

A study on the depth-tunnel mechanized excavation and optimum cross-section in GTX (Great Train eXpress) tunnel

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1. Introduction

Seoul national capital area witnesses an ever growing transport coverage due to rapid expansion of the city such as the Second Phase New Town Development, severe traffic congestion everywhere caused by automobile intensive transport, and low commercial speed (30 ~ 40km/h) of the existing railway system, which requires construction of wide area express railway.

Furthermore, there is insufficient underground space in Seoul available for use considering the subway line 1 to 9, the underground conduit including the wide area railway and power line conduit, underground road system construction plans, transformation of Seoul-Incheon railway in to subway, etc.

Considering the need of wide area express railway (GTX) and restricted underground space, the GTX plan that uses the very deep underground space provided an alternative. Use of the great depth space may meet the two realistic needs: realization of high speed railway thanks to straightened line system using the public land and the underground of private land, and provision of available additional underground space.

Behind these needs are the followings:

- 1) Expansion of metropolitan commuting area
- 2) Insufficient transport capacity of metropolitan railway
- 3) Need for improving global competitiveness of metropolitan area

Metropolitan GTX construction and operation, however, needs close review of various aspects.

Construction of GTX that will run in a great depth tunnel at a commercial speed of 100km/h (design speed of (200km/h) raises many problems including safety problems considering passing near the skyscrapers on the private land, vibration during construction and operation, disaster prevention plans and huge cost of construction, etc.

Therefore, this study will first, provide the result of the study on TBM construction and NATM excavation method considering the effect on adjacent buildings under the great depth environment, second, Review the optimal cross section of the tunnel considering economic construction of the tunnel, ventilation and exit way in the tunnel, disaster prevention facility such as emergency exit(corridor); and drive resistance, micro-pressure wave and rail center separation caused by fast driving in the great depth tunnel.

Table 1 : The commercial speeds of local and international metropolitan railways

Region	Capital area(Korea)	Tokyo	Paris	London
Commercial speed (km/h)	Wide area 39.5	Peak: 52.5 Non-peak: 64.1	(RER) 53.2	Wide area(NSE) 59.0

Source: How to improve metropolitan railway operation system (KORAIL,2003)