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Development of Framework for Rating System for Indian Green Highways

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ABSTRACT: *Sustainability has been broadly used in the infrastructure trade in recent years. Green highway requires a stability performance between environmental, economical and social. Green highway required a rating system to evaluate criteria for design, construction, and maintenance. It must be applying to all road projects including new, reconstructed and rehabilitated roads. Its awards credits for sustainable selection and practices and might be used to assess road project sustainability. The rating system will be used to compare different road projects for their overall performance toward being additional sustainable than an average road project. The objective of this research is to develop a framework for the green highway rating system. A rating system framework was established by the literature review of existing green highway rating systems i.e. GreenGuide of roads, I-LAST, INVEST, Envision, Green Guide for Roads, GreenLITES, GreenPave, and BESTin-Highways, CEEQUAL, and STARS. And with help of Indian green building rating system LEED India, IGBC and GRIHA because so far rating system for highway has not been implemented. After completing a literature review, we identify the major categories and their corresponding items most suitable for assessing the "greenness" of a highway project. The six major categories identified are: site selection and planning, energy conservation, water conservation material and resources, environment quality and innovation in design. the questionnaire method is then employed to determine the weighting of the categories as well as the sub categories in each category*
Keywords*-sustainability, highway, LEED India, rating system, credits.*

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I. INTRODUCTION

Infrastructure plays very important role in the growth of the country. During recent past infrastructure development in India, is at very fast pace. Highway construction is one of major area of infrastructure development and for which a substantial amount of money has been allocated. The construction agency such as NHAI CPWD, PWD, public sector and private construction agencies are preparing detail project reports.

Transportation is a large contributor to environmental impacts, especially harmful CO2emissions that increases global warming. To ease the impacts on the environment, sustainable practices should be implemented, so the needs of today can be met without affect in the needs of the future. Climate exchange is a global challenge and transport region is a huge source that contributes to increasing GHG emissions.

In India, Road transport is taken into consideration to be one of the cost-effective and desired modes of transport. According to ministry of road transport and highways, India has a wide-ranging road network of 5.6 million km– the second largest in the world as on 31 March 2016. As of June 2017, 23 km per day of highway construction has been achieved which is record in Indian history. The National Highways have a total length of 115,435km and serve as the arterial road network of the country (MORTH 2018). It is estimated that more than 70 % of goods and 48% of passenger traffic in the country is being handled by a highway (KaushalP Nikumbh 2017) (AppaRoa 2013). While Highways/ Expressways constitute only about 2.7 % of the length of all roads,

rest are the state highway, major district road, district roads and rural and another road which is considered as low volume road (AppaRoa 2013).

There are programs and tools available that promote sustainability and reduce environmental impacts such as the popular LEED rating systems developed by the USGBC. The rating systems produced by the USGBC have been a huge success, its membership has quadrupled since 2000 and it continues to raise the bar for sustainable building practices and operation (USGBC, 2009). Unfortunately, there are currently no nationwide standard rating systems like that of LEED available to promote sustainable transportation planning, construction and operation (Clark, 2009). However, there are programs attempting to reduce environmental impacts through government regulated recycling programs and material reuse (Anon., 2012).

Sustainable development is outlined as the ability to satisfy the requirements of this generation while not compromising the requirement of future generation (CEM, 2008). Some researchers said that highway construction will never be sustainable. For example, the methods of manufacturing construction materials similarly Because the construction process is energy intensive using a significant amount of energy resources. Buildings account for material usage, water usage, greenhouse emissions, are 30%, 12% & 30% respectively (Verma, 2015). transportation of materials and different sundry tasks account for an extra 18 % of greenhouse emission emissions, 45-65 % of waste to landfills, 71 % of electricity consumption and 31 % of mercury in solid waste. However, it has been established that the construction industry can reduce waste and resource consumption by reusing existing life resources and maintaining existing structures rather than making it from the ground (Yudelson, 2008).

