BUS ROUTE PLANNING FOR ADEQUATE PUBLIC TRANSPORT SYSTEM FOR MYSORE CITY

Swarup Kumar K[1], Sakshi[2]

Student BE in Civil Engineering, The National Institute of Engineering, Mysuru, India[1]

Student, BE in Civil Engineering, The National Institute of Engineering, Mysuru, India[2]

Abstract: The overview of this project was to analyze the bus route network of Mysore city, to build existing bus route network for Mysore city and to provide revised bus route to improve efficiency of public transport system which was done by collecting the data from OSM(open street maps) and was analyzed in QGIS. The other source which was used to get the bus route data was from the application called moovit, where it provides the information such as bus stop details, list of bus route names with information of origin and destination, it also gave the information of path of bus routes that helped in mapping the existing routes. The output of the project is that we were able to map 25 routes across the Mysore city that routes almost cover the entire city, further in this project questionnaires was done to identify the untraveled routes in Mysore city and to provide city bus to those identified untraveled routes, which includes the questions such as preferred destination point, bus time, trips travelled per day, ticket fare, purpose of travel etc. based on that we designed the bus route.

I.   INTRODUCTION

1.1   Introduction

Transportation is considered as an essential part of human life and backbone of national, regional and local economy. Transportation sector plays a crucial role in boosting up the lifestyles of common men by providing facilities and accessibilities as required to them.

Public transportation systems include a variety of transit options such as buses, light rail, and subways. These systems are available to the general public, may require a fare, and run at scheduled times. The purpose of introducing or expanding public transportation is to increase access and use of public transit while simultaneously reducing motor vehicle miles driven and traffic congestion. The public transportation system must possess five principles of sustainability which are affordability, accessibility, connectivity, holistic transportation coupled with land use planning and planning that incorporates environmental effects. Additionally, good public transport means should have many connections and high-frequency travel.

Importance
* Improves community health.
* Improves fuel efficiency.
* It reduces Air pollution.
* Improves road congestion.
* Improves community mobility

Mysuru is the third-largest city in the state of Karnataka, India. The city has expanded spatially in a concentric manner since 1971. The city is located in the southern part of Karnataka. The city is well connected by road, rail and airport. Mysuru city has radial and grid-iron pattern road network with arterial roads originating from the city centre.

Mysuru city has a city bus transportation facility managed by state transport corporation. The city services division of the KSRTC has been operating in the city as well as suburban areas connecting the following places, namely Chamundi Hill, K.R.Sagar, Srirangapatnam, Elwala, Melapura, Mellahalli, Mahadevapura, Wajamangala, and Siddharamaiana hundi. More than 4000 buses are put in service for public transport. The city of Mysuru is served by a well-established grid network. It is essentially grid based with arterial roads radiating from the city Centre. The total road network amounts to 1170 km. The city is connected to nearby towns and cities via National and State highways. The city is also served by the National Railway network. Almost all roads are of good quality with Right of Way of 18 m to 30 m. The city bus system forms the mode of public transport in the peer city which has a high spatial coverage.

1.2 GIS

A Geographic information system (GIS) is a computer system for capturing, storing, checking, and displaying data related to positions on earth's surface. By relating seemingly unrelated data, GIS can help individuals and organisation better understand spatial patterns and relationships. With GIS, different sets of location-based data are added to a map as separate layers. This visual representation makes it possible to understand data in context and see the relationships that might exist between different types of data attached to the same location.

II. LITERATURE REVIEW

2.1 Literature Review

A STUDY OF RURAL PUBLIC TRANSPORT SYSTEM – A CASE STUDY OF MYSORE AND CHAMARAJANAGAR DISTRICTS

Authors - N. Ramesh Babu, Harish Mahadevappa, (2016)

In this paper, public opinion survey was conducted in Mysore and Chamarajanagar Districts regarding performance of public transportation of Government (KSRTC) and Private Buses. Questionnaire was designed for both KSRTC and private bus commuters and the questionnaire was administered to the commuters in Chamarajanagar and Mysore District. The questionnaire consisted of three sections, General Section consisted of general questions like name, age and gender of respondents, Basic Travel Information Section consisted of origin, destination, frequency of travel, purpose of travel, cost of fare etc., and KSRTC/Private Bus Section consisted of questions like frequency, connectivity, overcrowding, travel comfort, cleanliness, safety etc., Nearly 250 commuters were interviewed regarding the performance of KSRTC and Private Bus.

