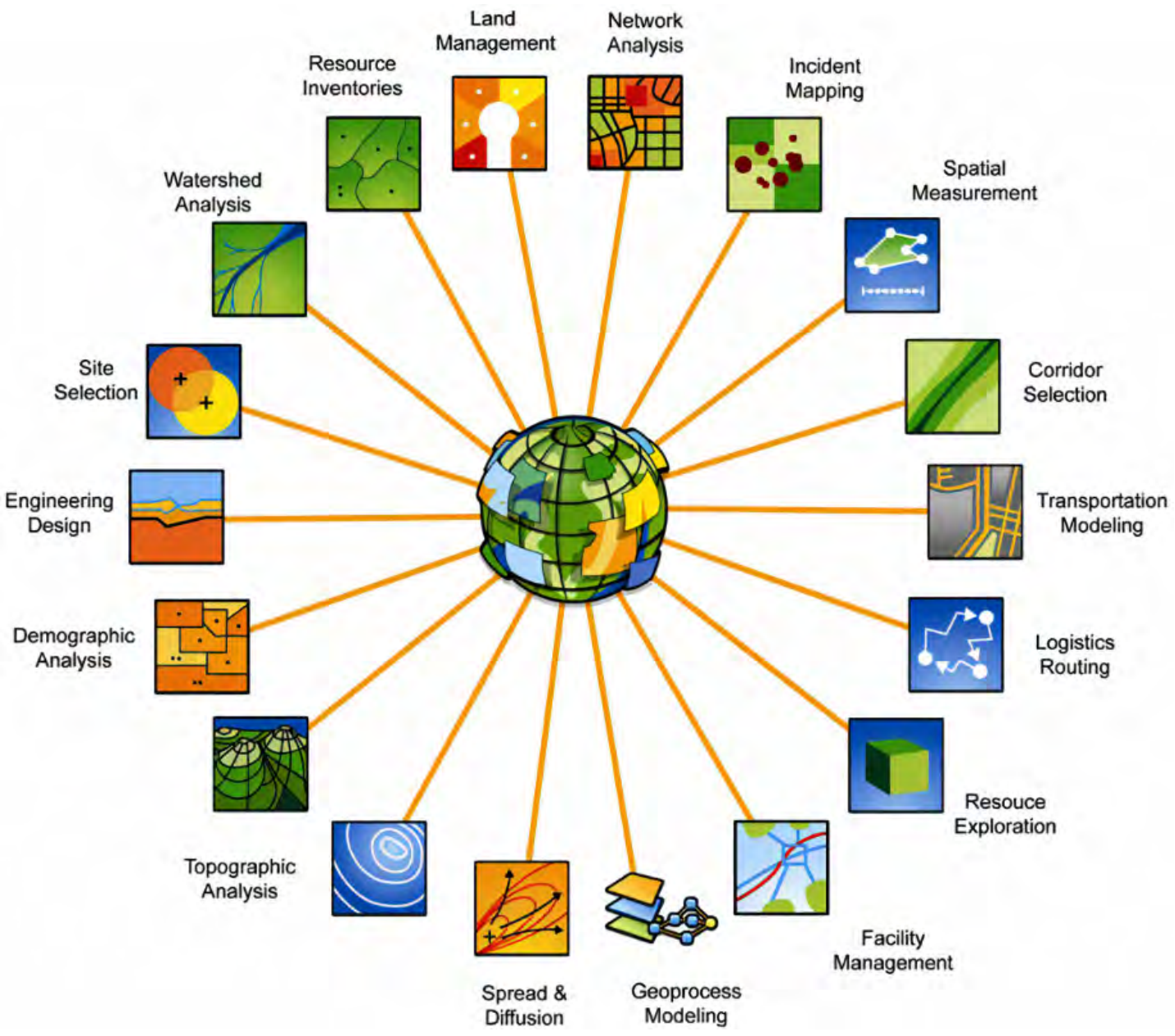
KERALA INFRASTRUCTURE INVESTMENT FUND BOARD

