International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 04 Issue: 05 | May -2017 www.irjet.net p-ISSN: 2395-0072

A REVIEW PAPER - STUDY OF GREEN HIGHWAY RATING SYSTEME

KaushalP Nikumbh[1], Pritesh D Aher[2]

[1]Departmen of civil engineeringt,NDMVPs KBT College of engineering , Maharastra, India
[2] Assistant Professor, Department of civil engineeringt,NDMVPs KBT College of engineering , Maharastra,India

---

Abstract -*Different technologies available to scale or measure environmental impact of highways for different activities like the advanced designing, intelligent construction and also, efficient support methods normally used in advanced highway design, however the present Indian situation watches keeps an eye on different building short costs road, usually neglecting ways that to lower long-run or life cycle prices through more sustainable road construction There is need of Growing open consciousness of temperature changes and incorporates green ideas into the roadway construction process Subsequently, there's the prerequisite of a rating framework that characterize roadway supportability characteristics for green highway and confirm the weightage for every criteria so as that the majority contribute to the green practices and sustainable development*

The aim of this paper is to study of available road rating system and its implementation in Indian scenario. It's a performance metric that awards points for achievement of a list of project requirements and according to total points earn certification is awarded.

***Key Words*: Green rating system, Green light, Green road,Invision**

1. INTRODUCTION

Highway in every country plays significant roles where it provides linkages of transportation for nation economic activities. Highways development involve massive earthwork and conversion of land used in it construction. This requirement applies the knowledge of environmental science whereby control have to be made in conserving of natural resources, at the same time sustain the need of the present and future generation. To accomplish a green parkway arranging, plan, development and appraisal of roadway need to coordinate with nearby natural insurance thought, along these lines it help to maintain a strategic distance from resulting ecological devastation and extreme asset utilization.

Sustainability performance measures can help to monitor environmental, economic, and social performance – and can help communicate that performance to user and stakeholders .Sustainability performance measures may be used to help prioritize and influence funding decisions

"There are currently no standardized indicator sets for comprehensive and sustainable transport planning in India . Each jurisdiction or organization must develop its own set based on needs and abilities. It would be helpful for real arranging and expert associations to set up suggested reasonable transportation marker sets, information accumulation norms, and evaluation best practices in order to improve sustainability planning in infrastructure development.

Following are important consideration for selection of rating tool or rating indicator

• E*ncyclopaedic*– rating Indicators should identified various social , economic and environmental impacts, and data collection various transport activities

• *Data quality* – Data collection practices should high standards to insure that information is accurate and consistent.

• Easy *Comparable* – It should be suitable for comparison between various criteria and Indicators should be clearly defined.

• *Easy to understand* – Indicators must understandable to the general public and useful to decision-makers.

• *Cost effective* – The indicators should be cost effective to collect data and application.

• *Performance targets* – select indicators that are suitable for existing condition and establishing usable performance targets.

1.2 Rating systems

Rating systems attempt to measure performance of transportation decisions or projects. They are planned for use in benchmarking, in identifying areas of success, and in identifying areas of opportunity for improvement. Rating systems provide credits for sustainable choices or practices, and according to that certification awarded.

Rating systems used in the following ways:

• **Defining basic transportation sustainability characteristics-** list of sustainable transportation characteristics can be useful to those seeking to design/construct a more sustainable roadway.

• **Greater participation in transportation sustainability**. The rating systems involved present transportation requirements and sustainability in a straightforward manner so that everyone can understand and participate in sustainability – particularly at a project level.

• **Evaluating sustainability tradeoffs-** Rating systems can compare two different criteria using a common point system to determine their relative impact.

• S**ustainability assessment**. Rating systems use to track sustainability progress.

• **Contribute market recognition for sustainability efforts-** Rating systems can use to increase awareness of sustainability efforts and gives recognition to those who participated in the effort.

Nowadays, green highway Rating system becomes a popular tool to confirm the green credential of highways. With the successful implementation of green building rating system, the rating system can be widened into the highway. This rating system was established with the help of existing green building rating system. There are some common criteria that can be found in every green rating system such as sustainable site, water efficiency, energy efficiency, materials and resources and innovation.

Although new technologies are constantly being developed to complement current practices in creating greener structures, the common objective is that green highways are designed to reduce the overall impact of the built environment on human health and the natural environment. In India the national highways have a total length of 70,934km and serve as the arterial road network of the country. In the world the second largest highway is in India. Growing public awareness of climate change requires transportation professionals to integrate green concepts into transportation planning, design, construction and operation process.