ROAD NETWORK ANALYSIS GUWAHATI CITY GIS.

Authors - Debashis Das, Anil Kr.Ojha, Harlin Kramsapi, Partha P.Baruah, Mrinal Kr. Dutta, (2019)

In the present study an effort was made to prepare a road network map of Guwahati city and to find the shortest route between two places by proper analysis and digitization of its existing road network system in order to solve the traffic related problems to great extent. Network Analyst is a special analysis tool in ArcGIS which not only scrutinize the closest facility available in network of digitized interconnected lines but also facilitates in optimizing route during foods and emergency responses. One of the best models that can be generated through Network Analysis is the shortest route between required origin and destination points. The analysis is done based on input of certain network attributes like traversing distance, time and cost of travel, barriers, vehicle restrictions etc. All the important roads connecting each other within the Guwahati City were digitized in the GIS environment and proceeded further to serve the purpose.

TRAVEL TIME RELIABILITY ANALYSIS ON SELECTED BUS ROUTE OF MYSORE USING GPS DATA.

Authors - Akhilesh Chepuri, Chetan Kumar, Pooja Bhanegaonkar, Shriniwas S Arkatkar, Gaurang Joshi, (2019).

This research study aims at evaluating the travel time reliability indices like Buffer Time Index, Planning Time Index and Travel Time Index over space and time on selected city bus route of Mysore city, India. Also, this study focuses on developing the correlation models between the bus journey speed and flow for different type of urban roadway conditions. These models are observed to be performing better and hence can be used for predicting traffic volumes for similar roadway conditions when traffic data are not available from field.

A QGIS-BASED ROAD NETWORK ANALYSIS FOR SUSTAINABLE ROAD NETWORK INFRASTRUCTURE: AN APPLICATION TO THE CACHAR DISTRICT IN ASSAM, INDIA.

Author - Pradip Debnath, Published on 30 August 2022 by MDPI.

In this paper, they make an attempt to digitize the existing road network of Cachar district for its proper analysis. They compile the major and minor road density maps for the five revenue circles of the district. They use OpenStreetMap (OSM) to access and download existing road network in the district.

Further, using the shortest path tool in QGIS, they find and display the shortest route between two junction points in the road network. Finding optimal route can be of great utility during emergency medical responses or fire or flood situations. Most of the major and minor roads within Cachar district were digitized in QGIS environment to perform the road network analysis.

2.2   Summary of Literature Review

Network analysis using QGIS is a very powerful tool for solving real time transportation problems. It has replaced many conventional methods of analysing and emerged as an essential instrument for transportation planning and destination studies.

Adequate knowledge of the shortest route will enable the drivers and passengers to achieve low operating cost of vehicles and reach destination in optimal time. QGIS therefore have plenty of applications in transportation industry as effective communication network directly impacts the economic development of a region.

III.   OBJECTIVES AND METHODOLOGY

3.1   Objectives

The broader objective of study is to plan a adequate bus route network for Mysore city. The specific objective of the study are as follows;

i.   To build existing bus route network for Mysore city using QGIS.
ii.   To propose revised bus route to improve efficiency of public transport system for better reach.

