An Integrated Approach to Reduce Intra City Traffic at Coimbatore

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Abstract

Coimbatore (11.0168°N, 76.9558°E) is a fast developing cosmopolitan city with large number of industries and educational institutions. The development has lead to a large number of vehicles causing heavy traffic. The traffic congestion at Coimbatore has been a major problem which causes traffic jams and accidents. The major reason for traffic has been the mofussil buses that operate in the city. Around 1300 mofussil buses enter into the city, these buses play an important role in traffic congestion. The best solution is to construct a centralized bus stand at the outskirts of the city. This would reduce the traffic, accidents and also leads to development of the outskirts of the city. A suitable location near the city with sufficient road access to connecting cities has been chosen and the bus terminus has been designed, modeled with all facilities and features.

Keywords: Coimbatore Bus Traffic, Bus Terminus Design, Modeling of Bus Terminus, Centralized Bus Terminus

I. INTRODUCTION

Traffic congestion due to mofussil buses is a major trouble at Coimbatore (THE HINDU - march 21), which is also a major reason for accidents. The major bus stands are Ukkadam bus stand, Gandhipuram bus stand, Singanallur bus stand, SETC bus stand. Around 1500 buses are handled by these bus stands in a single day. These bus stands connect major cities like Trichy, Madurai, Salem, some parts of Kerala and mostly all major part of Tamil Nadu. All the buses enter the city causing heavy traffic. The apt solution for this problem is the construction of a centralized bus terminus. Centralized bus terminus that is planned to be constructed must have easy access to the city and all connecting routes to other cities. The terminus must have all amenities for the comfort of passengers. The paper contains, choosing of apt location, planning, design and modeling of the bus terminus. It also includes detail estimate for the construction of the bus terminus and the income forecast details.

II. CHOOSING LOCATION

The first and foremost step is choosing the location of the bus stand. Various important factors that has to be considered while choosing a location for the bus terminus are,

- Accessibility from the city
- Road connectivity to major cities
- Availability of vast barren land

Other factors like operational considerations, turning, layover, driver change are also considered. A feasibility study was done to choose the location of the bus terminus. Considering all the factors, VELLALORE (10.9778° N, 77.0277° E) was found to be the apt location for the centralized bus terminus.

Fig. 1: Location of Vellalore.
A. **Suitability of the Location:**

Vellalore is a panchayat town and a western suburb of Coimbatore. Vellalore is situated at the outskirts of the city. It is a place that has a lot of unused lands. Construction of centralized bus terminus at this location improves the locality to a greater extent, this would pave way to the extension of the city.

B. **Accessibility of the Location:**

Accessibility from the city is an important factor, where Vellalore has accessibility to avinashi road, one of the important roads of the city. Avinashi road is just 7 km away from Vellalore. Avinashi road can be Accessed by vellalore road and kamaraj road.
The road that connects avinashi road and vellalore is a single lane road and cannot handle the traffic when the bus terminus is in use. The road must be made as a two lane road to accommodate the traffic. Another major reason for choosing this location is that it lies on NH-544(formerly known as NH- 47). NH-544 connects major cities like cochin, thrissur, salem, kaniyakumari. This road is currently a two lane road but actually as per the agreement of government with L&T, the road must be made as six lane road. So this road can sufficiently handle the traffic of the mofussil buses.

III. DESIGN REQUIREMENTS OF THE TERMINUS

A. Capacity:
The centralized terminus that is planned is an integration of Gandhipuram bus stand, Singanallur bus stand, Ukkadam bus stand, SETC bus stand. Therefore, the capacity of the bus terminus must occupy the handling capacity of all these bus stands. On calculating the number of buses that is handled

By all these bus stand was found to be around 1500 buses, where Gandhipuram bus stand alone handles 648 buses that travels to 14 different destinations. Area of the bus stand, bus shed and parking facilities must be in accordance with SP7- National building code 2005. Three wheeler and taxi stand area must be 500m2 for 15,000 populations. Bus terminal must have an area of 4000m2 for 1,00,000 populations. Bus depot must have an area of 2 hectares for 5,00,000 populations. These area requirements must be adhered.

B. Interior dimensions:
Interior dimensions include the design of bus bays and turning spaces for buses. Taking a multi-axle bus into account, length is 12 m and breadth is 3.2m and a turning radius of 10m. 15 bus bays may be provided in a single side. A factor in the location of a terminus is how to turn the bus around to start the route in the other direction, which may be difficult in areas where road space is an issue, or the road layout prevents U-turns. This does not apply for true circle routes, where buses simply operate permanently in the clockwise or anti-clockwise direction. Termini in bus stations will often include reversing/run-around space, negating the turning issue. If numbers of bays are increased, it would increase the walking distance of a passenger. Entry and exit must be designed such that buses can turn and move inside easily.