Newsletter

Vol 5 Issue 11 November 2022



Geographic Information System

Projects - Statistics

Department	KIIFB Approved Projects	
	No. of Projects Approved	Approved Amount (₹. in Crore)
PWD	449	25,754
Agriculture	1	21
Ayush	2	183
Backward Classes Development Department	1	18
Coastal Shipping & Inland Navigation	8	1,865
Culture	17	464
Devaswom	2	130
Fisheries and Ports	26	517
Forest	4	459
General Education	142	2,869
Health & Family Welfare	65	4,960
Higher Education	52	1,113
Home	6	220
Industries	1	62
Information Technology	3	1,413
Labour & Skills	5	85
Local Self Government	21	616
Power	18	5,200
Registration	6	89
Revenue	2	33
SC/ST Development	10	182
Sports & YA	38	784
Tourism	11	417
Transport	3	601
Water Resources	93	5,885
Total	**986**	**53,941**

Projects under Land Acquisition Pool of ₹ 20,000 Crore		
PWD-NHAI	1	6,769
Industrial Parks - 3 projects - ₹13988.63 Cr	6	16,077
Taking over of land from HNL - ₹ 200.60 Cr		
Kochi - Banglore Industrial Corridor & Gift City - ₹1888.00 Cr		
Total	**7**	**22,846**

KIIFB Approved Projects Grand Total		
Infrastructure Projects	986	53,941
Projects under Land Acquisition Pool	7	20,000
Total	**993**	**73,941**

From the CEO's Desk...

Geographic Information System (GIS) has become a part of our everyday life. Whether we are obtaining a list of nearby restaurants, checking traffic or public transportation schedules. Without a doubt, GIS has made our lives easier, not just for ordinary citizens but businesses and governments have also reaped the benefits. The intellectual implications of geographic information systems (GIS) are enormous, and their practical applications are now in worldwide use. The ability to make maps that communicate, perform analysis, share information, and solve complex spatial problems has proven to be critical, especially when it comes to infrastructure planning.

Beyond the domains of what to do and how to do it, in alphanumeric words, the main concerns for any agency engaged in infrastructure development, about locating resources, are where to set up and how to build up the infrastructure. Both problems are directly related to corporate economics, and GIS provides realistic and appropriate solutions to these problems after considering several options. GIS improves design and planning by using geographically referenced data on subjects ranging from the economy to ecology and beyond. Since its origins in the 1960s, GIS has enabled designers, planners, developers, public agencies, and communities to make better decisions about the shape of urbanization and its impact.

Due to the ability to handle spatial data in a more efficient manner, many infrastructure projects are increasingly considering GIS technology for implementation. Knowing where infrastructure is located, how different pieces relate to one another, and where the critical dependencies lie are required first steps for infrastructure development to be successful. Geographic information systems make it easier to discern and understand the precise location of every facet of infrastructure, from what's underground to what's overhead.

KIIFB understands that to get the myriad elements of new national infrastructure programs to coalesce, investments need to be smart, timely, data driven, and efficient. They must also account for society's current and future needs in a sustainable way. Significantly, the planning and design processes will generate new jobs and continued innovation in the GIS and geospatial technology sectors. This edition of the KIIFB newsletter focuses on the topic of GIS. The articles highlight how KIIFB, as an organisation understands the versatility of GIS and utilises its potential by applying it in its work.

More in the next edition, Happy Reading

Chief Executive Officer, KIIFB

Chief Editor's Page

The world is rapidly urbanising, but not all regions are moving at the same speed. As new challenges emerge in urban centres, cities struggle to manage integrated infrastructure networks. The development of technology to collect, organize, and handle the mass quantities of data has led to the digital transformation of cities and urban planning. Even today, decisions about regional and municipal development, land use planning, provision of infrastructure, transportation, natural resources management, disaster preparedness, etc. are based on simple paper maps that are often outdated and derived from incomplete data and which normally require a lot of searching in the archives of different departments and institutions.

In cases like there, the use of geospatial technology that links location information of projects to relevant technical and management information can be key in improving the efficiency of management intervention to check the progress of works and later for maintenance purposes. Geographical Information Systems (GIS) can be the digital backbone that is built on spatial data and analytics for streamlining decision-making by improving our ability to harness the project data, organize it, interpret it to uncover patterns faster.

In simple terms, a Geographic Information System (GIS) is a system that creates, manages, analyses, and maps all types of data. It connects data to a map, integrating location data with all types of descriptive information. GIS helps users understand patterns, relationships, and geographic context. The benefits include improved communication and efficiency as well as better management and decision making, by generating actionable intelligence from disparate data as well as the possibility of using current and saved historical data to predict future outcomes.