The Indian government launched its green Highways (Plantation, Transplantation, beautification & Maintenance) Policy 2015, the purpose of which is to assist the atmosphere, facilitate native communities, and generate employment by planting trees on all the highways within the country (NGHM, 2015). The target for the primary year is to plant trees on 6,000 kilometres of highways. India contains a total 46.99 lakh kms of road length and out of that over 96214 kms are National Highways, accounting 2% of total road length. The Highways transmit regarding 400th of the traffic load. The Ministry has determined to develop all of existing National Highways and 40,000 kms of further roads within the next few years as green Highways (NGHM, 2015).

"The green highway Policy can facilitate in creating India pollution free. it'll additionally facilitate in curtailing the number of road accidents in India. The vision of the policy is to supply dignified employment to native people and communities," Nitin Gadkari, Minister of Road Transport and Highways, said during the release of the policy in 2015.

The first green expressway is launched in April 29, 2018 in Delhi, which is 135km-six-lane -access-controlled long Kundli-Ghaziabad-Palwal (KGP)expressway-also known as Eastern Peripheral Expressway. time taken to build 500 days (17 months) (nghm, 2018).

In India, the government has come to be interested in sustainability in construction, which includes road production, because it acknowledges the significance of difficulties which includes global warming and climate change, and appreciates the various negative environmental affects which result from construction activities. These current practices are a start but do not promote sustainable transportation over the life of a road. the development of a green highway rating system for the street and highway production region could provide a useful way of promoting the implementation of green practices over a road's life cycle. A green rating system offers hints that help green practices and technology in road construction and therefore reduces the road's environmental effect whilst improving its associated social and financial benefits. further, it affords a baseline for green building practices and benchmarking alternatives, enables set priorities, presents selection support and courses the selection of green practices and documentation. Thus, several public agencies in the United States (US) have developed and implemented green road rating systems, BE2ST, Green Pave, Envision, STARS, CEEQUAL, Green-guide for roads, GreenLITES, GreenRoads, I-LAST and INVEST, to support sustainability in road construction.

II. LITERATURE REVIEW-

Accordingly, (Verma, 2015)Transportation sector emissions, one of the main drivers of climate change accounts for 22nd of global carbon dioxide emissions. Transport Greenhouse Gas (GHG) emissions and energy demand can have so much reaching implications in developing countries like India, wherever increasing personal implementation and growing urbanization are the most challenges faced by its metropolitan citiesIn 2015 the transport sector accounted for 19% of global energy use and contributed 24% to the total carbon dioxide (CO_2) emissions in the world (Verma 2015). The transportation sector in India taking about 16.9% (36.5 mtoe: million tonnes of oil equivalent) of total energy (217 mtoe in 2005–2006). Various energy sources used in this sector are coal, diesel, petroleum (gasoline) and electricity (Ramachandra 2009). Road, rail, and air are responsible for the emission of 80%, 13%, and 6% respectively. The transport sector is also responsible for

20 percent of global emissions of Black Carbon (BC), the second largest contributor to warming of the planet, next to CO2(Black, 2010).

The Indian Green Building Council (IGBC) says 30 percent of the energy savings in green buildings, 30 to 50 percent water saving, 50-90 percent reduction in construction waste, and 20 to 30 percent reduction in greenhouse gas emissions Can be offered. According to IGBC the carbon emission reduction can be reached 35% in 2030(AppaRoa, 2013). Sustainability execution measures can screen natural, financial, and social execution and can help convey that execution to client and partners. Sustainability execution measures might be utilized to help organize and impact financing choices. (KaushalP Nikumbh, 2017)

A sustainable transportation is defined as one which can permit the essential access needs of people to be met safely whereas making Certainly the health of the ecosystem and equity within and within generations is appropriate and provides the option of transport mode, is economical and supports a spirited economy whereas minimizing emissions and waste to grade that is definitely absorbed by the atmosphere (Black, 2010). It also minimizes the utilization of non-renewable resources, encourages recycling in its construction and minimizes pollution and also the use of land (Yeh, 2008).

(Park, 2015)said a green road rating system framework was developed based on existing green road rating systems that has applicable categories, indicators, and credits, and applies applicable weightings to every. A green road rating system manual was created to provide a comprehensive guide for the design and construction of green roads also can be used as an education manual.