3.2   Data Collection

3.2.1   For the road network analysis of Mysuru city;

•   A base street map of Mysuru city was added in QGIS software in a form of OSM type file (Standard Open Street Map).
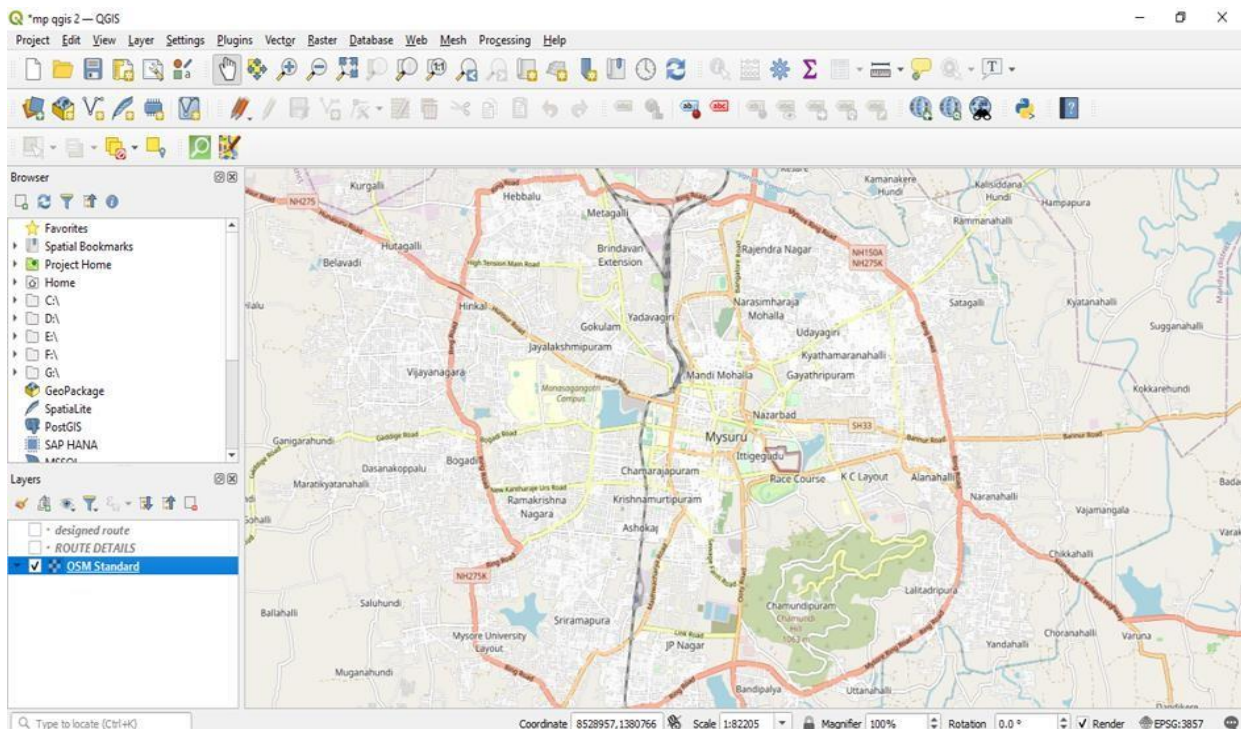

Fig 3.1 OSM Standard layer.

•   The next step is to create a new shapefile for the design of existing roads.
•   To create this .shp file, we can access tool bars.
•   The option called "Layer" we can create a new shapefile.
•   For the creation of the shapefile layer, we have to give certain data which includes file name, geometry type, name field, name type, etc, this is required for the purpose of attribute table.

- After creating this layer, we can map the bus routes with the help of toggle editing which has access to create or edit any type of features like point, line, polygon features etc,
- Since we are dealing with the mapping of bus routes, select line feature and add or create lines on the existing routes on the base map.
- To map the routes, we need the details of bus routes from origin to destination. The collection of this data is explained in the next steps.
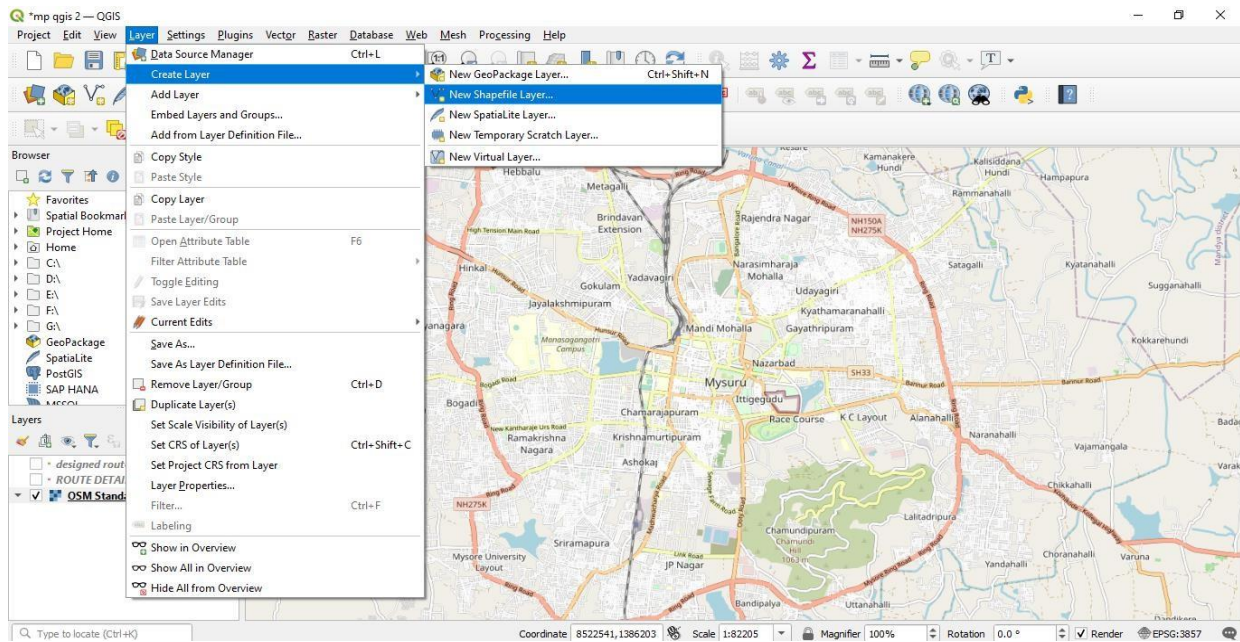

