ABSTRACT

Proper interpretation of existing field conditions in pre-construction is a vital, yet often under-utilized principle with respect to the construction efficiency of an urban project. The quality of information available to the contractor is directly proportional to the quality of investigation, data collection and data interpretation. Faulty prediction or misinterpretation of existing adverse conditions yield additional cost to all parties involved in construction. Further, the process of navigating changes to contract work due to unforeseen or misinterpreted conditions can greatly alter project cost, anticipated schedule, and finished project quality. Urban infrastructure and building development projects, in particular, involve heavy rock excavation. These, as the first construction activities on a project, often involve the bulk of the project’s unforeseen conditions due to faulty prediction of rock behavior. Correlating rock mass categorization and accurate predictive modeling allows for better indication of a rock mass’s resistance to excavation. Creating a theoretical correlation between existing geology and excavation methods yields lower overall cost to the project owner and flexibility to the contractor, allowing for higher profit margins.

This research has the purpose of correlating parallels between rock mass classification and excavation efficiency by utilizing standard empirical relationships found in rock support and rock fracture analyses and developing theoretical modifications to existing production and cost models for rock excavation. Further, opportunities provided by technological advances in investigation and monitoring are presented to encourage active project controls and method alteration in the presence of new information during construction. As a practical guide, increased knowledge leads to increased efficiency in excavation and construction. With urban cities experiencing increasing population densities, taller buildings, underground
Infrastructure modifications, and the potential for completely underground construction are becoming more prominent in urban construction. A common and practical guide for expected excavation rates helps to curb the unpredictability associated with rock excavation, allowing practical collaboration between property owners, designers, and constructors of projects.