# The Study of Development of Traffic Signals with GIS

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***Abstract*— Traffic signs are an essential a half of the road system, and a road with poor signing or by poorly maintained signs are an insufficient road. Road users depend on traffic signing for information and guidance, and route authorities depend on signing for the economical operation of the route network, the group action of traffic rules, traffic control and facilitate to road safety.Signs should offer road users their message clearly and at the right time. The message should be clear and quickly understood. A pattern normal sign assist in their quick recognition, as can regularity of form, colour and writing for every type. Induce the fullest advantages of uniformity there mustn't only be regularity of signs, however additionally regularity in their use, positioning and lighting. Signs are provided to manage and guide traffic and to market road safety. They should only be used where they'll usefully serve these functions. On the other hand their omission where steering, and control or danger warrants a utilization of a sign isn't at the intervals the road users are best interest. A balance should be able achieved between too many and too few signs.**

***Index Terms*—**1Traffic 2. Signs 3. Asset Management 4. Roads
**Sub Area** :Construction technology & Management
**Broad Area** : Civil Engineering

## I. INTRODUCTION

Asset management is defined as " A systematic process of maintaining, upgrading and operating assets, combining engineering principles with sound business practice and economic rationale, and providing tools to facilitate a more coordinated and flexible access to preparing the decisions necessary to reach the public's expectations".
Assets of the road network as
1) Physical information such as roads and bridges.
2) Equipment and the resources.
3) Data, computer systems, methods and technology.

**Requirements of asset management system**
Asset management systems is generally consists of

- Include the asset inventory, information and condition measures.
- Include the values of a condition of the asset.
- Include the performance of prediction capability.
- It also ensure that data integrity, enhance data accessibility and provide data Compatibility.
- Include all the relevant components in the life-cycle cost analyses.
- Enable the removal of an out dated systems and unproductive assets also.
- Reports were useful information on periodic basis, ideally in a real time.
- Facilitate iterative analysis is a processes that can be performed on regular basis.

Integration is key aspect of asset management. This system delivers a integrated approach to all the costs, road user, works, administration, environmental and also public costs and the current data sources. This system integrates the current management system for single assets. This merger provides the road administrations with a consistent system-wide data, allowing the allocation of an available fund across competing pavements, structure and other infrastructure.

**Components of an Asset Management System**
An asset management system holds all processes, tools, data and also policies necessary to achieve the goal effectively managing the assets. Although the concept of "system" does not usually focused on data requirements, an effective approach to a managing the assets as an integrated system should include the data required to meet the asset management objectives. This implies that in general, an AMS will consist of the following components:

- Goals and plans of organization.
- Data
- Resources and also budget details.
- Performance model for another strategies and program development.
- Project selection criteria
- Implementation of program.

## II. PROBLEM STATEMENT

The road network creates one in each of the most important community assets and this predominately government closely-held. The agencies are liable for the transport infrastructure, maintain, operating, improve, replace and preserve this asset. At identical time the economic and human resources needed to achieve the performance objective of the road network and may be managed fastidiously. All carefully accomplished below the shut study of the final public World Health Organization get this a district of the transport system, area unit regular users

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of this place and increasingly demand improved levels of quality, in terms of safety, reliability and luxury, from the road network.

Roads and highways offer the dominant mode of land transportation. They kind the backbone of the economy, typically carrying over eighty per cent of passengers and over fifty per cent of freight in a very country, and providing essential links to large rural road networks. Roads square measure among the foremost necessary public assets in several countries. Enhancements to roads bring immediate and typically dramatic edges to communities through higher access to hospitals, schools, and markets, bigger comfort, speed, and safety; and lower vehicle in operation prices Governments is placing greater pressure on road administrations to improve the efficiency of roads and accountability for the management of community assets. In some of the countries like Canada, the United States and Australia face formal accountability and reporting requirements on how they manage their assets.

**Introduction about Geographic Information System**

Geographic Information System (GIS) is a system for mapping and analysing the any object on earth. This should be gathering, storing, and managing any type of data with spatial data components. GIS data is usually kept in above one layer. This is the fundamental aspect of GIS, and working with layers of geographic information system is generally known as data integration. GIS technology integrates powerful database capabilities with a unique visual perspective of a good old fashioned-map. This makes GIS unique among various information collection systems.

