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An Application of GIS in Traffic Sign Asset Management

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ABSTRACT
Asset management is a systematic system of maintaining, upgrading and working assets. Several agencies are making use of asset administration ideas as a enterprise tool and mannequin to help them define desires two and prioritize corporation resources in selection making. Road asset management is targeted on bridges, visitors signs, pavement markings, culverts. This challenge focuses on the development of site visitors signal asset administration system. For this we have to habits a visual night time time inspection method to find the Retro-reflectivity of a sign. This survey will be carried out at ordinary night time intervals. This survey will be conducted at minimal vehicle distances with car high beam lights. And some of visitors signs and symptoms need to be failed the test they now not visible to the driver. And some signs and symptoms need for maintenance. The find out about findings indicate that making a business case for formal asset administration programs. In the management study, we have to take manufacture fee of each signal and protection cost of the signs. For this we want two to replace the some signs and symptoms and upkeep ought to be required for some signs. And ought to be aware the latitude and two longitude of the signal and create a file in the arc GIS and have to plot a role of the every sign. .

KEYWORDS: *Asset management, visitors signs, management methods, arc GIS, cost analysis, Retro-reflectivity.*

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I. INTRODUCTION

Asset management is defined as " A systematic manner of maintaining, upgrading and running assets, combining engineering ideas with sound enterprise practice and monetary rationale, and providing equipment to facilitate a more coordinated and bendy get right of entry to to getting ready the choices critical to reach the public's expectations". Assets of the street community as physical information such as roads and bridges, Equipment and the resources, Data, laptop systems, strategies and technology. Asset management systems is commonly consists of Include the asset inventory, data and condition measures, Include the values of a condition of the asset, Include the performance of prediction capability, It additionally ensure that information integrity, beautify information accessibility and supply information compatibility, Include all the relevant aspects in the life-cycle cost analyses, Enable the elimination of an out dated systems and unproductive assets also, reviews have been useful records on periodic basis, ideally in a actual time, facilitate iterative evaluation is a tactics that can be carried out on ordinary basis.

Integration is key component of asset management. This machine offers an built-in strategy to all the costs, avenue user, works, administration, environmental and additionally public expenses and the modern records sources. This system integrates the cutting-edge administration machine for single assets. This merger presents the road administrations with a steady system extensive data, permitting the allocation of an accessible fund across competing pavements, structure and different infrastructure. An asset administration system holds all processes, tools, facts and additionally policies indispensable to achieve the aim efficiently managing the assets. Although the notion of "system" does now not generally focused on records requirements, an high quality strategy to a managing the assets as an integrated machine have to consist of the information required to meet the asset management objectives. This implies that in general, an AMS will consist of the following components dreams and plans of organization, data, resources and additionally finances details, overall performance mannequin for another strategies and program development, task selection criteria, implementation of program.

The avenue community creates one in every of the most necessary community belongings and this predominately government closely-held. The corporations are responsible for the transport infrastructure, maintain, operating, improve, change and preserve this asset. At equal time the financial and human resources wanted to acquire the overall performance objective of the road network and can also be managed fastidiously. All cautiously executed under the shut find out about of the last public World Health Organization get this a district of the transport system, place unit everyday customers of this area and an increasing number of

demand improved tiers of quality, in phrases of safety, reliability and luxury, from the avenue network.

Roads and highways provide the dominant mode of land transportation. They sort the spine of the economy, generally carrying over eighty per cent of passengers and over fifty per cent of freight in a very country, and supplying necessary links to massive rural avenue networks. Roads rectangular measure amongst the main vital public property in quite a few countries. Enhancements to roads convey instant and normally dramatic edges to communities via higher access to hospitals, schools, and markets, higher comfort, speed, and safety; and lower car in operation prices Governments is setting larger strain on street administrations to enhance the efficiency of roads and accountability for the management of community assets. In some of the nations like Canada, the United States and Australia face formal accountability and reporting necessities on how they control their assets. Objectives and scope to grant prepared get admission to to the database system, to enhance the choice help machine the usage of the acquired facts set for the asset management, to increase a support gadget to optimize use of assets,to two make use of two the concepts of economics, accounting and consumer provider models.