The six rating systems are GREENLITES, GREENROAD, ENVISION, I-LAST, INVEST reviewed have similarities and differences. Specifically, all six sustainability rating systems are applicable to the planning and design phases of projects. Only Envision, GreenLITES, Greenroads and INVEST are applicable to the construction phase; and only Envision, GreenLITES and INVEST are applicable to the operations and maintenance phases of a project. I-LAST is currently developing a sub-system applicable to the construction phase. Envision is the only system applicable to many different types of infrastructure projects. The other rating systems are only applicable to highway projects

Table 1 : Important elements consider in Highway rating systems

Important elements consider in Highway rating systems			
Sustainable Management Systems	**MATERIALS CATEGORY**	**WATER QUALITY AND USE CATEGORY**	**ENERGY CATEGORY**
Environmental Management Systems	Reuse of Materials	Stormwater Treatment / Management	Energy and Fuels
Site Vegetation/Trees and Plant Communities	Recycled Content/	Reduce runoff and treat stormwater runoff	Energy Efficiency
Protect Enhance or Restore Wildlife (Habitat Restoration)	Locally Provided/Regional Material	Runoff Flow Control	Reduce Electrical/Energy Consumption
Ecological Connectivity	Bioengineering	Runoff Quality	Reduce Petroleum Consumption

Environmental Training	Techniques	Stormwater Cost Analysis	Stray Light Reduction
Improve Air Quality by Improving Traffic Flow	Hazardous Material Minimization	Reduce Impervious Areas	Renewable Energy Consumption
Improving Bicycle and Pedestrian Facilities	Life Cycle Assessment	Construction Practices to Protect water Quality	Total achievable for Energy
Noise Abatement	Pavement reuse	Water Tracking	
Integrated Planning Natural Environment	Earthwork Balance	Total achievable for water quality	
Siting & Biodiversity	Energy Efficiency		

2. Comparative Analysis of different rating systems

Table 2: Comparative Analysis of different rating systems

CRITERIA	Green roads	Green lites	I- Last	Invest	STEED	Envision
Launched Date	2009	2010	2010	2010	2008	2012
Origin	USA	New York State, US	USA	USA	USA	United States
Website	www.greenroads.org	www.dot.ny.gov/progr/greenlites	ILast Guid book	www.sustainablehighway.org	N/a	www.sustainableinfrastructure.org
Certification Level	Certified/Silver/Gold/Evergreen	Certified/Silver/Gold/Evergreen	N/A	Bronz/Silver/Gold/Platinum	N/a	Bronz/Silver/Gold/Platinum
Fees (RS)	335000 RS	Free	Free	Free	Free	Registration 67000, ISI Member- 167500 RS ,Non ISI Member 201000 RS
Cetification Labeling	Green roads	Green lites	N/A	Invest	STEED	Envision
Update Process	Every Five Year	N/A	N/A	Voluntary	N/A	Voluntary
Governance	Green roads Foundation	NYS DOT	Illinois DOT	Federal Highway Administration	H.W. Lochner Inc.	Institute of sustainable infrastructure
Stage of Use	Project devlopment	Project Design,Opration	Project devlopment	Planning Project devlopment ,Opration & Maintenance	Planning Project devlopment ,Opration & Maintenance	Planning Project devlopment ,Opration & Maintenance
Verification Porcess Time	90 days	120 days	120 days	90 days	90 days	90 days
Total points	54	278	233	System planning 160,Operation 150,Project Development 85/117	153	60 Criteria- 181
Minimum Points (%)	16	75	N/A	30	N/A	20

3. RESULTS AND DISCUSSION

From studding many criteria in different rating system, main criteria of sustainable site had the highest importance from other criteria. It shows that sustainable sit selection and Material and resources are the most important criteria to achieve green highway development. The lowest importance in water efficiency. Quality management is a second important criteria in green highway development because as to achieve and maintain the green highway should have a good quality of design and construction method. Other criteria follow respectively based on their weightage/point noise mitigation, context sensitive design, erosion and sedimentation control and alignment selection. Those criteria had equal total of weightage/point. It show that they are related to each other and had same level of important during design and construction of green highway.

