

# Railbus from Edappally Railway Station to Vallarpadam Container Terminal

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## ABSTRACT

With the increase in population tremendously there is an increase in demand for public transportation. There exists an 8.5 km broad gauge line from Edappally railway station to Vallarpadam Goods Terminal which is presently underutilized (utilization is less than 10% only) and Kerala Rail Development Corporation Limited wants to explore the feasibility of providing passenger Rail Bus connectivity to this Vallarpadam station. This project proposes to run a 2-3 car railbus from Edappally Railway station to Vallarpadam Terminal over the underutilized rail connectivity to International Container Transhipment Terminal, Kochi. Study of routes covered by bus transport is carried out. Based on the location of stations and the density of commuters at that station, the study is carried out. Two intermediate halt stations are also proposed at Chittoor road and Mulavukad and they are well placed to accommodate the traffic needs. The principal benefit of the project would be that it provides a faster and cheaper transport between Edappally and Vallarpadam without entering the busy Ernakulam city limits.

**Keywords:** Railbus, feasibility, connectivity

## 1 Introduction

Indian cities are growing rapidly. There is a need to guide growth at the early stages of their development in a coordinated manner, with sufficient attention to the transport system. Cities are seeing a dramatic rise in the number of personal motor vehicles, with extreme congestion and emissions being the most noticeable manifestation of the rise in motor vehicle number. The effort to address the problem would have to focus on improving the public transportation system. This will allow mass transit systems such as metro, bus rapid transit, light rail transit, etc. to be introduced in many cities. Mass Rapid Transit Systems (MRTS) in urban areas not only promote simple and fast movement of people but also have a positive effect on the economic development and quality of life. It results in increased income and multiple benefits to the community including decreased economic expense due to reduction in traffic congestion, road and parking expense, transport cost and per-capita traffic accidents.

## 2 Objective

The study of connecting Edappally railway station to Vallarpadam Container Terminal by a railbus aims to:

- reduce traffic congestion in the road
- reduce travel time of commuters
- seamless mode of transport
- promote tourism



At present, commuters in the region of Vyppin and Mulavukad lacks direct connectivity to their destination like Aluva, Edappally, Vytilla and Kakkanad. Commuters have to alight at the high court junction and board the next bus to their destination. Lack of direct buses increase their travel time in addition to the traffic congestion in the road. A seamless mode of transport would reduce their travel time and enhance their travel experience. Reis et al (2012) proposes a tourism model for rail trail which illustrates six characteristics-physical features, length, heritage, gateways, environmental aspects and scenery. The study area which has a stretch around 8 km has the potential to attract tourists to enjoy the beauty of Kochi back waters.

### **3 Methodology**

The study of connecting Edappally railway station to Vallarpadam Container Terminal by a railbus involved:

- Identification of several bus routes connecting Edappally and Vallarpadam
- Determination of traffic flow
- Check the feasibility of railbus in the existing railway line connecting Edappally and Vallarpadam
- Typical station model at Chittoor road (Vaduthala) and Mulavukad

Inorder to attain the above objective, enormous data was collected. Data includes land use studies, population studies and and traffic studies in the selected corridor. The collected information is used to understand the current state of the transportation system and bring forward optimum solutions. The data is collected in terms of surveys. Various surveys are conducted to gather information on the present corridor characteristics, the passenger demands, flow pattern in a particular route etc. the whole analysis depends on the collected data. Furthermore, the data collected can also be used to justify a future developmental transportation project. Following transportation studies were undertaken to meet the above objectives:

1. Reconnaissance Survey
2. Population study
3. Existing Bus Service Survey
4. Traffic Volume Count (TVC)
5. Bus operator Survey
6. Bus passenger interview Survey
7. Boarding and Alighting Survey

The reconnaissance survey was conducted by visiting the study area and collecting the relevant information such as the present road conditions, public transport mode in the route and the different alternative routes connecting Edappally and Vallarpadam. After checking up on the different routes, the above listed surveys were conducted. In addition to reconnaissance survey, population forecast studies was studied from the Comprehensive mobility plan (2017) conducted by Urban Mass Transit Company for the Kochi region. As per the census, there is a decadal growth rate of 8.9% in population. The next step was the data analysis which included the ridership calculation, coach design, ticket faring and station modelling. With the collected data and obtained results, the railbus parameters were designed such as the station modelling, the number of coaches required and railbus specifications. In addition to the above survey,

## 4 Results and discussion

### 4.1 Existing Bus Service Survey

Existing Bus Service Survey is conducted to study the existing bus facilities in the proposed roadway section. Through this, we gather information about the existing number of buses through the road. The survey was conducted for ridership calculation and calculation of the number of coaches. The number of buses via Edappally to destination zones through all routes per day between 6:00 am and 8:00 pm is given in Table 1.

