An Approach for Sustainable Transportation System in Surat (Urban) City.

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Abstract— Surat city had a population of 44, 66,826 as per 2011 census, it is the 4th fastest developing city in the world. Subsequently, there is an increasing growth of vehicle and population in Surat city. There is an acute demand for effort and innovations for solving the transportation-related problems. Not only solutions, but a sustainable solution is the demand of time. A survey was conducted using social media platform and on the basis of the survey a road width with all the parameters like safety, green cover, parking, footpath etc. are covered and proposed for roads having width 12 m, 18 m, 24 m, 36m.

Keywords: sustainable transportation system, urban transportation, transportation demand, smart city planning, paramters for sustainable transportation system, road layout

Introduction

A transportation system can describe as a conveyance system which passes on people and freight across urban areas and nation as a whole. The modern-day transportation system of many major cities in India cannot be classified as a sustainable transportation system as it fails to address the problems caused due to increase in a number of vehicles on roads, increase in population and subsequent increase in demand of public transportation.[3], [4]. Traffic congestion, increasing rise of the rate of accidents, air and noise pollutions and traffic delays are some of the problems accumulated due to faulty transportation system planning at the initial level of urban development of a city.[5], [6]. The existing transportation infrastructure and system lag considerably in contrast to the prevailing transportation demand of people. This proves that existing transportation system is deemed to be obsolete and there is an urgent need to upgrade it.

The study area chosen is Surat City as it is one of the fastest developing cities in the world and due to vast development, transportation problems are reaching its peak. This is due to high vehicular count in Surat city which is approximately 24,21,043 in 2015 and lack of sufficient public transportation. Problems like noise pollution, air pollution which according to World Health Organization is defined as high, traffic congestion etc are faced in Surat city. The meaning of Sustainable urban development is that it clarifies the role of transportation in sustainable urban development in 3 area, society, economy, and condition and to establish the relationship of transportation with the various elements of Sustainable urban development.[1], [2], [7].

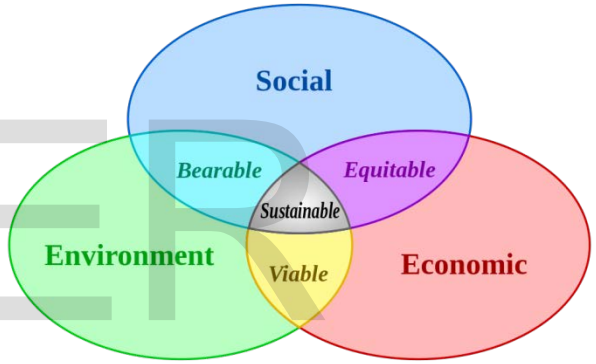

Fig. 1. Sustainable development diagram

Parameters for Sustainable Urban Transportation System

Parking

Parking can be characterized as a fundamental aspect of the sustainable transportation system as good parking facilities have a lot of benefits which are explained further. Good parking facilities provide individuals can locate the best spot accessible, sparing time, resources and effort. Looking for parking area consumes around one million barrels of oil a day.

Footpath

The footpath is a vital component feature of the sustainable transportation system as walking is an essential feature of urban dwellers. Good footpaths provide a variety of benefits like provides safety feeling for pedestrians, improves the mobility of pedestrians across urban areas, produces no emission of air pollutant hence can be characterized as environmentally friendly and promotes health in pedestrians. Pedestrian trip accumulates from one quarter to one-third of all trips made in Surat City.

Bicycle and Pedestrian mode sharing
The fact that bicycling and walking do not emit any pollutants into the atmosphere. In addition to that, bicycling and walking enables people to include physical exercise in their day to day activities. This is beneficial as it improves the general health of people, money is saved which alternatively is used in fuel and vehicle maintenance and relieves road of traffic congestion.

Public transportation system
There are a number of advantages of the efficient public transportation system in a city. Together with this, an efficient public transportation system relieves roads from traffic congestion thus saving people time and money. From an environmental perspective, public transportation system produces much fewer air pollutants as compared to private vehicles as per passenger wise.

Green cover
Green cover partially eliminates noise in major business areas of the city. Green cover in sustainable transportation system creates a peaceful environment for its road users. In addition to that, Greens cover absorbs the majority of carbon dioxide gas emitted by vehicle hence reducing damages to the environment.

Safety
Safety is the most important fundamental of the sustainable transportation system as a safe transportation has low accident rates and no life is lost due to road accidents.