II. LITERATURE REVIEW:

Harris, E.A., Rasdorf et al describes the minimum traffic sign reflectivity standards. This paper was once analysis of a number of site visitors symptoms reflectivity maintenance strategies using sign asset management. This method based totally on inspection and data collection process. The simulation phase should be done. They need to take 30 scenarios in the annual maintenance price per sign and proportion of site visitors signs. The simulation results must be greater cost per greater signal preservation usually the resulted in a lower percentage of signs. For some signs the usage of night time two time inspection method.

Petri Jusi et al describe the avenue network of Papua and New Guinea. This country the complete road community of 8258km of country wide labeled roads and different 19937km low-traffic roads. The whole value of roads us 1billion dollars. In this us of a department of works (DOW) have been maintaining the road assets. And this branch doesn't give the ample interest to preserving the road networks. And this have to impact on the monetary boom and gross domestic product. In this usa to be capable to provide a simple service to access, to markets, administrative, fitness and education. The poor preservation of street network limits get admission to to the rural populace of fundamental services. Dow collects the two money and education by means of Asian improvement bank and with the assistance of Finland marketing consultant and developed Road asset management system. This is a stirring and offering street records information, short time period and long term maintenance, budgets made for street networks.

Michael J. Markow used to be describing the asset management practices on pavement markings. They instructed that two the standards and asset management via pavements and bridges. They divide the six training of non-pavement infrastructure property from the NCHRP synthesis subject matter 37-03. Traffic signals, signing, lighting, pavement markings, culverts, sidewalks are the training of asset management. They should evaluation some of the components to drawing close the asset maintenance, budgeting methods, measuring the asset performance, asset service life, cloth usage, technology. This find out about shows the basic information on pavement markings, management, and web site stipulations service life for one of a kind materials. And for some of the approaches the usage of the reflect meter for reliability, asset administration approach. **MohdZulkifli etal** used to be describing the street maintenance the use of the GIS functions and they do a case study two two on Penang, Malaysia.

In this paper they mostly viewed development and economic technique of a kingdom is carefully associated with its accessible transportation system. Road transport infrastructure facilities can promote industrial and economic development. To supply security and alleviation to street users, road maintenance schedule must be formulated and adopted to make sure these roads are in properly situation at all times. Preventive street maintenance works, like road rehabilitation will facilitate to minimize the essential street repairs. Prior to this, a true database, gathered via GIS will twotwo be critical in order to make certain upkeep is completed effectively. Geographic records machine (GIS) is stated to be one of the useful tools that can be utilized to control data in street maintenance engineering. GIS device is capable of storing, managing, analyzing, computing and showing all types of geographical records for road upkeep works. In two this study, two they must adopt two GIS two application software – ArcView, two and have reviewed and analyzed its effectiveness in managing avenue data. This data are then used to help the two management two to two confirm wonderful and systematic avenue maintenance..

III. METHODOLOGY

An asset administration device in use by using a road administration will utilize the following data definition of the system, definition of the advantages 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 medicine plans and moreover gazing data, for example, execution measures), Budget information (e.g. Broken down through

asset type, application level). The visual night time approach makes use of human observers visually judge at a night time weather and observers have some judgement on the reflectivity of signs. Generally it must be performed at normal highway speeds from the travel lane the usage of the low beam headlights. To measure retro reflectivity method uses a retroreflector meter to measure all signs. At least 4 two retro reflectivity readings are taken all through the daylight and the common retro reflectivity cost of the signal is in contrast to the installed minimums for that specific sign. The expected sign existence approach calculates a signal existence from the signs.it be combination of sheet coloration and sheet type.it should requires the monitoring age of symptoms both by using using the signal set up date labels on the back of every sign. The blanket replacement method replaces all signs and symptoms alongside the corridor within an area. Replacement must be based on the producer warranty. The control sign method makes use of symptoms both in a managed learn about yard or a sample of signs and symptoms from the subject to determine signal life. The manipulate pattern of signs is used to signify all of the signs and symptoms in an agency. Asset management structures commonly carry out the following two data analyses Interpretation of the situation statistics gathered on the character holdings, Identification of "ideal" medicines, Prioritization of preservation medicines in opposition to plan, Prioritization of renovation redress in opposition to budgets. Holding administration for the most section looks at such factors as task levels, help norms and budgetary vitality. Regarding base administration, these variables may be interpreted into different measures of execution of the advantage, including level of utilization, well being and ecological effect. Possession administration will therefore be affected by topographical and socio-monetary instances in the affiliation and the enterprise strategies received. The estimation of the benefits will be ascertained using perceived and acknowledged bookkeeping practices. The calculation of the price of the asset is now not typically covered in management systems for individual assets. Information investigation should be of a specialized, budgetary, or general nature and no longer each form of dissection will be utilized similarly as a phase of all stages of an association. All in all, one of a kind parts of an association will whole information investigates at various stages of subtle element. The indicates beneath instances of the varieties of statistics investigates did by a road company and which may profit from the utilization of an benefit administration framework.

