Performance assessment on influence zone of existing structures for metro construction

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Abstract

The current mega cities such as Kolkata, Mumbai developed over centuries from even before colonial times and they now consist of old parts and new parts. Though underground construction even in the new parts is not an easy task, in the highly built-up old areas with narrow lanes, going underground while saving what exists above ground is a daunting task. Such a situation arose while taking one of the lines of Delhi Metro through the area of "Old Delhi". Monitoring the ground features, including old building and monuments during construction became essential. Underground construction, as carried out for East-West metro Kolkata or Mumbai metro line 3, demanded extensive monitoring to assess ground movement and displacement depending upon depth and volume of works underground, soil conditions and foundations of existing buildings and utilities. The paper highlights geology, protecting existing structures, ground movement, construction method, and safety aspects in planning and construction.

Keywords: Geology, Assessments, Heritage Structure, Condition Assessment, Mitigation Measures, Safety

1. Introduction

Cities grow over centuries- some of them over millenniums. The prevalent mode of transport a few hundred years ago may no longer relevant or not enough today. Comprehensive and integrated multimodal transport system is need of the day. Mass Rapid Transit System elevated and under-ground in most of the urban India is a necessity.

Underground corridor portions of Mass Rapid Transit Systems (MRTS) are in general carried out by tunnelling (precast concrete tunnel segments), while stations & shafts using cut-and-cover approach, either top–down or bottom-up depending upon site conditions. In some areas NATM approach may also be used for majority of existing structures within the zone of influence. Accordingly, it is anticipated that the selection and proper use of tunnelling method appropriate to the sub-surface conditions encountered is important to control ground movements. If required additional protection needs to be applied to avoid damage to the existing structures, old or new.

Heritage buildings, as monuments or as living quarters in old cities must be treated with respect as the cultural umbilical cord connecting the hoary past and the rising future. Any new construction in the old areas of historical cities must be careful not to rupture such connections even as they establish newer ones.

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