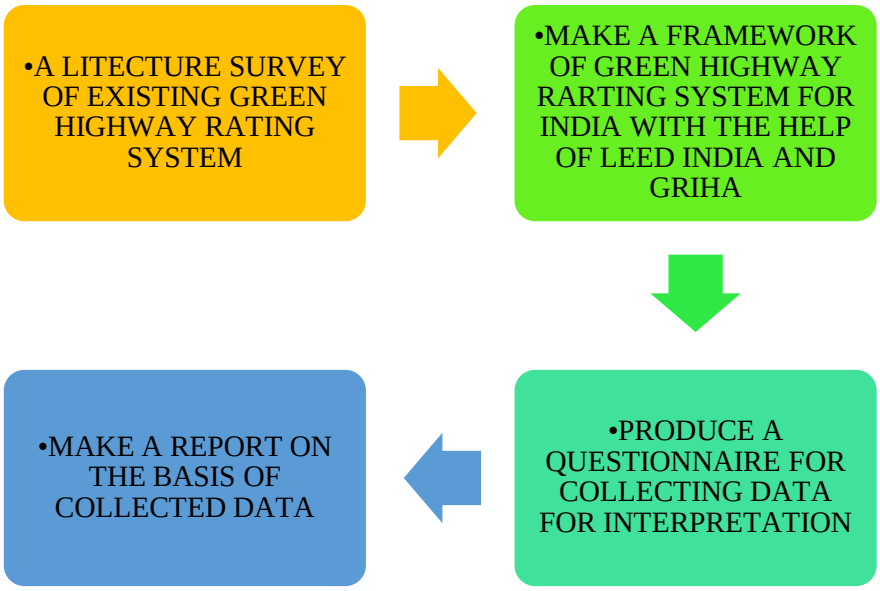
several green road rating systems (Table 1) have been developed and implemented the green practices in the road construction in US.

Rating system	Established years	Feature
Green guide	2008	Green Guide was developed by Stantec, the previous version of the Green Guide for Roads evaluated projects under seven categories: Mobility for All, Transportation, Efficiency, Safety, Energy and Atmosphere, Materials and Resources Community Impact, Innovation in Design Process
STARS	2009	The Sustainable Transportation Analysis Rating System (STARS) was developed by the North American Sustainable Transportation Council (STC), Project credits are classified into six categories: Integrated method, Access, Climate and Energy, Ecological function, cost Effectiveness Analysis and Innovation.
BE2ST	2009	BE2ST-In-Highways (Building Environmentally and Economically Sustainable Transportation-Infrastructure-Highways) Developed by the Recycled Materials Resource Centre (RMRC) based at the University of Wisconsin, BE2ST projects are evaluated based on 9 sub-criteria: Greenhouse Gas Emission, Energy Use, Waste Reduction (including ex situ materials), Waste Reduction (recycling in situ materials), Water Consumption, Hazardous Waste, Life Cycle Cost, Traffic Noise and Social Cost of Carbon Saving.
Green roads	2009	The Greenroads rating system are developed by collaboration of a global engineering company CH2 HILLS and university of Washington, which is revised in 2012. projects are evaluated based on 6 sub-criteria: Environment and Water, Access and Equity, Construction Activities, Materials and Resources, Pavement Technologies and Custom Credits.
GreenLITES	2008	GreenLITES' became developed by the NYSDOT to achieve its sustainability goals related to road creation. there are two certification programmes: a layout rating gadget and an operation rating gadget. GreenLITES additionally, recognises best practices and measures their overall performance by using evaluating initiatives that contain green practices
Green Pave	2010	GreenPave developed by the Ontario Ministry of Transportation, GreenPave takes the form of a computerized checklist which is divided into four main categories: Pavement Design Technologies (PT), Material and Resources (MR), Energy and Atmosphere (EA), Innovations and Design Process.
I-Last	2010	The I-LAST sustainability rating system was developed out of a collaborative effort among the Illinois Department of Transportation (IDOT), the American Consulting Engineers Council (ACEC) and the Illinois Road and Transportation Builders Association (IRTBA). The rating system has 8 categories across which credit points can be earned. Environmental and Transportation, Materials and Water Quality. Design, Planning, Lighting and Innovation and Design.
Envision	2010	Envision is developed by the partnership between the Zofnass Program for Sustainable Infrastructure at the Harvard University and the ISI (Institute for Sustainable Infrastructure). The Envision sustainability rating system is major credits in the Natural World and Resource, Quality of Life, Leadership and Climate.
CEEQUAL	2010	The Sustainability Assessment and Awards for Civil Engineering, Infrastructure, Landscaping and the Public Realm (CEEQUAL) rating system, CEEQUAL for Projects contain the same question sets in nine categories; Project Strategy,