3.1 Future Project Plans -Developing a Rating System

Applying an credit system to all highway projects would prove counterproductive. Each highway project is unique to the extent that the environmental impacts of projects can vary vastly from one side of the country to another.

Suggesting the rating system according to different factors, comparative study on four different quantitative sustainability assessment tools for green transportation projects to provide clear picture of the rating systems. Based on the analysis of the environmental perimeters, social benefits are most evident in INVEST because 53% of its total points are related to social benefits.

Environmental benefits are most evident in I-LAST because 95% of its total points are related to environmental benefits. Economic benefits are most evident in GreenLITES because 54% of its total points are related to economic benefits. No exact equivalents from one rating system to another can be found and some points may be too project-specific. All categories in GreenLITES and I-LAST have a similar equivalent in INVEST. INVEST has about 22% of its points similar to Greenroads. These results can be used as a basis to develop a thematic framework to measure the sustainability of transportation projects

4. CONCLUSION

Rating System depicts a proposed standard for measuring maintainable practices related with roadway plan and development which can be utilized as a part of India. Green highway rating can potentially provide a common metric for considering sustainability in roadway design and construction The idea of this system is to present roadway sustainability in a straightforward manner so that everyone can understand and participate in roadway sustainability.

In India different rating systems are available for Green Building construction which evaluates and gives identity to that building in terms of sustainability but the there are very rare rating systems for green highway infrastructure development so there is need to focus on rating systems.

The Smart city concepts mainly focus on sustainability which is essential requirement where it would maintain the ecological balance hence the study focuses guidelines on design, construction and evaluation criteria's of green highway which will play an important role in smart city development. The overall study involves the information and working of rating systems available for green highway projects, its comparison based on various criteria's and to suggest the new rating system by overcoming the limitations of available rating systems.

REFERENCES

[1] Pranav Chavan, NilamPhad, Study Of Greenroads Rating System For Sustainable Road Construction In India, TACE 2015. Impact Factor: 1.036, Science Central

[2] C.R. Suresh, Green highway ratings for existing NH& SH in Tamilnadu – a case study, JCPS Volume 8 Issue 4 , December 2015

[3] E. Saad Sarsam, Sustainable and Green Roadway Rating System, December 2014

[4] Padmanabhan Vasanthi, GREEN HIGHWAYS RATING SYSTEM, International Journal of Science, Technology &Management,Volume No 04, Special Issue No. 01, March 2015

[5] Stephen T. Muench, Green Roads: A Sustainability Rating System for Roadways, Master of Science in Civil Engineering Thesis, TRB 2008

[6] T. James ,M. Bryce ,Exploring the Development and Implementation of a Green Highway Rating System, University of Missouri,2008 ASTM August 7, 2008

[7]V. Jeralee Anderson, Greenroads: A Sustainability Rating System for Roadways, ISSN 1997-1400 Int. J. Pavement Res. Technol. 3(5):270-279

[8] Tuncer B. Edil, Craig H. Benson, James M. Tinjum, "Building Environmentally and EconomicallySustainable Transportation Infrastructure: Green Highway Rating System", ASCE Journal ofConstruction Engineering And Management, Society of Civil Engineers.

[9] Stephen T. Muench, Jeralee Anderson, and Tim Bevan, "Greenroads: A Sustainability RatingSystem for Roadways", International Journal of Pavement Research and Technology, ISSN 1997-1400 Int. J. Pavement Res. Technol. 3(5):270-279Copyright @ Chinese Society ofPavementEngineering.

[10] Raja Rafidah Raja Muhammad Rooshdi, NurizanAbRahman, NazurahZahidah Umar

Baki, MuhdZaimi Abdul Majid, Faridah Ismail, "An Evaluation of Sustainable Design and

Construction criteria for Green Highway", ELSEVIER Journal of Environmental Science, ProcediaEnvironmental Sciences 20 (2014) 180 – 186

[11] Manoj K. Jhaa,*, Hellon G. Ogallob, OludareOwolabia, "A Quantitative Analysis of

Sustainability and Green Transportation Initiatives in Highway Design and Maintenance",

ELSEVIER journal of Social and Behavioral Science, Procedia - Social and Behavioral Sciences 111(2014)

[12] Rajiv Kumar, Amar D.D., Ryntathiang T.L. "Green Road Approach for the Sustainable Development in India", European Journal of Sustainable Development (2013)