C. Sanitary and drainage requirements:
Bus terminus will be used by a large number of persons. In such a case sanitary requirements is very important. Number of water closets for male, female, urinals for male, wash basins, shower stalls must be provided in accordance with part ix section 2- Drainage and Sanitation of National Building Code of India. Separate sanitation facilities are to be provided for passengers and for drivers and other administrative workers in the terminus. Drainage must be provided such that no water must get stagnated. Adequate storm drains must be provided.

D. Practical considerations:
Provisions for future extensions without dismantling should be made in the planning. Proper planning should be done to prevent any congestion within the bus terminus. A bus terminus must have all amenities that can comfort the passenger. Amenities like, hotels, pharmacies, staying rooms, waiting hall, locker rooms, ATM facilities must be present in a bus terminal. Structural stability is so important and must bear any natural disaster. Each element like beam, slab, column, staircase, water tank must structurally bear the loads. Since number of passengers will be more or less constant and huge on regular basis, proper design of a septic tank is mandatory in order to avoid physical discomforts for both the passengers as well as environment. Septic tank design must be done in accordance to IS2470.

IV. DESIGNED CENTRALIZED TERMINUS

A centralized bus terminus which would be sufficient to handle the mofussil bus traffic at Coimbatore has been planned and designed. The designed bus terminus has a land area of 30 acres. It can handle up to 1600 buses with 8 platforms and 160 bus bays. It can station up to 250 buses. The total built up area of the platform is 10,800m². The terminus also includes a G+1 building with a built up area of 12,000m². The terminal building has various amenities like, 4 hotels, 2 veg and 2 non-veg hotel ,6 smaller eateries inside the terminus, Two 24-hour pharmacy and first-aid facilities and medical assistance, Shops, supermarkets, ATM, rooms (a/c and non-a/c) for rent, Toilets, Wheel chairs are provided for the physically disabled, Passenger waiting hall, Locker rooms. Terminus also includes a 6400m² area for two wheelers and for wheeler.
V. STRUCTURAL DESIGN

Each and every structural element of the bus terminus which includes beam, slab, column, water tank, septic tank has been designed to bear all loads with adherence to Indian standards. Design has been done manually and also analyzed through STAAD Pro.

VI. PAVEMENT DESIGN

Rigid pavement is composed of a concrete surface course and an underlying base and sub-base course (optional) and is stiffer than the flexible pavement. The cement concrete may be plain, reinforced or prestressed concrete. In the rigid pavement the load transfer phenomenon is quite different than the flexible pavement. The concrete surface layer alone provides most of the rigid pavement. The flexible pavement requires maintenance and routine repairs every few years and they deteriorate rapidly, cracks and pot-holes are likely to appear due to poor drainage and heavy vehicular traffic. Thus rigid pavement is preferred even though the initial cost is high, it will be economic in the longer run compared to flexible pavement. Hence rigid pavement is designed in accordance to IRC 58.

VII. MODELING & RENDERING

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Modeling and rendering any structure has become an essential component as they portray the real time structure. Building Information Modeling (BIM) is the fastest developing one nowadays. Modeling gives a neat and clear cut idea of each and every element of the structure. Revit Architecture has been used for modeling and lumion has been used for rendering and walkthrough, to show the real time design of the centralized terminus.

![Fig. 7: 3D view of bus stand](image1)

![Fig. 8: 3D view of bus base and utility area](image2)
VIII. ESTIMATE & INCOME

The total cost for the bus terminus is estimated to be around 87 cores.

Income from the bus terminal has been calculated based on half occupancy. Monthly revenue from the bus stand has been analyzed to be as follows:

- Shops - 8,80,000
- Single room - 1,92,000
- Double room - 3,12,000
- Restaurants - 8,00,000
- TOTAL - Rs. 21,84,000

Apart from the above the bus stand will also fetch more indirect benefits to the government as well as to the Vellalore locality in the aspects of physio-economic growth.

IX. CONCLUSION

Coimbatore, the Manchester of south India houses more than 25,000 industries. It has a very fast growth rate in economic means. Due to this development it has lead to in city bus traffic. Centralized bus terminus at the apt location is a permanent solution. The bus terminus can also be extended in future if required. Construction of this centralized bus terminus at vellalore not only reduces intra city bus traffic but also yields an income of 21 lakhs per month and also leads to the development of the locality leading an extension to the city.

REFERENCES