A REVIEW PAPER - STUDY OF GREEN HIGHWAY RATING SYSTEME

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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:

- **Encyclopaedic** – 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.

• **Sustainability 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, GreenLITED 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

<table>
<thead>
<tr>
<th>Sustainable Management Systems</th>
<th>MATERIALS CATEGORY</th>
<th>WATER QUALITY AND USE CATEGORY</th>
<th>ENERGY CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Management Systems</td>
<td>Reuse of Materials</td>
<td>Stormwater Treatment / Management</td>
<td>Energy and Fuels</td>
</tr>
<tr>
<td>Site Vegetation/Trees and Plant Communities</td>
<td>Recycled Content/</td>
<td>Reduce runoff and treat stormwater runoff</td>
<td>Energy Efficiency</td>
</tr>
<tr>
<td>Protect Enhance or Restore Wildlife (Habitat Restoration)</td>
<td>Locally Provided/Regional Material</td>
<td>Runoff Flow Control</td>
<td>Reduce Electrical/Energy Consumption</td>
</tr>
<tr>
<td>Ecological Connectivity</td>
<td>Bioengineering</td>
<td>Runoff Quality</td>
<td>Reduce Petroleum Consumption</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>Green roads</th>
<th>Green lite s</th>
<th>I-Last</th>
<th>Invest</th>
<th>STEED</th>
<th>Envision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launched Date</td>
<td>2009</td>
<td>2010</td>
<td>2010</td>
<td>2010</td>
<td>2008</td>
<td>2012</td>
</tr>
<tr>
<td>Origin</td>
<td>USA</td>
<td>New York State, US</td>
<td>USA</td>
<td>USA</td>
<td>USA</td>
<td>United States</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.greenroads.org">www.greenroads.org</a></td>
<td><a href="http://www.dot.ny.gov/pgpg/green">www.dot.ny.gov/pgpg/green</a> lite s</td>
<td>LastGuidbook</td>
<td><a href="http://www.sustainablehighway.org">www.sustainablehighway.org</a></td>
<td>N/A</td>
<td><a href="http://www.sustainabilityinfrastructure.org">www.sustainabilityinfrastructure.org</a></td>
</tr>
<tr>
<td>Certification Level</td>
<td>Certified/Silver/Gold/Evergreen</td>
<td>Certified/Silver/Gold/Evergreen</td>
<td>N/A</td>
<td>Bronz/Silver/Gold/Platinum</td>
<td>N/A</td>
<td>Bronz/Silver/Gold/Platinum</td>
</tr>
<tr>
<td>Fees (RS)</td>
<td>335000 RS</td>
<td>Free</td>
<td>Free</td>
<td>Free</td>
<td>Free</td>
<td>Free</td>
</tr>
<tr>
<td>Certification Labeling</td>
<td>Green roads</td>
<td>Green lite s</td>
<td>N/A</td>
<td>Invest</td>
<td>STEED</td>
<td>Envision</td>
</tr>
<tr>
<td>Update Process</td>
<td>Every Five Year</td>
<td>N/A</td>
<td>N/A</td>
<td>Voluntary</td>
<td>N/A</td>
<td>Voluntary</td>
</tr>
<tr>
<td>Governance</td>
<td>Green roads Foundation</td>
<td>NYS DOT</td>
<td>Illinois DOT</td>
<td>Federal Highway Administration</td>
<td>H.W. Lochner Inc.</td>
<td>Institute of sustainable infrastructure</td>
</tr>
<tr>
<td>Stage of Use</td>
<td>Project development</td>
<td>Project Design, Operation</td>
<td>Project development</td>
<td>Planning Project development, Operation &amp; Maintenance</td>
<td>Planning Project development, Operation &amp; Maintenance</td>
<td>Planning Project development, Operation &amp; Maintenance</td>
</tr>
<tr>
<td>Verification Process Time</td>
<td>90 days</td>
<td>120 days</td>
<td>120 days</td>
<td>90 days</td>
<td>90 days</td>
<td>90 days</td>
</tr>
<tr>
<td>Total points</td>
<td>54</td>
<td>278</td>
<td>233</td>
<td>System planning 50, Operation 80, Project Development 85, Project Development 85/017</td>
<td>153</td>
<td>60 Criteria-81</td>
</tr>
<tr>
<td>Minimum Points (%)</td>
<td>16</td>
<td>75</td>
<td>N/A</td>
<td>50</td>
<td>N/A</td>
<td>20</td>
</tr>
</tbody>
</table>

3. RESULTS AND DISCUSSION

From studying many criteria in different rating systems, 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. These 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.

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