IV. STUDY AREA AND METHDOLOGY

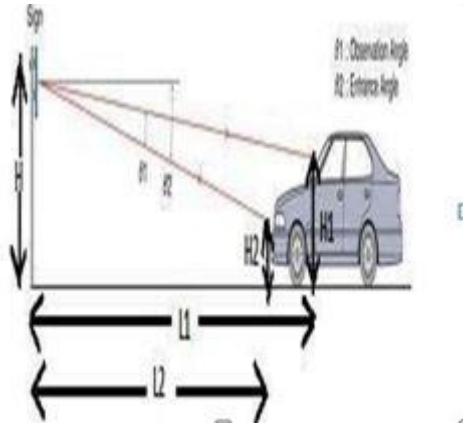
Hisar is the administrative headquarters of Hisar district of Hisar division in the nation of Haryana in northwestern India. It is positioned 164 km (102 mi) to the west of New Delhi, India's capital, and has been identified as a counter-magnet city for the National Capital Region to enhance as an alternative center of increase to Delhi.

To locate the coefficient of retroflection (Ra) values for each sign. The coefficient of retro reflection (Ra) is the ratio of the mild which the sign displays to a driver (cd) to the light which illuminates the sign (lx) per unit vicinity (m2). By getting the Ra values we can find the observation angle, entrance angle. From these two angles we can discover the coefficient of retroflection (Ra). Vehicle to signal distance is 100 meter sign height is 2.0 meter.

Table: Minimum Distances for Sign Visibility and Legibility

Speed (kmph)	Visibility (m)	Legibility
40	90	55
50	100	55
60	150	70
70	170	70
80	185	70

Vehicle headlight distance from the street 0.65 meter driver sight distance is 1.2mts.from these distances can discover the commentary angles and entrance angles.First can find the statement attitude and entrance perspective for the visibility distance. These distances are based on the type of roadways and cities.



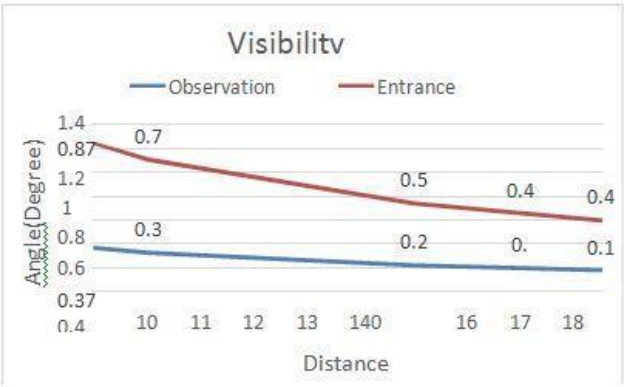
Using the proper attitude triangle technique the statement angle and the entrance attitude is discovered by using using the lengths and heights measured throughout observations the angles are measured. The top of the sign underneath consideration taken as H, H1 is the peak of the observer in the car from the ground, L1 is the distance between the observer andthetrafficsign, two and H2 is the top of the headlights of the auto from the ground, L2 is the distance between head lights of the automobile and the site visitors sign.

Speed (kmph)	Distance(m)	Observation angle (θ1)	Entrance angle (θ2)
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

Table: Observation Angle and Entrance Angle for Visibility

Distance

The above table observation angle and entrance angle for visibility distance, this include speed, distance, observation angle and entrance angle. Speed variation of difference distance and find out the different reading of observation angle and entrance angle.