Basically, this system utilizes hardware, software, user, and effective management to collect, store, analyse and present the related information of a given area on the earth. Even more, it has the capability to overlap map and provide an information inquiry facility that can indirectly create a whole new set of information. Here, data output can be obtained in the form of tables, maps, graph or combination of these three. The other powerful aspect of GIS is its flexibility in modelling spatial objects to suit the particular needs of the user or application. GIS provides a set of tools or computer programs that allow user to perform specific operations on the map, assisted by a set of attribute data.

**2.10 GIS Capabilities**

GIS consists of four subsystems, namely data acquisition, data management, analysis of data and information output. Some of the GIS advantages are listed as follows:

- Consists of a central database storing all data related, available and usable to users when required.
- Promotes data sharing culture and enhances team spirit.
- Improves data currency, accuracy and consistency of data maintained.
- Minimizes data duplication.
- Performs analyses of spatial and non-spatial components.
- Has a more effective presentation of data.
- Data is managed more efficiently.
- Increases work productivity, particularly in planning and managing infrastructures, to produce results from numerous combinations of data sets.

## III. Objectives and Scope

- To provide ready access to the database system
- To develop the decision support system using the acquired data set for the asset management
- To develop a support system to optimize use of assets.
- To utilize the principles of economics, accounting and customer service models.

## IV. Study Methodology

4.1 General

An asset management system in use by a road administration will utilize the following data

- definition of the system
- definition of the benefits on the system
- Location of the advantages on the system.
- Condition of the assets.
- Levels of utilization
- Policies and measures (e.g. Support models and medication plans and additionally observing data, for example, execution measures).
- Budget data (e.g. Broken down by asset type, program level)

**4.2 Sign asset management method**

- Visual night time inspection method
- Measured Retro reflectivity Method

The visual night time method uses human observers visually judge at a night time weather and observers should have some judgement on the reflectivity of signs. Generally it should be conducted at regular highway speeds from the travel lane using the low beam headlights.To measure Retroflectivity method uses a retroreflecto meter to measure all signs. At least four retro reflectivity readings are taken during the daytime and the average retroreflectivityvalue of the sign is compared to the established minimums for that particular sign.

**4.3 Management methods**

- Expected sign life method
- Blanket replace method
- Control sign method

The expected sign life method calculates a sign life from the signs.it should be combination of sheet colour and sheet type.it should requires the tracking age of signs eighter by using the sign installation date labels on the back of each sign.The blanket replacement method replaces all signs along the corridor within an area. Replacement should be based on the manufacturer warranty.The control sign method uses signs either in a controlled study yard or a sample of signs from the field to determine sign life. The control sample of signs is used to represent all of the signs in an agency.

## V. STUDY AREA AND DATA COLLECTION

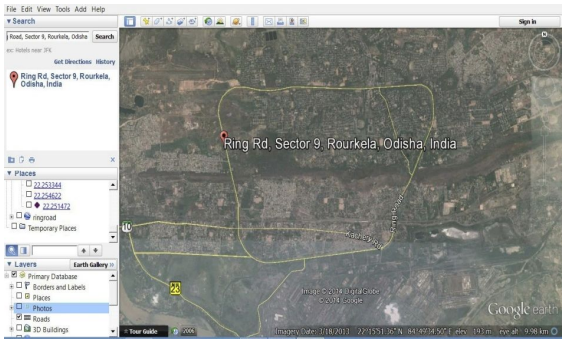


Fig 5.1 study area of data collection

**Study Area**

Kaithal is located in the north-western border of Haryana. Kaithal district is one of the 21 districts of Haryana, state in northern India. Kaithal town is the district headquarters. The district occupies an area of 2317 km². It has a population of 10,72,861.It is the third largest city of Haryana. Situated about 340 kilometres (211 mi) north of state capital Bhubaneswar, the city is surrounded by a range of hills and encircled by rivers. One ofthe largest steel plants of the Steel authority of India (SAIL) is situated here. Kaithal has a good connection to the other towns in the State with an average frequency through Road. Kaithal city is connected with National Highways NH-23 and SH-10 to the towns and cities of Haryana. And the Kaithal has the 23 kilometre ring road and it's connecting 19 sectors and some other parts of Kaithal City.