Problem Identification

a. Introduction
The survey was done on the above-mentioned parameters around Surat City. During survey, it was found that, lacking in regards to latest transportation system Introduction

The survey was done on the above-mentioned parameters around Surat City. During survey, it was found that, lacking in regards to latest transportation system requirement. In addition to this, a questionnaire in form of Google form was sent to the people's to get the opinions in regards to the existing transportation system.

b. Parking

Fig. 2. Improper Parking
Location: Ghod Dod Road

Fig. 3. Illegal Parking
Location: Shiv Shakti Sweet Ghod Dod Road

Fig. 4. Parking on road
Location: Near Rupali Junction

Fig. 5. Parking on footpath
Location: Valentine Theatre Piplod Road

c. Footpath

Fig. 6. Improper Placement of green cover on footpath
Location: Ghod Dod Road

Fig. 7. Discontinuity of footpath at Property entrance
Location: Bhatar Char Rasta

Fig. 8. Improper Footpath Surface
Location: Ram Chowk

Fig. 9. Insufficient Footpath Width
Location: Athwagate

Fig. 10. Absence of Designated Area
Location: Keval chowk

Fig. 11. Illegal Setting up of Refugee Camps
Location: Breadliner Circle Canal Road

d. Bicycle and Pedestrian mode sharing
Surat city has a distinct lack of bicycle traveling facilities for example lack of designated bicycle track, lack of bicycle parking provision, etc. Cyclists have to helpless use bicycle on roads sharing the same carriageway with motorized vehicles. This puts them at large risk of getting involved in an accident with motorized vehicles.

e. Public transportation system

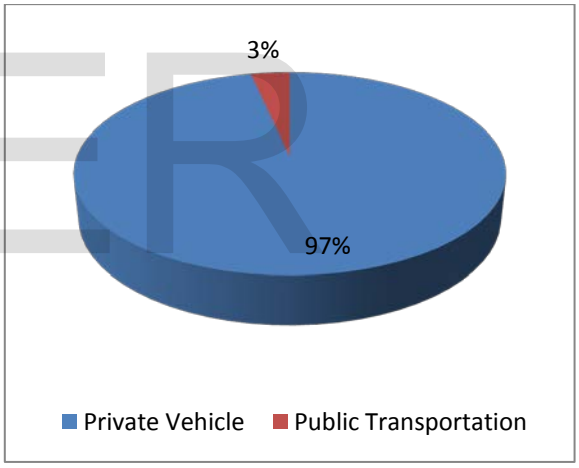

Chart 1 Showing Percentage Of People In Surat Utilizing Public Transportation And Private Vehicle

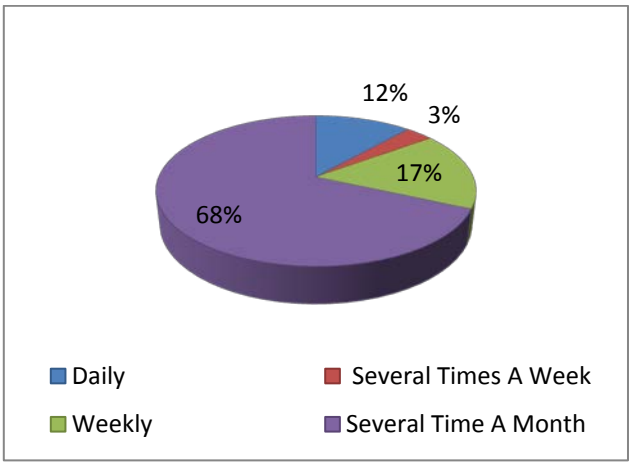

Chart 2 Showing Percentage Of People Use Public Transportation

f. Green cover

Fig. 12. Utilisation of Non-Aesthetic and Weak Trees and Absence of fencing
Location: Bhagavan Mahavir College

Fig. 13. Lack of sufficient Green Cover in CBD
Location: Udhana junction

g. Safety

Fig. 14. Absence of Traffic signals at Intersection
Location: Vip Road

Fig. 15. Absence Of Rotary Circle
Location: Udhana Dharwaja

Proposed design of Sustainable road Layout

After brief survey and analysis of the existing transportation system in Surat City, it was discovered that the previous mentioned parameters are lagging behind with the present day transportation demands. Hence to overcome these drawbacks designs and guidelines on how to improve and upgrade these parameters of the existing transportation system in Surat City in to a sustainable transportation system is explained in the figures below. Sustainable transportation system is the answer to the many drawbacks the current transportation system in Surat City poise to its users.