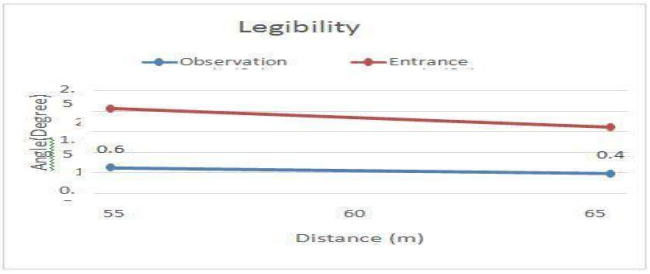
The above graph shows the variation in the observation and entrance angles. These angles should be depends on the speed of the vehicle and distance of vehicle from the sign. The speed and distance increases then the angles will be decreased.in this area of study using for night time inspection method speed is 40kmph and distance is 90mts.

Table: Observation Angle and Entrance Angle for Legibility Distance.

S.N.	Signs Type	Manufact ure Cost (INR)	Maintenan ce cost	Tota l Cost (INR
1	Maximu m Speed	1010 x 5	Individual sign crew worker wage/total Number of signs.	5050
2	Speed Breaker	510 x 1		510
3	Major	510 x 2		1020
4	No Parking	1140 x 3		3420
5	Informato ry	760 x 23		1748 0

The above table observation angle and entrance angle for legibility distance, this include speed, distance, observation angle and entrance angle. Speed variation of difference distance and find out the different reading of observation angle and entrance angle.

The above graph the find the average of legibility distance, the graph is plotted between distance verses observation angle and entrance angle, and find out the average angle with respect to distance of decreasing order length are increase the angle decrease.



	Regulatory Signs	Informatory Signs	Warning Signs
Tested	10	23	3
Passed	8	15	3
Failed	2	8	0
Failed (%)	20%	80%	0%

In above table have sign inspected data, the sign inspected and compare these with the retro-reflective standards. The signs failed at the night time inspection methods using the legibility and visibility sight distances. 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. 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.

Latitude	22014'46.56"	22014'46.00"	22014'35.29"	22014'27.94"	22014'22.44"	22013'54.35"
Longitude	84052'46.41"	84052'44.69"	84052'41.05"	84052'37.18"	84052'34.35"	84052'17.10"
Latitude	22013'51.72"	22013'49.47"	22013'23.67"	22013'24.21"	22013'21.41"	22013'21.61"
Longitude	84052'14.18"	84052'13.37"	84052'03.88"	84052'05.17"	84051'56.64"	84051'52.61"
Latitude	22013'21.60"	22013'21.60"	22013'18.68"	22014'52.27"	22015'02.57"	22015'12.04"
Longitude	84051'47.24"	84051'47.24"	84051'31.20"	84051'52.56"	84052'48.61"	84052'46.18"
Latitude	22015'16.64"	2201505.30"				
Longitude	84052'37.35"	84052'42.48"				

In above figure Steps followed in arc GIS: Get the latitude and longitude in an excel sheet, import the excel sheet to arc GIS, define the x and y values in arc GIS,Then the point of features opened in the arc GIS, Convert the point features into a layer feature using the arc GIS tool, then convert the layer to (km) format for viewing the layer file in Google earth, open Google earth and import the (km) file to open in Google earth.
The cost of the regulatory sign is the INR 1010 and no of signs should be 5 and speed beaker sign cost INR 510 and two major road ahead signs with the cost of 510. No parking sign should be INR 1140inr total 3 signs. And 23 more number of informatory signs each sign cost is 760. Then the total manufacture cost of the total signs is INR 27480. And the maintenance cost should be included in the management methods (daily wages, paintings, repairs) for all this the minimum maintained cost per year INR 250 per sign approximately. We have to maintain 33 signs the total cost should be 8250 per year. To maintain should be twice in a year. The total cost of the signs was INR 35730.these values are based on the population and traffic volume and market prices. These costs are changes year by year

V. CONCLUSION:

The goal of analyzing 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. Parkingsigns should be visible from 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 marketprices.

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