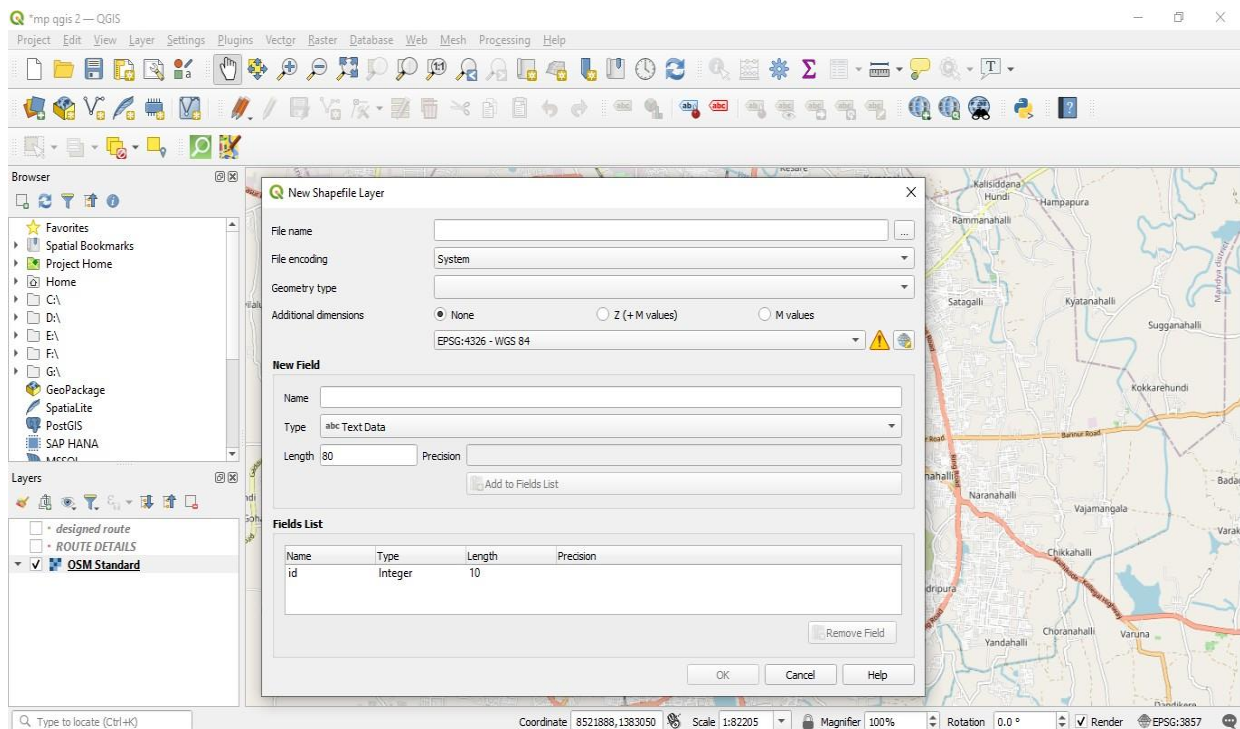**Fig.3.2** Creation of Shapefile layer.