		Project Management, People and Communities, Land use (above and below water) and Landscape, The Historic Environment, Ecology and Biodiversity, Water Environment (fresh and marine), Physical Resources Use and Management, Transport.
INVEST	2012	the Invest sustainability rating system is the project delivery and system planning and processes containing, Operations and Maintenance and Project Development containing the rating system.

III. OBJECTIVE AND RESEARCH METHODOLOGY

The objective of this study is developing a framework of green highway rating system for India so that it will assist the implementation of green practices in road construction and broaden a platform in an effort to inspire and inspire the construction industry to implement the new system.
The full process involved in emerging the rating system is revealed in Figure 1



Step one- within the development of the gadget was to check the present green dual carriageway rating structures listed in Table 1. as soon as the elements which are vital for sustainability in road creation – and hence need to be integrated into any green rating machine for road creation – had been understood, a fixed of objectives and dreams had been developed for the system provided in this look at. Once the objectives and aim for the green highway rating system had been established, 20 industry experts (from 10 belong to government and 10 construction industries) have been brought in to discover what turned into needed to funding sustainability in road creation and increase classes, indicators, and credits for green assessment (Table 2). as well as being created on at least 20 years of experience inside the industry. categories, indicators and credit were evolved by reviewing the categories and credit utilized in current green road rating structures together withBE2ST, GreenPave, Envision, STARS, CEEQUAL, Green-guide, GreenLITES, GreenRoads, I-LAST and IN-VEST (Table 1). based totally at the list of categories, signs, and credit, the industry experts were requested to feed the importance of every object and their applicability to road production in India. The frame work is made with help of LEED INDIA and GRIHA which is green building rating system because India do not have any rating system for highway yet.

After the study of existing rating system, we find 6 major categories. The six major categories identified are: site selection and planning, energy conservation, water conservation material and resources, environment quality and innovation in design. every category has sub categories which denoted by their **indicators.**

Table no.2 sub categories of Site selection and planning

Indicators	Sub categories
SS-1	Develop density & community connectivity
SS-2	Access to public places/shuttle services
SS-3	Design to adjust highway features Using design flexibility
SS-4	Natural topography & landscape 20%, 30%
SS-5	Heat island effect on top layer and parking areas

SS-6	Non -fossil fuelling facility for vehicles
SS-7	Design for differently abled
SS-8	Night sky pollution reduction
SS-9	Construction activity pollution prevention
SS-10	Brownfield redevelopment
SS-11	Alignment selection
SS-12	Quality control (e g. Storm water)
SS-13	Tenant design and construction guidelines

Table no.2 sub categories of water conservation

Indicators	Sub categories
WC-1	Storm Water Management Plans During Construction
WC-2	Best Management Practices
WC-3	Limit Turf Area 20%, 30%, 40%
WC-4	Drought Tolerant Species 30%, 40%
WC-5	Management of Irrigation System
WC-6	Rainwater Harvesting 75%, 95%
WC-7	Non-Process Waste Water Treatment 75%, 95%
WC-8	Water Use Reduction 20%, 30%
WC-9	Water Efficient Landscaping 20%, 30%
WC-10	Detecting and Eliminating the Non - Storm Water
WC-11	Water Reclamation Plant and Supply

Table no.3 sub categories of energy conservation

Indicators	Sub categories
EC-1	Monitoring
EC-2	On-Site Renewable Energy 50%, 75%, 100%
EC-3	Green Power 50%, 75%, 100%
EC-4	Eco-Friendly Captive Power Generation for highway Requirement
EC-5	Enhanced Commissioning
EC-6	Cool Pavement
EC-7	Environment Management System
EC-8	reduce Petroleum Consumption

