

## Reliability of the Estimate of Earthwork Quantity Based on 3D-BIM

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**Abstract :** In case of applying the BIM method to the civil engineering in the area of free formed structure, we can expect comparatively high rate of construction productivity as it is in the building engineering area. In this research, we developed quantity calculation error applying it to earthwork and bridge construction (e.g. PSC-I type segmental girder bridge and integrated bridge of steel I-girders and inverted-Tee bent cap), NATM (New Austrian Tunneling Method) tunnel construction, retaining wall construction, culvert construction and implemented BIM based 3D modeling quantity survey. we confirmed high reliability of the BIM-based method in structure work in which errors occurred in range between -6% ~ +5%. Especially, understanding of the problem and improvement of the existing 2D-CAD based of quantity calculation through rock type quantity calculation error in range of -14% ~ +13% of earthwork quantity calculation. It is benefit and applicability of BIM method in civil engineering. In addition, routine method for quantity of earthwork has the same error tolerance negligible for that of structure work. But, rock type's quantity calculated as the error appears significantly to the reliability of 2D-based volume calculation shows that the problem could be. Through the estimating quantity of earthwork based 3D-BIM, proposed method has better reliability than routine method. BIM, as well as the design, construction, maintenance levels of information when you consider the benefits of integration, the introduction of BIM design in civil engineering and the possibility of applying for the effectiveness was confirmed.

**Keywords :** BIM, 3D modeling, 3D-BIM, quantity of earthwork

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