Organizations around the world in virtually every field are using GIS to make maps that communicate, perform analysis, share information, and solve complex problems. This is changing the way the world works. As a key entity managing infrastructure development in the state of Kerala with the mandate to plan, monitor and evaluate progress of infrastructure projects, KIIFB understands the importance and potential of a versatile system like the GIS. Tackling the data silos that exists across government departments and having them subscribe to the data lake approach whereby information is centralised and made easily accessible to stakeholders, is key here. The initiatives by the Kerala Spatial Data Infrastructure (KSDI) and the Information Kerala Mission (IKM) fits in well with the data lake approach consisting of a centralized repository to store all structured and unstructured data and an interface to drive spatial data analytics for improved decision making. These include digital maps, GPS points, BIM models, scheduling information as well as the in-house project monitoring work. This edition of the KIIFB newsletter follows the theme "GIS-Transforming Kerala" and the articles incorporated in it will shed light into the topic in detail.

Happy reading!

Regards,
Chief Editor

The use of GIS in devising traffic management plans during implementation of water supply projects.

Ms Anoja BV GIS Analyst, IIM, TIW

Water is a vital part of our everyday lives. The explicit recognition and acknowledgement of the human right to water as essential to the realisation of all human rights by the United Nations General Assembly on 28 July 2010, through resolution 64/292, puts this in context. In the scheme of local self-governance, of all municipal services, the provision of potable water is perhaps the most vital.

As Kerala's nodal agency for drinking water supply and sewerage services, the Kerala Water Authority takes lead in the installation and commissioning of water supply projects. Unfortunately, water supply works cause severe disruption to the public by way of roads remaining dug up for extensive periods and restoration works being side-lined. Day-to-day lives for people in the locality and surrounding areas get thrown out of gear and the disruption can be considerable, especially for commuters, and worse for school children. The use of GIS in planning the implementation of water supply projects can effectively address this by foreseeing the disruptions, while the use of modelling tools can build up scenarios to help plan alternatives.

The diversion of traffic to alternative routes during the implementation phase of a water supply project is considered as an effective management practice towards reducing traffic delay and consequent inconvenience to motorists. Prior information on alternative routes for use by motorists during the pipe laying phase of a WSS project can reduce travel delay and traffic congestion, not to speak of positive psychological impacts on motorists. The impacts of traffic conditions, right of way and carriage way details, travel time, turning radius for heavy vehicles, and the timelines for the installation of pipelines can be identified and compiled in GIS environments for the identification and mapping of alternative routes. This information can greatly aid the planning of site works in a manner creating the least interference to the flow of traffic while being consistent with safety standards and regulations.

Even though, GIS applications for water distribution systems are not new, getting beyond the basic inventory and mapping functions is often challenging. Getting field data with coordinates and the reliability of the information that gets compiled on WSS projects remains a challenge. Added to this are differences from engineering and management perspectives. For KIIFB-led water supply projects, every effort is taken to minimise disruption during implementation and the use of GIS in combination with field data facilitates this. The case study detailed below intends to provide recommendations to Contractors

and KWA professionals on how to effectively operate alternative routes to reduce difficulties for motorists and meet their expectations during the pipe laying process in urban areas.

Neyyar – PTP WSS project

The Neyyar – PTP Nagar WSS project aims to supply, lay, join, test, and commission a 1422 mm MS PIPE 12.5 mm thick clear water gravity main from 120 MLD WTP at Neyyar Dam site to PTP Nagar GLSR and allied works. The project is mainly for the benefit of people in the Thiruvananthapuram city and 4 nearby panchayaths. The alignment proposed is through the main road from Neyyar dam to PTP Nagar for a length of ~ 24 km including inclined, vertical, and undulating portions. The transmission main using a 1422 mm diameter MS pipe of thickness 12.5 mm is proposed to be laid along Kallikadu – Kattakkada – Anthiyoorkonam – Malayinkeezh – Peyad – Kundamonkadavu – Elipode and to the reservoir at PTP Nagar via internal road and compound of Revenue department and Nirmithi Kendra.