**Data Collection:**

The data collection should be taken on the ring road of the Kaithal. This data should be taken from Ig Park to Ispat market. Data collection of the signs and signals on the road by using inspection methods and using cameras

The sign asset data was collected on the ring road from sail chock to ispat market. This data was collected by using visual night time inspection method. This method was a visually judge the retro reflectivity of a sign. Retro reflectivity is the physical ability of the material to reflect the light back in the direction of the original light source (e.g. Vehicle headlight) normally at night. This test was conducted during night hours 7pm-9pm. The vehicle speed is the 40kmph and the visual inspection from the 100m distance from the sign. The vehicle head light was focused on the sign and it is reflecting light back is in the direction of the original light source. Some of the signs were not clearly visible and this type of signs should be replaced.

**Data storage:**

The information utilized by an AMS has high money related worth to a street organization. Along these lines, once the gathered information has been supplied, they will for the most part go under the control of the organization work inside the street organization. The organization will have obligation regarding controlling the Quality of both new and put away information. Ordinarily, information quality control techniques ought to incorporate.

- Data confirmation (i.e. Information ought to be checked for trustworthiness, area, time, culmination and precision).
- Application of both approaching information and existing put away information.

**Minimum Distances for Sign Visibility and Legibility:**

**Table:minimum distances for sign visibility and legibility**

| Speed (Km/hour) | Visibility (m) | Legibility (m) |
|---|---|---|
| 40 | 90 | 55 |
| 50 | 100 | 55 |
| 60 | 150 | 70 |
| 70 | 170 | 70 |
| 80 | 185 | 70 |

To find the coefficient of retroflection (Ra) values for each sign. The coefficient of retro reflection (Ra) is the ratio of the light which the sign reflects to a driver (cd) to the light which illuminates the sign (lx) per unit area (m2). By getting the Ra values we can find the observation angle, entrance angle. From these two angles we can find the coefficient of retroflection (Ra).Vehicle to sign distance is 100 mts sign height is 2.0 mts. Vehicle headlight distance from the road 0.65mts driver sight distance is 1.2mts.from these distances can find the observation angles and entrance angles. First can find the observation angle and entrance angle for the visibility distance. These distances are based on the type of roadways and cities.

**Observation Angle And Entrance Angle For Each Sign for visibility distance:**

Using the right angle triangle method the observation angle and the entrance angle is found by using the lengths and heights measured during observations the angles are measured. The height of the sign under consideration taken as H, H1 is the height of the observer in the car from the ground, L1 is the distance between the observer and the traffic sign, H2 is the heightof the headlights of the car from the ground, L2 is the distance between head lights of the car and the traffic sign.

**Table: Observation angle and entrance angle for legibility distance**

| Speed | Distance | Observation angle | Entrance angle |
|---|---|---|---|
| 40 | 55 | 0.62 | 1.45 |
| 50 | 55 | 0.62 | 1.45 |
| 60 | 70 | 0.48 | 1.13 |
| 70 | 70 | 0.48 | 1.13 |
| 80 | 70 | 0.48 | 1.13 |

This is the legibility distance is the enable to read the sign. These distances are also depends on the speed and distance of vehicle from the sign. These values must be comparing with the AASHTO specification sign retro-reflectivity method.in this area of study using for night time inspection method speed is 40kmph and distance is 90mts.

**Asset data mapping in a geographic information system (GIS):**

The collected signs will be plotted in a geographic information system. First, we should take a position of the each sign and then noted the longitude and latitude of the each

sign. And this should be plotted in the arc GIS we should create a file.Data from various sources can be integrated into the road safety database and displayed all together in Google Earth. This makes it easier to find out the contributing factors that influences the safety performance of the road. Figure 1 below shows an example of integrated use of road sign and asset data in a safety study. Latitude and longitude points will be shown in the table no. 6.7

## CONCLUSIONS

The goal of analysing the asset management of traffic signs. Can minimize sign asset costs while maintaining a high level of safety on local and state roads. These observations are compared with the AASHTO specifications and there is a minor percentage of error, so these values are reliable for the further analysis of the study. In my study around 75% of the signs are visibility and legibility properties are according to the standards.

- Some of the regulatory signs need to be changed because the reflectivity of signs is less and maintenance should be required for 3 signs.
- Some of The informatory signs should be re replaced because the directions of the signs not visible from a certain distance.
- Parking signs should be visible from the all the distances and angles.
- Manufacture cost and maintenance cost for all the signs is estimated.
- These costs should be changed year by year and this should be based on the population, traffic volume and market prices.

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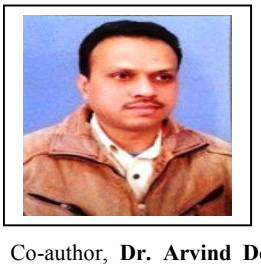

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