Temporary Support Design for Cross Passage Construction

Y. R. Reddy

L & T Construction, Engineering Manager, Chennai, India

Contact: ramanareddy-yeruva@lntecc.com

Rakesh Singh

ATKINS, Senior Engineer, Bangalore, India

Contact: rakesh.singh@atkinsglobal.com

Abstract

The temporary support design for the cross-passages construction are estimated by using the Q-value assessment of Barton (2013) and validation of Q-value system using finite element analysis package PLAXIS 2D. The Q-value is obtained from the GIRs and from face-mapping on site to provide the appropriate rock support solution. The Barton Q-value is an empirical approach, validation of the minimum support category is required to ensure its applicability to the site specific ground conditions. The validation of Q-value system is carried out by using finite element analyses with Mohr-Coulomb constitute model. The unsupported cross passages excavation are considered in finite element analyses and the results shows that the rock is self-supporting and Barton Q-value system is appropriate to the ground conditions encountered.

Keywords: Cross passage, temporary support, Barton Q-value, shotcrete, unsupported excavation, Finite element analyses

1 Introduction

Cross passages generally connect two parallel tunnels transversely or a connection between emergency exit shaft and tunnel along the alignment (2). It helps in providing safe egress route to the passengers in case of emergency as well as helps in maintenance and inspection. The primary lining design for the cross-passages construction are estimated by using the Barton Q-value assessment (1). To validate the minimum proposed solution of a superficial layer of shotcrete, the unsupported excavation for the cross passage designs have been modelled in Plaxis 2D.

2 Cross Passage Temporary Support Analyses and Design

The cross passages typical geometry is as follows: a minimum width of about 1500 mm and a height is 2100 mm. Sometimes, for the accommodation of MEP (Mechanical, Electrical and Plumbing) an extra width of section may be proposed at the central part along the cross passage see Figure 1 (a). The cross passage joining the two tunnels vary in between two adjacent rings of tunnel lining along the width of a segmental ring. By which the cross passages moves from straight to a skew at different locations. At the deep location of the vertical alignment cross passage with sump proposed for collecting the drainage water. The sump in the cross passage shall be constructed

https://doi.org/10.2749/stockholm.2016.2811
Distributed by structurae