Fig.3.3 Details for attribute table.

3.2.2 Existing Road Network of Mysuru City

The city has radial and grid-iron pattern road network with arterial roads originating from the city centre. The palace is the focal point of origin of all arterial roads running radially to outer areas of the city. The road network of the city includes three ring roads.

They are outer ring road, intermediate ring road and inner ring road. In addition, arterial roads, sub- arterial roads, collector roads also form a major part of road network. The three ring roads not only collect traffic from other roads but also act as by-pass roads at their respective locations in order to avoid congestion especially at the core of the city.

● The data of existing Mysuru city can be obtained from Mysuru Urban Development Authority, or hardly from any websites or applications.

● We did find some sources like mitra, ksrtc (Mysuru Intelligent Transport System) which gives both KSRTC and City buses route numbers and names. But this didn't provide information about the path of bus routes.

● So, the other source we found was an application called "MOOVIT" App.

● From this we could get every necessary information we needed. This provides about data like any searched bus stop details, list of bus route names with information of origin and destination.

● The main highlight of this app is that it even gives the direction or path of bus routes indicating a highlighted line on the street map of any existing origin and destination path.

● This feature helped a lot in mapping the existing routes.

● The route information also includes the timings and frequency of buses, from which we can even find adequacy.

● The designed existing routes and identification of untravelled locations are explained in the results part.

Fig.3.4 App logo.
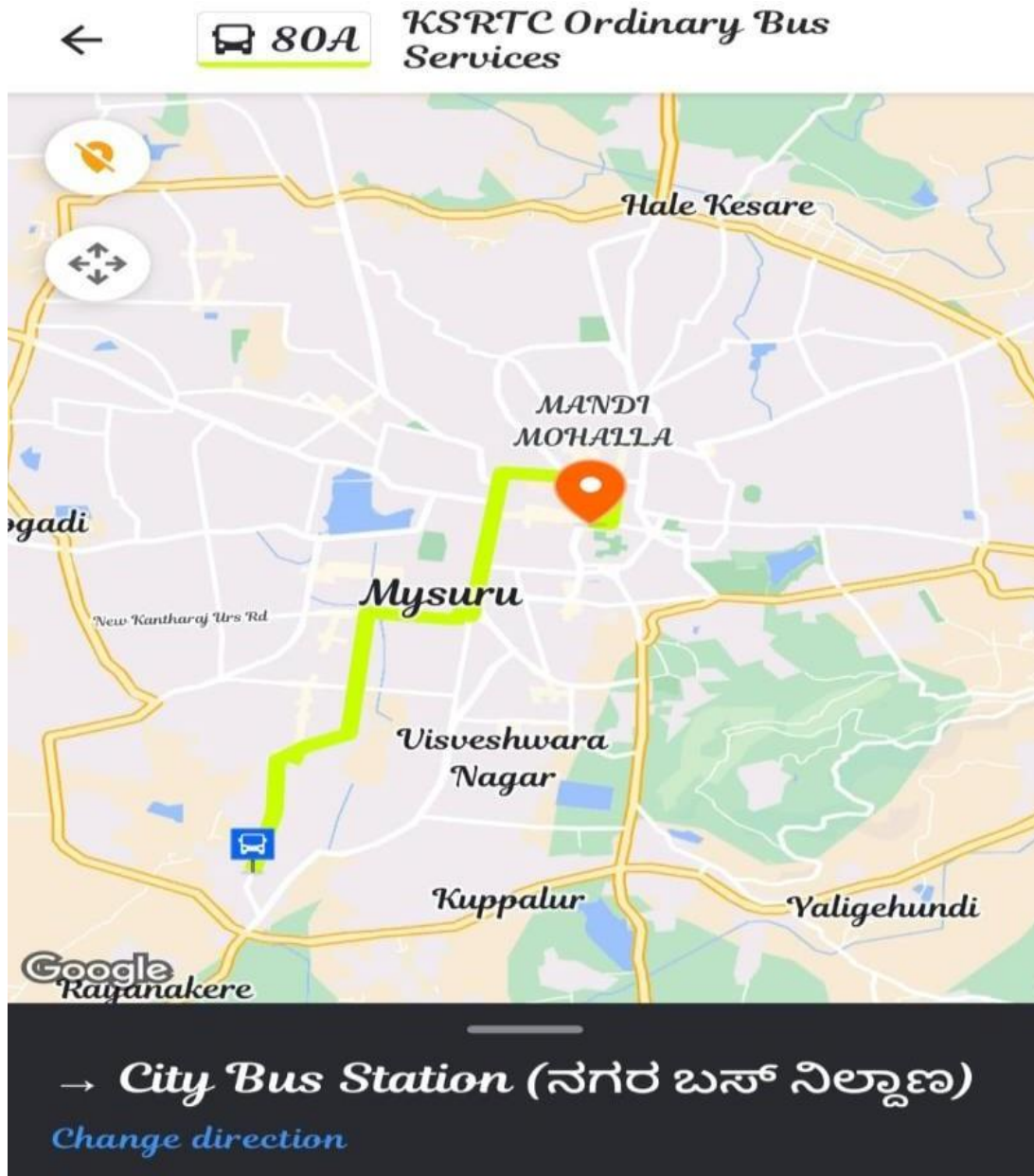
Fig.3.5 List of routes in Moovit app.

