

A Possible Underground Roadway for Transportation Facilities in Kathmandu Valley Ring Road: A Racking Deformation of Underground Rectangular Structures

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Abstract

The increasing number of private cars, public transportation vehicles, and pedestrians, as well as the absence of adequate space for these ground amenities, are the primary causes of traffic congestion and accidents in the Kathmandu Valley. Investigations have indicated that the Kathmandu Valley has the greatest traffic accidents despite the heavy presence of government and its agencies there. Most teens and young adults suffer injuries while using motor vehicles. The study's primary objective is to foresee and prevent such complications by planning for sufficient subsurface infrastructure for the Kathmandu valley's transportation network. Overlying pressure, lateral earth pressure, live load, uplift pressure, and live surcharge are some of the forces acting on the tunnel, creating unique stress and moment zones. The tunnel meets the following geometric requirements: a) each of the tunnel's two cells has a clear span of 10 meters and a clear height of 5.5 meters. The side walls, inner walls, top slab, and bottom slab are all 700 mm thick. Soil has built up to a height of 4m over the tunnel's roof. Construction sequencing, the application of various loads during construction, and expected service life are all taken into account during the design process. Analytical and computer software (SAP 2000) are both used in the tunnel segment's analysis. Furthermore, the designed tunnel has been evaluated for stability, considering the deflection and shear resistance. The analysis indicates that the tunnel meets the stability requirements, as the checks performed for deflection produce satisfactory results. This implies that the structure is capable of withstanding the applied forces without excessive deflection.

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