Formulation of a Rapid Transit Route Network for Colombo

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Abstract

Colombo, as many major cities in the world with a growing population and an expanding economy, is facing the challenge of meeting the demands of increasing mobility needs within the city in terms of quantity and quality. Over the past few decades, land transport in Colombo has evolved in to traffic clogged roads especially during the peak hours making access and mobility between households, work places and other important locations a time consuming and a tiring task. Therefore, improving the mobility and accessibility in the inner core of the city, has become one of the major requirement of the country.

A review of literature for the possible interventions suggested that an elevated mode of rapid transit is the best due to the unavailability and high costs of lands in this area. The other supporting reasons for such a system are the comfort, ease of access, less obstruction for the existing road traffic and hence low travel time between origins and destinations. Therefore an elevated system is likely to attract more private vehicle users, provide more options for public transport commuters and reduce road traffic congestion while improving the accessibility and mobility. Formulating the most effective and efficient route network to solve the mobility issue is therefore at utmost importance.

The access locations of the rapid transit system which is the most important component of the network, were identified with due regards to the major trip generation points (Residential areas, apartment buildings and etc.) and major trip attraction points (office complexes, schools, recreational facilities, transport nodes, super markets and public places like hospitals and etc.). Possible major stations (nodes) were selected within the walking distance (500m) of majority of these trip attraction and generation points considering the land availability and security reasons as well.

The routes were identified through minimum spanning tree process in order to minimize the cost of construction by minimizing the total length required to cover the identified locations and by taking the difficulty of construction (sharp bends and etc.) and required land acquisition in to account. Possible connections between the nodes along the existing roads

that are possible to connect were identified with their distances. All these links were converted to equivalent cost figures which has taken the length, difficulty of construction and required land acquisitions in to account. A cost matrix was then formed between the nodes.
In order for the cost to be a minimum, these nodes have to be connected with the links with minimum possible costs. Therefore, the minimum spanning tree method was utilized to connect the nodes. Using the cost matrix, a minimum spanning tree was developed to connect the identified nodes (possible RTS stations).

From the developed minimum spanning tree network, the RTS network was derived while giving due attention to the construction and operational aspects. Special attention was given to the possibility of creating loops and connecting links with other available transport modes such as railway and bus transport.

Key words: RTS Network, Minimum Spanning Tree

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