Table no.4 sub categories of material and resources

Indicators	Sub categories
MR-1	Waste reduction during construction 50%, 75%
MR-2	Materials with recycled content 10%, 20%
MR-3	Local materials utilization 50%, 75%
MR-4	Material reuse 5%, 10%
MR-5	Certified rapidly renewable material 50%, 75%
MR-6	Storage & collection of recyclables
MR-7	Life cycle costing

Table no.5 sub categories of environmental quality

Indicators	Sub categories
EQ-1	Low VOC Materials
EQ-2	Protect, Enhance and Restored Wildlife Habitat
EQ-3	Improve Air Quality by Improving Traffic Flow
EQ-4	Improve Bicycle and Pedestrian Facilities
EQ-5	Noise Abatement
EQ-6	Portable Toilets & Government Shopping Centres
EQ-7	Protect, Plant or Mitigate for Removal of Trees
EQ-8	Transplantation Techniques
EQ-9	Monitoring and Maintenance

Table no.6 sub categories of innovation in design

Indicators	Sub categories
ID-1	Prevention in Natural Sources

ID-2	Using Relevant Software for Highway
ID-3	Safety Improvement Plan
ID-4	New Techniques of Construction
ID-5	Life Cycle Assessment
ID-6	Regional Priority

After defining the kinds, signs, and credit within the green highway rating system, a weighting operation became executed to allocate factors for every of the credit score necessities across the system. the primary part of the questionnaire changed into designed to define all element of respondent with touch element and in 2nd part designed to outline the main elements of rating system and evaluation tool for street construction that are maximum perfect to the India transport situation. The third element changed into aimed at adjusting the feedback or any idea for the assessment, and then the evaluation signs and their parameters (signs and credit) had been described. The questionnaire survey was comprised of Likert type-five-scale question, where scale 1 refers to non -relevant,2relevant,3- less important, 4- important, and scale 5 refers to most important (Marzouk, 2014).For each part, the contributors were requested to rank measures in keeping with their significance for organising a green highway rating system for India. applying this approach empowered the authors to recognize the categories, and parameters (indicators and credit) of the assessment device and assign the precise weighting to each.

Equation 1 shows the formula of the average index based on study done by (Al-Hammad, 1996).

Average index = $\sum alxl / \sum xl$ ..... (1)

Where:

al = Likert scale (1= non -relevant; 2= relevant; 3= less important; 4= important; 5= most important)

xl = Number of respondents

Step-4 highlights the end product of this research after all the findings were evaluated, validated, and summarized so that the development of an assessment framework for green highway rating system elements can be attained. The assessment framework of these elements was developed based on the factor scores obtained from the analysis.

IV. RESULT AND DISCUSSION

As mentioned within the methodology, the credits can be considered by multiplying the mean values and element loadings of each component concerned so as to get the most score in every green component practice. Henceforth, all of the findings have been presented during a professional discussion for obtaining their opinion and feedback concerning the category and their weightage. Since the highway experts had greater than 10 years working experience in transportation sector, they were all worried regarding the green development in highway industry.

Therefore, the proposed category, sub category, and maximum credit of each criteria are all presented in table no. 7,8,9,10,11 and 12 respectively. All the information in the framework have been verified and agreed by the highway expert in the discussion. This framework turned into advanced that allows you to certify the performance of practicing green technology elements during the project's evaluation phase among of the road concessionaires. primarily based on the conclusions, it is clearly recognized that all six factors had been essential to be considered and represented as a vital aspect in accomplishing sustainable road enhancement.