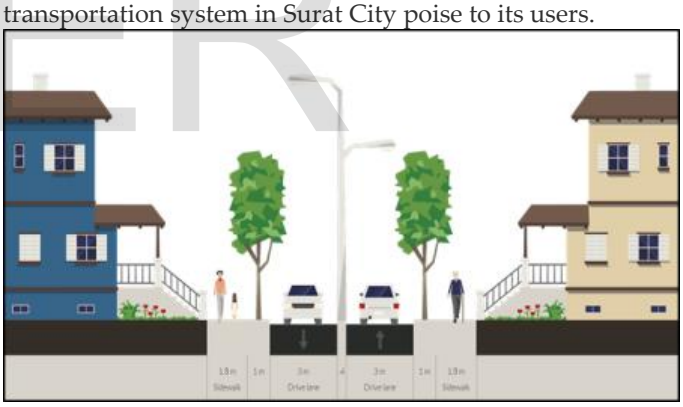

Fig. 16. Road Width 12 m

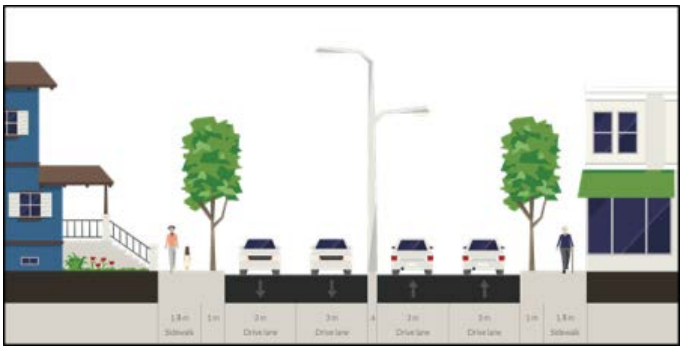

Fig. 17. Road Width 18 m

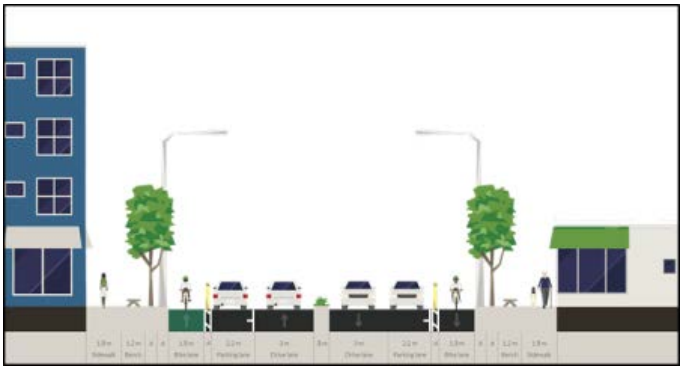

Fig. 18. Road Width 24 m

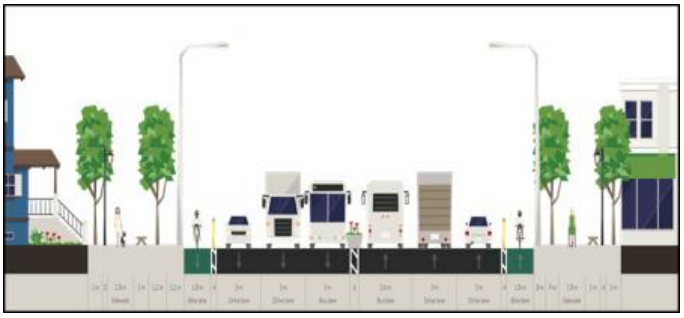

Fig. 19. Road Width 36 m

Conclusion

As per the current scenario, to overcome the drawbacks, design and guidelines are provided. After adopting the sustainable transportation scheme for Surat city following benefits are associated with it:

- Reduces traffic congestion to its minimum levels.
- Reduces carbon footprint per person hence is environmentally friendly
- Reduce travelling cost in terms of travelling expenditure and travelling time
- Increases the productivity of roads and urban area space
- Increases safety factor of the transportation system
- Is easy to use for all class of people hence can be said it is user friendly
- Offers more flexibility in terms of travelling i.e. more choices of mode of transportation is available
- Increased mobility of people around the city meaning increase in economic development of the city
- Is a more efficient transportation system of moving people from place to place
- Less dependency on foreign oil imports due to adoption of bicycle mode of transportation
- Less noise pollution and air pollution due to efficient planning of green cover provided around the city
- Standard of living of all classes of people is increased due to better and efficient transportation system.

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