Double-Decker - Nagpur Metro Flyover with Spine & Wing Superstructure

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Abstract

The rapid urbanisation demands the development of National highways (NH) & Metro corridors. However, the space available for the transportation structures is only the existing road width, which becomes a deadlock for executing agencies. The Nagpur Metro rail development & NH flyover work along the demanding Wardha road happened to follow suit. The 3.4Km stretch of NH & Metro alignment coincided between Ajni and Airport Road. The challenge became an opportunity to construct a double-decker, however, with various riders such as aesthetics, a stringent schedule, and overall economy. The stretch also included three stations and one obligatory span, which resulted in a Link Bridge for passenger movement and extended pier caps. The multilevel structural arrangement resulted in the optimisation of land use, materials, and other precious resources. The successful implementation of a double-decker became a trend-setter for various upcoming projects.

Keywords: Double-decker; Metro; Flyover; Spine and Wing; Combined Pier; Link Bridge; Aesthetics.

1 Introduction

The National Highways Authority of India (NHAI) proposed an elevated corridor of 3.4km on NH-6 passing through Nagpur city, wherein the alignment coincided with the metro alignment proposed by Maharashtra Metro Rail Corporation Ltd. (MAHA-METRO) between the New Airport and Sitaburdi. The Chatrapati junction on the alignment had an existing flyover, which necessitated the demolition of an existing structure. The initial independent planning by both authorities resulted in two separate structures, wherein the flyover was proposed to be supported on portal piers and the Metro viaduct by single cantilever piers at 25m intervals placed alternately with portals. The minister overseeing project monitoring directed authorities to investigate the possibility of a common solution. Hence, the double-decker with metro alignment on top of the flyover is conceptualised in consultation with all the stakeholders.

The combined alignment eliminated land acquisition requirements. The Metro alignment comprises a viaduct with two tracks and three stations at Chatrapati Square, Jayaprakash Nagar, and Ujjwal Nagar. The NHAI flyover comprises 4-lane divided carriageways for most of its length and a part of 6-lanes to accommodate traffic from a merging flyover connecting Manish Nagar to the elevated corridor at Ujjwal Nagar. The consultant proposed a scheme with a spine and wing superstructure for the flyover that allowed a single combined pier for the metro and flyover.

The metro station platforms and buildings in the double-decker portion are divided due to the presence of a viaduct. However, connectivity between two platforms in metro stations is vital for passenger movement. This obstacle had been

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