



# Determine of tunnel face stability pressure in EPB machine with use analytical methods (Case study: Mashhad metro line2)

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## Abstract

This article discusses the face stability of the soil in front of the TBM cutterhead and includes calculations of face stability for 27 cross sections for Mashhad Urban Railway Line 2 with use analytical methods. In the case of the Mashhad Urban Railway Line 2 Project a TBM will be applied with an Earth Pressure Balance shield. The objective of this study is to advise on a support pressure which has to be applied during the different phases of the tunnel boring process of Mashhad Urban Railway Line 2.

The 27 cross sections have been selected for their spreading over the sections between the stations and the locally present soil overburden. During the shield tunnelling process, subsoil is cut loose by the cutting wheel. Due to this process a free standing soil wall (cutting face) is created. If the free standing cutting face is not supported, a risk of instability according to a number of failure mechanisms exists. The main failure mechanism, which may occur, is inward collapse or cave in. This failure mechanism may be further divided into local collapse and global collapse. To prevent the cutting face from collapsing, a supporting pressure can be applied by the TBM.

**Keywords:** Face stability, Analytical methods, EPB machine, Mashhad Urban Railway line2.

## 1. INTRODUCTION

Mashhad Urban Railway line 2 with total length of about 14Km is extended from North-East of Mashhad, around Northern Tabarsi St. and to South-East Television Sq. (Jomhury) and contain 12 stations along the route. Based on the Mashhad Comprehensive Transportation Studies, 4 lines have been considered for Mashhad urban railway would service the 25% share of urban trips leads to around 6.25% for each line. The line 2 shall be able to prepare services for about 10000 passengers per hour per direction. Figure (1) shows Mashhad geographical location in I.R.Iran.

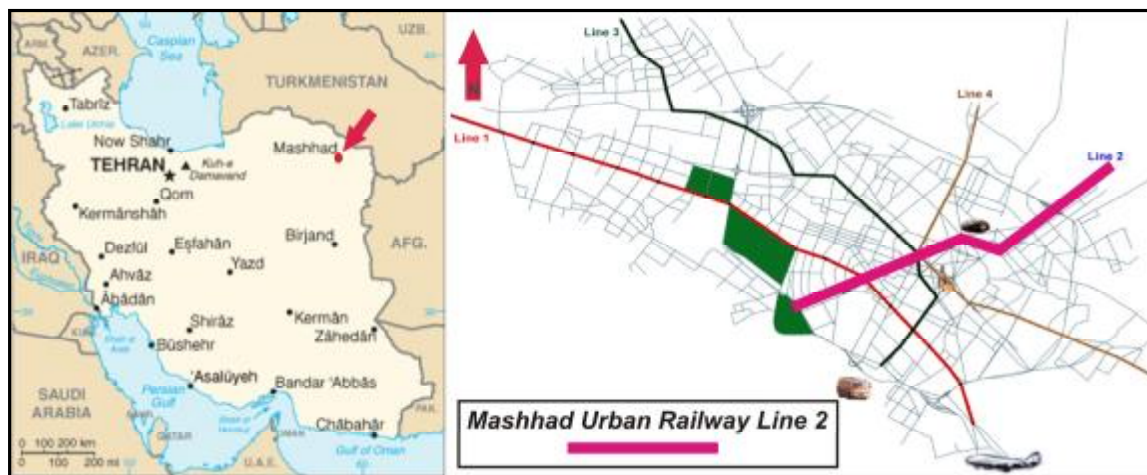


Figure 1. Mashhad geographical & MURL2 location

The tunnel was bored by two earth pressure balance (EPB) shield and the advance rate depending on the ground conditions encountered. The characters of this EPB machine presented in table (1).