and seepage rates. Specifically, we observed that seepage rates were low (averaging -22 cm/day) at Mirror Lake where resistivity values were greater than or equal 3000 Ω-m and where they were less than or equal to 100 Ω- m. Low (100 Ω- m) resistivity values were indicative of organic matter deposits. High (3000 Ω-m) resistivity values were indicative of low porosity, poorly sorted till. Intermediate (~ 1500 Ω-m) resistivity values were observed in the regions where seepage rates were highest (averaging -92 cm/day). Core, modeling, and slug test data suggest that these intermediate resistivity values reflect more well-sorted, higher-porosity drift. Resistivity surveys of the suspected region of salt contamination revealed a plume-shaped feature of low resistivity. Low resistivity and high chloride content were confirmed by laboratory analysis of pore fluid. We conclude that the rapidly acquired towed-cable survey can guide placement of higher-resolution, more time-consuming stationary cable surveys. The use of stationary cable resistivity surveys in the very near shore environments (<2 m from shore), which are generally inaccessible with a towed-cable survey, can guide seepage meter placement.

KEYWORDS: Electrical Resistivity, Marine Resistivity, Seepage Flux in Lakes