Management Plan

The proposed alignment is to follow the main road from Neyyar – PTP via Kattakada extending to 24.16 km and construction is to be planned for individual stretches (13 in nos. approx. 2 km in length) (Table 1). Towards assessing the availability of alternative routes to redirect traffic on the main road during construction works, field visits were conducted. Using smart-phone-based mobile app, the following field data were collected:

- Proposed site of WTP at Neyyar and existing GSLR at PTP
- Alternative routes (bus and light vehicles) were ascertained for each WSS stretches
- Identified locations for stacking pipes, dumping yard for excavated soil
- Religious places, educational institutions, and other inventories were mapped
- Field photographs were taken where relevant, to be linked with the base map prepared

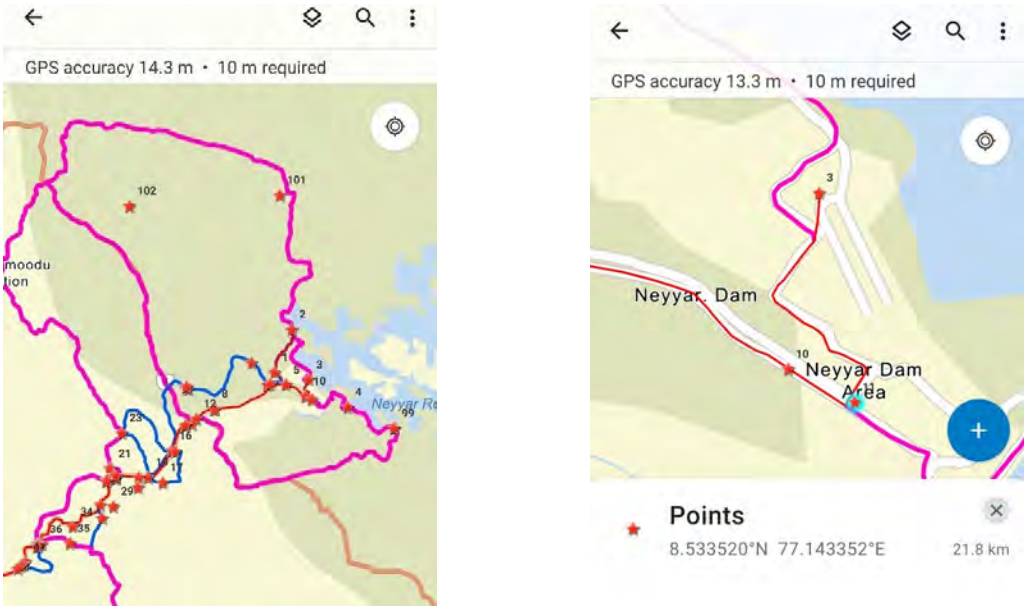


Figure 1: The mobile app interface

Following the collection of spatial data, non-spatial data such as Volume of Traffic, Type of Road, Width of Road, and Speed Limit were collected. The alternate route is controlled by specifying the origin, destination, and any stops or nodes the route must pass through. This case study evaluates the possible paths on the network from the starting point to the destination, towards determining the ones with the lowest impedance. GIS is used to find the optimal route between the given origin and destination. Figure 2 shows the details of stretch A and B with alternative routes.