Table 7 Credits for site selection and planning category

Indicators	Sub categories		Credits
SS-1	Develop Density & Community Connectivity	Acclimatize contaminated sites, where development is complicated by environmental contamination.	3
SS-2	Access to Public Places/Shuttle Services	Network development to urban areas with existing infrastructures, most of public places, protect green fields and preserve habitat and natural resources.	2
SS-3	Design to Adjust Highway Features Using Design Flexibility	Design a highway planning to without disturb natural resources, resource of water and any green land.	3
SS-4	Natural Topography & Landscape 20%, 30%	Minimalize disturbances to the highway site. So as to reduce long term environmental effect.	3
SS-5	Heat Island Effect on Top Layer and Parking Areas	Decrease the heat within the site areas produced by human activities.	4
SS-6	Non -Fossil Fueling Facility for Vehicles	Inspire the utilization of non-fossil fuel vehicles to reduce pollution from automobile use.	2
SS-7	Design for Differently Abled	Certify that the highway is user-friendly for differently abled people.	2
SS-8	Night Sky Pollution Reduction	Decrease light pollution and façade lighting to increase night sky access and enhance natural environment.	3

SS-9	Construction Activity Pollution Prevention	Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.	3
SS-10	Brownfield Redevelopment	Acclimatize damaged sites where development is complicated by environmental contamination and to reduce pressure on undeveloped land.	3
SS-11	Alignment Selection	Alignment selection should cover unwanted areas as well as public densified areas.	3
SS-12	Quality Control (E G. Storm Water)	Limit interruption and pollution of natural water flows by managing storm water runoff.	3
SS-13	Tenant Design and Construction Guidelines	Educate tenant about applying sustainable design and construction features in their tenant improvement build-out.	3
Total			37

Table8 Credits for water conservation category

Indicators	Sub categories		Credits
WC-1	Storm Water Management Plans During Construction	design features that focus upon pollutant removal can provide benefits of both volume reduction and water quality protection.	4
WC-2	Best Management Practices	To decrease runoff and associated pollutants to adjacent water resources by allowing infiltration of surface water, filtration of pollutants, or other methods to treat stormwater runoff.	3
WC-3	Limit Turf Area 20%, 30%, 40%	Limit such landscapes which consume large quantity of water.	3
WC-4	Drought Tolerant Species 30%, 40%	Rise the groundwater table or reduce the usage of water through effective and appropriate rainwater management.	3
WC-5	Managing of Irrigation System	Reduce the petition for irrigation water through water-efficient management techniques. Reduce non-process water usage by installing efficient water fixtures.	3
WC-6	Rainwater Harvesting 75%, 95%	Enhance the ground water table or to reduce the usage of water through effective and appropriate rain water management.	4
WC-7	Non-Process Waste Water Treatment 75%, 95%	Treat non-process waste water either in-situ or in a common effluent treatment plant.	3
WC-8	Water Use Reduction 20%, 30%	Decrease the demand for portable water through water efficient management technique.	4
WC-9	Water Efficient Landscaping 20%, 30%	To limit the use of portable water or other natural surface or subsurface water resources available on /or the project site for landscape irrigation.	3
WC-10	Detecting and Eliminating the Non - Storm Water	Detecting and eliminating any non-stormwater discharges from unpermitted sanitary or other residential, commercial or industrial sources.	2
WC-11	Water Reclamation Plant and Supply	To promote water reuse and recycling to meet non-portable water use requirement and to reduce overall water demand from the local municipal supply/ground water	4
Total			36

Table9 Credits for energy conservation category

Indicators	Sub categories		Credits
EC-1	Monitoring	Enhancement continuous monitoring and enhance the performance of highway.	3
EC-2	On-Site Renewable Energy 50%, 75%, 100%	Encourage self-sufficiency energy through renewable technologies for on-site power generation and utilize within the site.	4
EC-3	Green Power 50%, 75%, 100%	Upgrading investments in of-site renewable energy technologies to be funding to the grid.	4
EC-4	Eco-Friendly Captive Power Generation for highway Requirement	Reduce emission levels and their effects on atmosphere through the use of low emitting fuels or better equipment.	3
EC-5	Enhanced Commissioning	To start the commissioning the procedure and implement additional activities after systems performance verification is completed.	2
EC-6	Cool Pavement	The temperature is reduced by cool pavement technique.	3
EC-7	Environment Managing System	Environmental managing system was arranged for the highway to its individual site conditions.	3
EC-8	reduce Petroleum Consumption	To design projects that reduce the consumption of petroleum for transportation.	3

