

# **Petrographical Analysis on Microcracks and Delayed Ettringite Formation (DEF) of Saltwater Intruded Concrete**

## **Abstract**

The purpose of this study is to analyze deteriorated concrete samples from a port that located at southwest of Johor. The structure is exposed to aggressive environment which is seawater. Seawater contains chloride and sulfate which can promote to the concrete and structure deterioration due to chemical and mechanical reactions. Microstructural study which is petrographic analysis is aimed to examine the presence of microcrack and delayed ettringite formation (DEF) in micro-sized scale. Microcrack and DEF images are identified under polarizing microscope. The other method is used X-ray diffraction method as to determine the mineral content while rebound hammer test validates the mechanical strength of the port's structure. Microcracks and zonal boundaries are obviously observed in relation to the DEF content to samples with low mechanical strength. DEF is proven its growth with the 5.7–10.4% of mineral composition, especially ettringite caused the material strength reduced.

## **Keywords**

Delayed ettringite formation; Deteriorated concrete; Microcrack; Petrographic analysis; X-ray diffraction