Fig.3.6 Origin and Destination of routes.

IV. RESULTS AND DISCUSSION

4.1 Existing routes

- As explained in the methodology the routes were mapped reffering to the moovit application, by creating line features on the shapefile layer.

- Every line feature can be named giving the route names in the attribute table.

- We mapped around 25 routes which almost covers the mysuru city.

- For the analysis of adequecy check we prepared few questionnaires which involes questions like preferred destination point, bus time, trips travelled per day, ticket fare, purpose of travel, etc,.

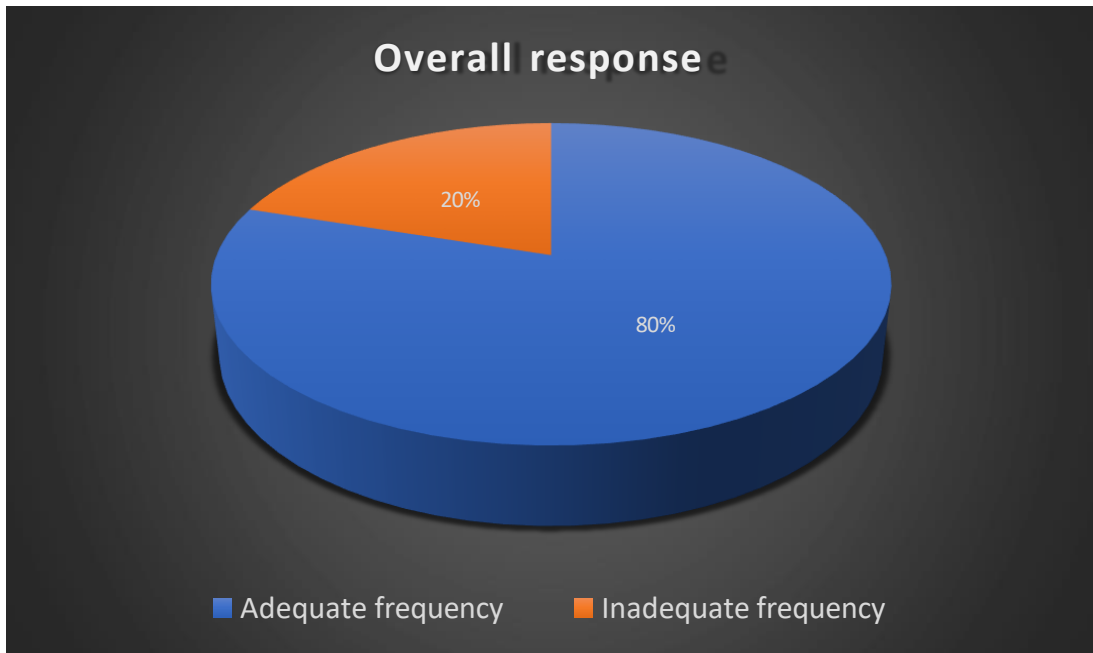- Although we would get the data of number of buses travelling at a stop and with timings from the moovit app.