**Table 1: Details of no. of buses via Edappally**

Service operator	No. of buses
KSRTC/KURTC	26
Mofussil permit	42
City permit	79
Total	147

### 4.2 The ticket fare fixation

The ticket fare from all these stations is determined based on the distances between the stations and based on IRCTC regulations of ticket rates. According to the IRCTC data, the minimum charge (0-5km) for second seating is Rs.10, the base fare for minimum distance is Rs. 5, the reservation fee is Rs. 15 and the rate of the platform ticket is 5 per person. So considering this, Table 2 gives the details about the ticket rate fixed from these 4 stations.

**Table 2: Identified ticket rate**

Stations	Edappally	Chittoor	Mulavukad	Vallarpadam
Edappally	10	10	15	20
Chittoor	10	10	10	15
Mulavukad	15	10	10	10
Vallarpadam	20	15	10	10

### 4.3 Ridership calculation

Edappally is well connected by bus service and the reasons for Edappally and ICIT Vallarpadam not being the natural origin and destination points since Vyppin and other related regions lie outside the city limits and no direct buses are connecting them to the city regions. There are no compelling reasons, except less time, at present for commuters to shift from bus to rail. The commuter explains that they would rather wait and watch for the railbus to start operating to see the timings, price and road connectivity from Edappally railway station to NH / Edappally junction. The advantages of this new corridor is seamless connectivity between an

employment generation hub like Edappally with a less accessible region. Lu, R. (2018) conducted a comparative study of rail and bus travel by low income group and found convincing evidence that low-income groups made more trips with the rail than the bus trips. In this scenario, the traffic expected has to be worked out. Nithya et al (2020) conducted prefeasibility studies on light rail transit in Kochi and expected ridership was calculated using the number of bus trips. Similar steps are followed here based on the number of buses operated in the four routes to Edappally.

Number of bus trips from origin zone to destination zone from 6:00am to 8:00 pm is calculated as shown below:

- During peak hour traffic of 4 hours (8:00-10:00 am in the morning and 4:00-6:00 pm in the evening), buses at 2-3 minutes are there. So, number of buses =  $(4*60)/2.5=96$  buses.
- So, ridership =  $96*42 = 4032$  people (42 is the occupancy in bus, as identified by occupancy survey)
- During non-peak hour traffic of remaining 10 hours, buses at 5-10 minutes are there. So, number of buses =  $(10*60)/7.5=80$  buses.
- So, ridership =  $80*42*0.3= 1008$  people (42 is the seat number in bus and only 30% is occupied, as identified by occupancy survey)

#### **4.4 Calculation of the number of coaches and schedule**

The number of coaches of the rail designed based on the traffic studies and ridership calculations. Total expected traffic on the railbus per day in peak hour=4032 people

- Considering trips at 15min interval during 4 hours of peak traffic (8:00am -9:45am and 4:00pm-5:45pm):
- Number of trips= 16
- Expected traffic in one trip =  $4032/16 = 252$  persons.
- Integral Coach Factory (ICF) coaches are conventional passenger coaches used on the majority of main-line trains in India. According to ICF, the capacity of the second sitting coach is 108 seats.
- The capacity of one coach = 108 persons.
- For the traffic of 252 persons,
- No of coach required =  $252/108 = 2.33$
- It demands 2 coaches with standing traffic allowed.

Similarly, total expected traffic on railbus per day in non- peak hour =1008 people

- Considering trips at 1 hour interval during 10 hours of non-peak traffic (6:00am-7:00am, 11:00am-3:00pm, 6:00pm-8:00pm):
- Number of trips= 10
- Expected traffic in one trip =  $1008/10 = 100$  persons.
- The capacity of one coach = 108 persons.
- For the traffic of 100 persons,
- No of coach required =1

#### 4.5 Station modelling

A typical model has been designed for the proposed four stations. The modelled stations was done in SketchUp software as per the station specifications. The specifications are taken from the Manual for Standards and Specifications for Railway Stations (2009). The elevation is as shown in Figure 1. A plan of the proposed railway station with the required amenities is as shown in Figure 2.