Total			25

Table 10 Credits for material and resources category

Indicators	Sub categories		Credits
MR-1	Waste reduction during construction50%, 75%	Minimize construction waste being send to landfills.	4
MR-2	Materials with recycled content 10%, 20%	Encourage the utilization of products which contains recycled materials to reduce environmental impacts associated with the virgin materials.	4
MR-3	Local materials utilization 50%, 75%	Escalation the utilization of locally available materials thereby abating the associated environmental impact.	4
MR-4	Material reuse 5%, 10%	Encourage the utilization of retrieved building materials and products to reduce the demand for virgin materials thereby minimalizing the impacts associated with extraction and processing of virgin materials.	4
MR-5	Certified rapidly renewable material 50%, 75%	To minimize the use of virgin materials thereby encouraging responsible forest management certification.	4
MR-6	Storage & collection of recyclables	To ease the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.	3
MR-7	Life cycle costing	The pavement is octenyl assessed it should rectify immediately.	3
MR-8	Bioengineering techniques	The objective is to increase the use of soil bioengineering to reduce the amount of heavy stone fill mined and transported to the site, reduce the amount of runoff and erosion from the site, and to increase the amount of carbon sequestration	2
Total			28

Table 11 Credits for sustainable environmental quality category

Indicators	Sub categories		Credits
EQ-1	Low VOC Materials	To increase the utilization of materials with low emissions so as to reduce adverse health impact for users.	3
EQ-2	Protect, Enhance and Restored Wildlife Habitat	Avoid, minimize, rectify, reduce, and compensate the loss and alteration of natural.	3
EQ-3	Expand Air Quality by Refining Traffic Flow	to reduce air emissions by improving traffic flow.	3
EQ-4	Improve Bicycle and Pedestrian Facilities	Improve the people healthiness and reduce the motor vehicle pollution of the highway.	3
EQ-5	Noise Abatement	Reduce traffic noise impacts to surrounding communities and environments.	3
EQ-6	Portable Toilets& Shopping Centers	Portable toilets and shops should provide certain distance.	3
EQ-7	Protect, Plant or Mitigate for Removal of Trees	For aesthetic enhancement of the project corridors and places of importance by planting selective ornamental trees, landscaping and turfing with grasses and ornamental shrubs.	4
EQ-8	Transplantation Techniques	Transplanting orreplanting isthe technique of moving a plant from one location to another.	4
EQ-9	Monitoring and Maintenance		4
Total			30

Table 12 Credits for sustainable innovation in design category

Indicators	Sub categories		Credits
ID-1	Selection of Alignment	To preserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.	1
ID-2	Prevention in Natural Sources	Using relevant software to improve quality of design	2

		and make more sustainable structure	
ID-3	Using Relevant Software for Highway	Traffic flow and safety enhancement plan should be Innovative	2
ID-4	Safety Improvement Plan	Meet economic and social needs and improve mobility without adding capacity, or Improve the efficiency of transportation systems.	2
ID-5	New Techniques of Construction	Create lifecycle assessment information for roads	2
ID-6	Life Cycle Assessment	To provide a motivation for the achievement of credits that report geographically-specific environmental priorities.	3
ID-7	Regional Priority	To provide an incentive for the achievement of credits that address geographically-specific environmental priorities.	2
Total			14

V. CONCLUSIONS

Sustainability in highways should be denoted with the understanding that highways are one part of transportation infrastructure, and transportation is one aspect of meeting human needs. In addition to addressing environmental and natural resource needs, the development of rating system based on local conditions should focus on providing people with transportation choices, such as safe and comfortable routes for walking, cycling, and transit.

Implementation of the rating system for green highway will help to improve the requirements of the road and defeat considerably less maintenance. it'll basis of sustainable highways. all the criteria stated above concentrations mostly on waste control and quality towards the accomplishment of sustainable highways. The requirement is to expand and take the designs and technology which is environments friendly. It progresses the highway requirements in futuristic view. The framework of rating system includes of 6 categories, 56 indicators, and 170 credits for highways the 6 categories under rating system are 'site selection and planning', 'water conservation', 'energy conservation', 'material and resources', 'environmental quality' and 'innovation in design'. Each category has 7 to 13 indicators, each with 1 to 4 credits, which indicate the base of the rating system.

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