Topographic Survey and Modelling using Photogrammetry: A Comparison against Electronic Distance Measurement (EDM) Method

ABSTRACT

Topographic surveying has been an important companion to the civil engineer in the development of human civilisation since ancient history. It is used to map terrestrial features on the ground along with its contour heights. Application of this can be seen in the establishing land boundaries and setting out construction projects. Conventional methods of surveying range from ground field methods such as the use of total station to aerial surveys such as photogrammetry or LiDAR. This study looks to assess the feasibility of aerial photogrammetry using UAVs as a replacement to the conventional EDM survey using total stations. This objective was achieved by carrying out both photogrammetric and EDM surveys on a 350m long stretch of highway. The resulting survey data were processed to produce two comparative TIN surfaces of the highway which were then superimposed together and compared for accuracy. It could be observed that on plan view, both surfaces were quite closely matched with a maximum difference of less than 0.4m and a low standard deviation. In elevation view, however, the differences were larger with maximums of 5.0m, accompanied by large standard deviations. RMS error analysis carried out also correlate with the findings.