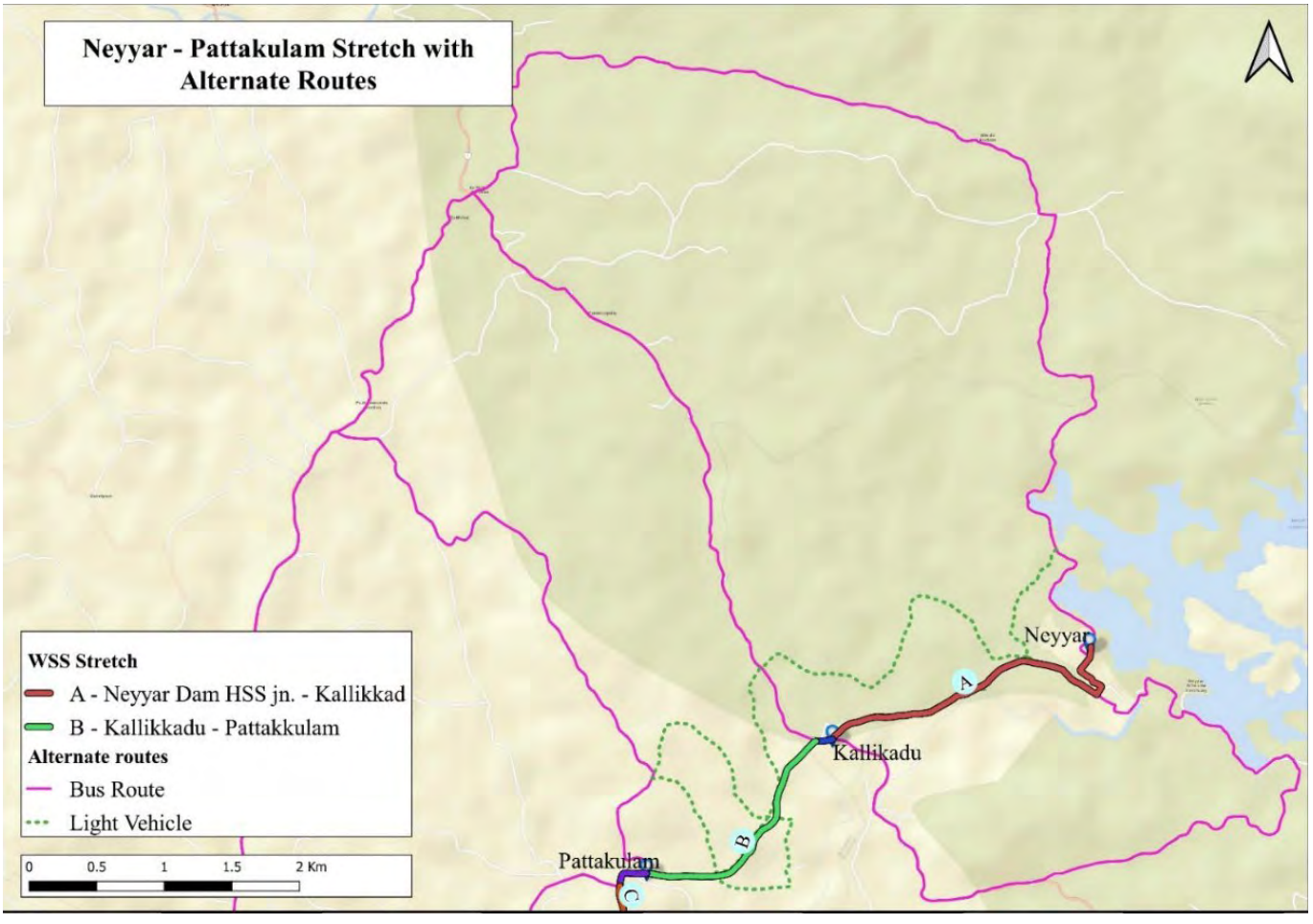


Figure 2: Stretch A and B with alternative routes

To facilitate effective decision-making using live field data, a WebGIS interface was also used (Figure 3). This enables the transition from a record-keeping system to one of engagement and facilitating everything from self-service mapping to making better decisions. For the alternative routes, the distance and time required are calculated in the web map (Table 1). The graphical output in the form of a map indicating alternative routes with distances and directions gives a complete description of the route with the least impedance. For instance, during site work in stretch 1: from Neyyar Dam HSS Jn. – Kallikkad 2.63 km long, 4 alternate routes are identified, two of which can be used by heavy vehicles. Despite the increase in distance from 2.63 to 15.35 km in alternative

number 3 earmarked for heavy vehicles, traffic congestion that would be caused when both light and heavy vehicles are diverted to a single road with no limits to the direction of flow is best avoided. The photographs shown in figure 3 as part of WebGIS are captured from the field showing a ground reality that can be an added facet to evidence-based decision-making from project management perspectives.

Furthermore, having such a map in an online interface with access to the public and the facility to find alternate routes between a given origin and a destination during the pipe-laying phase can greatly help limit disruption. This is a mandatory requirement for international funding agencies for the consideration of projects. For instance, the World Bank's Environmental and Social Framework (ESF) requires the borrower to identify, evaluate, and monitor the potential traffic and road safety risks to workers, affected communities, and road users throughout the project life cycle and, where appropriate, develop measures and plans to address them as part of the project design process itself. KIIFB being an agency that is spearheading change in the way infrastructure development sector is dealt with, and projects managed, the Traffic Management Plan devised for the Neyyar – PTP WSS project is solid proof of how the use of geospatial techniques can contribute positively to infrastructure project management. Indeed, it is a step in the direction and the one that can be mandated for all future projects involving transportation infrastructure.