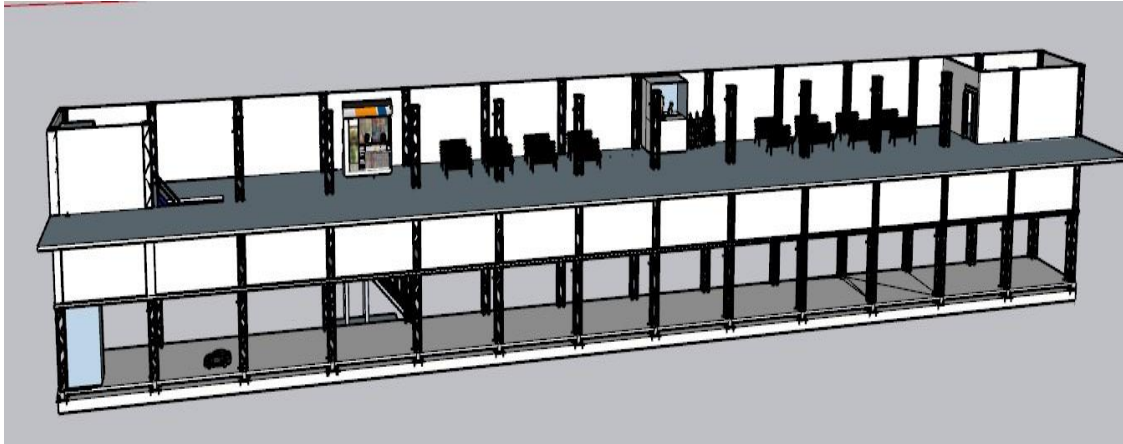


Figure 1: The two-floored halt station drawn using SketchUp software

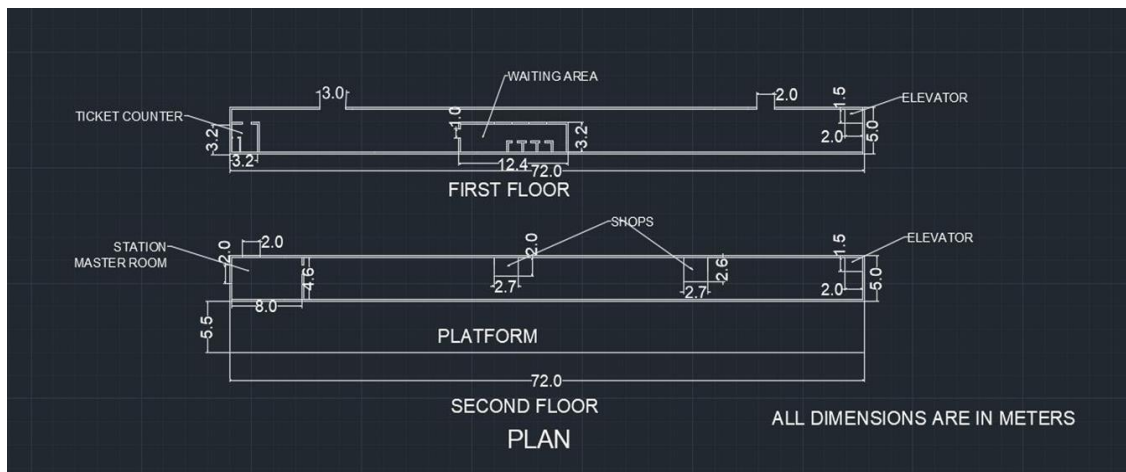


Figure 2: AutoCAD plan of the halt station

#### 5 Conclusions

The freight rail track between Edappally and ICTT Vallarpadam is underutilized, so running railbus over the existing track is technically feasible. There is potential for 2 halt stations, one at Chittoor road crossing and another at Mulavukad Container road crossing and the terminal station can be located inside the ICTT terminal. Station modelling of the proposed halt station at Chittoor Road and Container road was done in SketchUp software as per the station plan prepared. The passenger shift from the existing mode i.e. city bus is limited, therefore more traffic potential could be enhanced by integrating this railbus traffic with water metro and also by making a road in the additional land acquired for the 2nd line of ICTT rail connectivity. Two coach railbus can be scheduled to run at every 15 minutes during the peak hours in both directions and 1 coach railbus at 1

hour can be run in both directions during non-peak hours. Private traffic is not included in design. It was a limitation as there was no direct one route between Edappally and Vallarpadam. The principal benefit of the project would be that it provides a faster and cheaper transport between Edappally and Vallarpadam without entering the busy Ernakulam city limits. Apart from this, it also boosts local tourism. The railbus can become a tourist attraction providing a merry ride over the backwaters, since this railway line has the longest railway bridge over the backwaters (Vembanadu Bridge), at 4.6 km. By improving the local tourism and connectivity the railbus corridor can bring social uplift to the hinterlands in general.

### **How to Cite this Article:**

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