Fig 4.1 Overall response.

- As mysuru city is well developed, the overall frequency was good at every places.
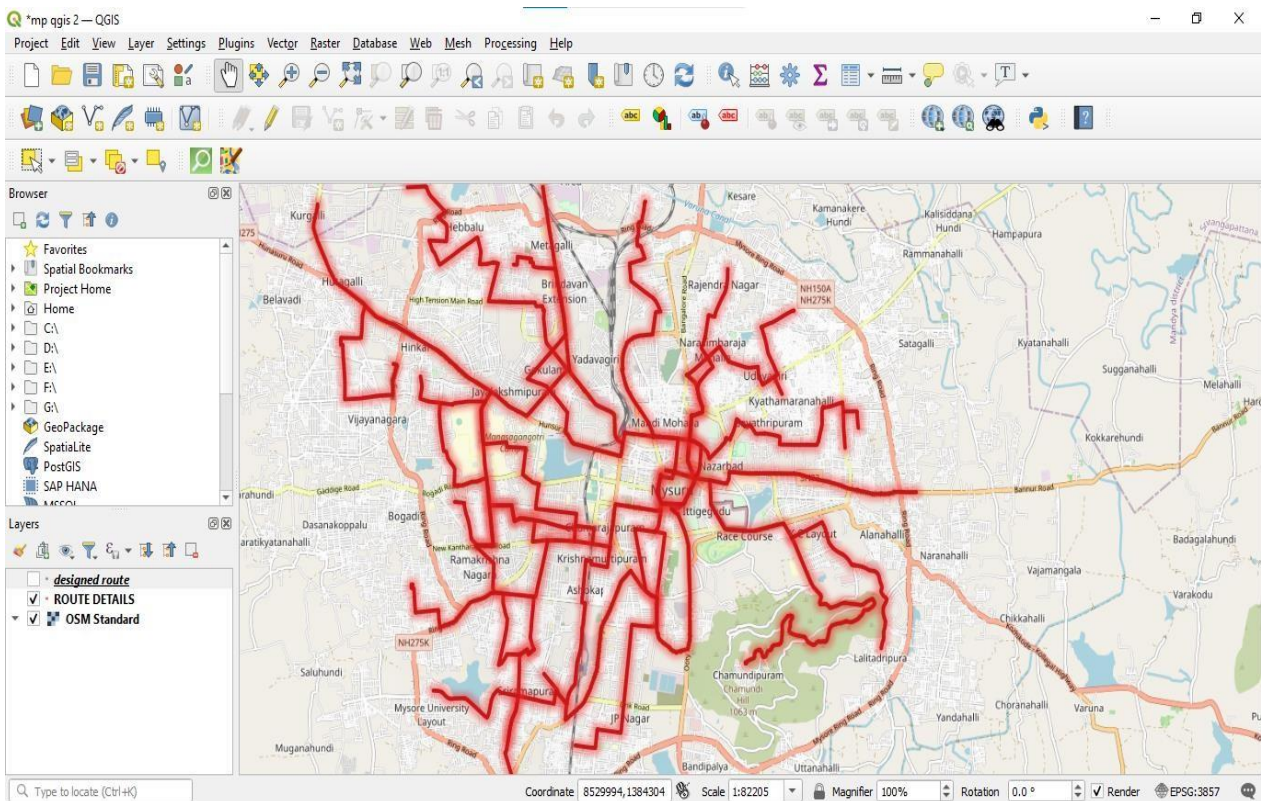
- The mapped routes are shown below.

Fig.4.2 Existing mapped routes.

Fig 4.3 Existing routes in attribute table.

4.2 Untravelled Areas

- To find the untravelled location in mysuru city was the difficult part of this. As the city is connected with routes to every place.

- Still we can provide the routes hardly for few residential areas, and for industrial areas there are availability of buses only thing we can add up is one or two frequencies.

- The untravelled area selected for our work was netaji nagar and bilwa which had buses quite far apart from the place.

- So we can suggest atleast frequency of one in this area.