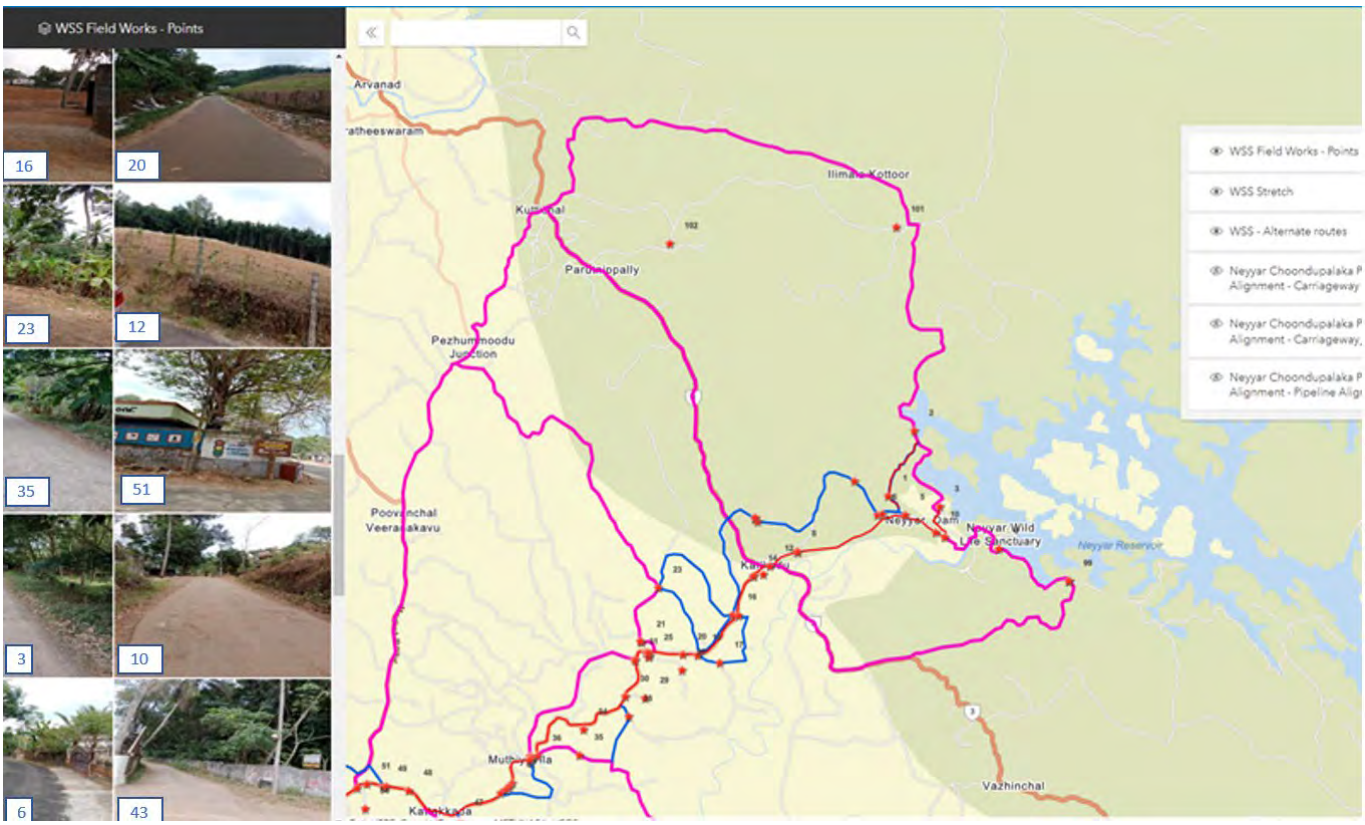


Figure 3: WebGIS interface for planning alternative routes. Geotagged photographs show ground reality.