- The path designed by us can be provided as shown below.
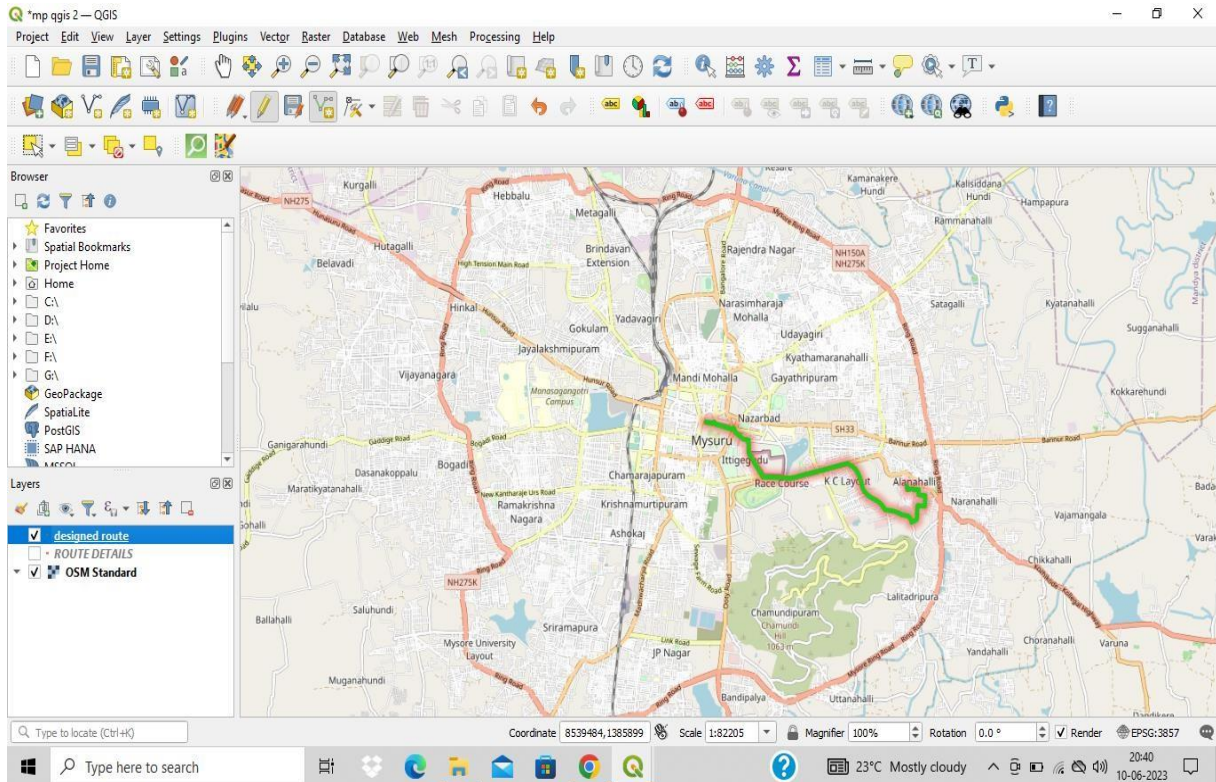
Fig.4.4 Designed route.

V. CONCLUSIONS

The work done in this project mainly highlights to know better about the existing routes which are mapped, and the purpose of the bus requirement for areas where there are no buses. The bus providing was mainly based on the questionnaires prepared, and checking of the development in that area like schooling, working and residential purpose. According to that we designed the routes for buses. From the field visit we were able to assure that Mysuru city bus routing or network are highly well designed or planned. The routing covers almost entire city (inside ring road). We Identified some areas which are developed and are in need of at least 1 or 2 frequency of buses in that area.

From the QGIS we can analyse about various fields in transportation. From this study we get to know about various existing bus routes which can be useful for further master planning of Mysuru city. And we got to know about the adequacies of transit system and solutions can be provided as per the above methodologies.

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BIOGRAPHY

Swarup Kumar K
Student BE in Civil Engineering, The National Institute of Engineering, Mysuru, India
2020cv_swarupkumark_b@nie.ac.in

Sakshi
Student, BE In Civil Engineering, The National Institute Of Engineering, Mysuru, India
2020cv_sakshi_b@nie.ac.in