No.	Stretch Name	Length of Stretch (Km)	Alternate Route Name	Route type		Alternate Route length (Km)	Time in min	Side
				Heavy Vehicle	Light vehicle			
A	Neyyar Dam HSS Jn. - Kallikkad	2.663	Neyyar Dam road		Light vehicle	2.103	5.0	Right
			Neyyar canal road through Perumjamkadavu Jn		Light vehicle	3.61	10.0	Right
			High School Jn - Kottoor - Kuttichal- kallikkad	Heavy Vehicle		15.35	31.0	Right
			Neyyar - Aduvally - Kallikkad	Heavy Vehicle		7.463	19.0	Left
B	Kallikkadu - Pattakkulam	1.84	Pattakulam kallamam panniyod pezhumoode kuttichakl Kallikkadu	Heavy Vehicle		12.59	21.0	Right
			Pattakulam- Kallam - Adhyatma Ashram		Light vehicle	3.472	11.0	Right
			Aruvukkuzhi pattakulam road		Light vehicle	4.5	12.0	Right
			Veeranakavu Temple-CSI Church-Aruvikuzhi		Light vehicle	1.249	4.0	Left
C	Pattakkulam - Mylottumoozhy	2.132	Veeranakavu Aanakodu road-Pattakulam	Heavy Vehicle		2.1	6.0	Right
			Mylottumoozhi-Chaikkulam-Madathikonam		Light vehicle	2.6	8.0	Left
D	Mylottumoozhi - Choondupalaka	1.597	Choondupalaka - Chandramangalam -Mylottumoozhi	Heavy Vehicle		6.7	14.0	Left
			Road near neyyar canal at Mylottumoozhy		Light vehicle	1.2	4.0	Left
			Peezhumedu jn poovachal kattakkada	Heavy Vehicle		10.249	23.0	
			Road near paithrikam at Kallikad		Light vehicle	0.8	2.0	Left
One way stretch between - D & E	Choondupalaka to Kattakada KSRTC Stn.	1.25	HAND SIGNAL	Heavy Vehicle				Main Road
E	Kattakkada - Killi	0.92	Killi - Kattkode - Kattakkada		Light vehicle	3	7	Right
			Thoongampara killi road	Heavy Vehicle		2.855	5.0	Left

			Alternate route for kattakada killi	Heavy Vehicle		0.9	3.0	Right
One way stretch	Between - Kattakada - Killi	0.463		Heavy Vehicle (One Way)				Main Road
One way stretch between E & F	Killi Jn.	0.587	HAND SIGNAL					Main Road
F	Killi - Anthiyaurkonam	2.046	Moongodu - manali - killi pallimukku	Heavy Vehicle		6.6	18.0	Right
			Pottankavu road		Light vehicle	1.4	5.0	Right
			Annapad stream road		Light vehicle	2.888	10.0	Right
			Nellikkad - Pottankavu road - Anthiyoorkonam-College Road		Light vehicle	3.3	8.0	Left
			Kandala to nellikadu		Light vehicle	5.8	13.0	Left
G	Anthiyurkonam - Pazhaya road	0.73	Meppukada - Moongodu - Anthiyurkonam	Heavy Vehicle		3.7	10.0	Right
One way bus route	Pazhayaroad-Malayaenkeezhu	1.044	Malayinkeezhu - meppukada		Light vehicle	0.631	2.0	Right
	Pazhayaroad - Malayaenkeezhu	0.304	HAND SIGNAL					
H	Malayenkeezhu - Thachotukavu	2.856	Malayenkeezhu - Balakrishna Kalyanamandapam		Light vehicle	3.3	7.0	Right
			Thachotukavu - moongodu - Anthiyurkonam	Heavy Vehicle		4.2	9.0	Right
			Thoongampara kandala aramaloor pongumood malayinkeezhu	Heavy Vehicle		9	20.0	Left
I	Thachotukaavu - Peyad	1.022	Bhajana madam road (One Way)		Light vehicle	1.3	6.0	Right
			Peyad - Pidaram - Thachotukavu		Light vehicle	2.048	5.0	Left

J	Peyad - Kundam-onbhagam	2.127	Thirumala - mangotuka-davu -thachotukavu	Heavy Vehicle		4.7	10.0	Left
			Peyyad - Vittiyam - Puli-yarakonam road		Light vehicle	12	25.0	Right
			Peyad - kollamkonam - puliayarakonam - vatti-yurkavu -	Heavy Vehicle		12.046	26.0	Right
K	Kundamanbhagam - PTP Nagar	1.956	Kundamankadavu - Vatti-yoorkavu			5.254	13.0	Right
			Vattiyurkavu- Arappura - PTP nagar	Heavy Vehicle		5.46	14.0	Right
			Vatiyoorkavu - Kulashe-karam	Heavy Vehicle		8.89	21.0	Right

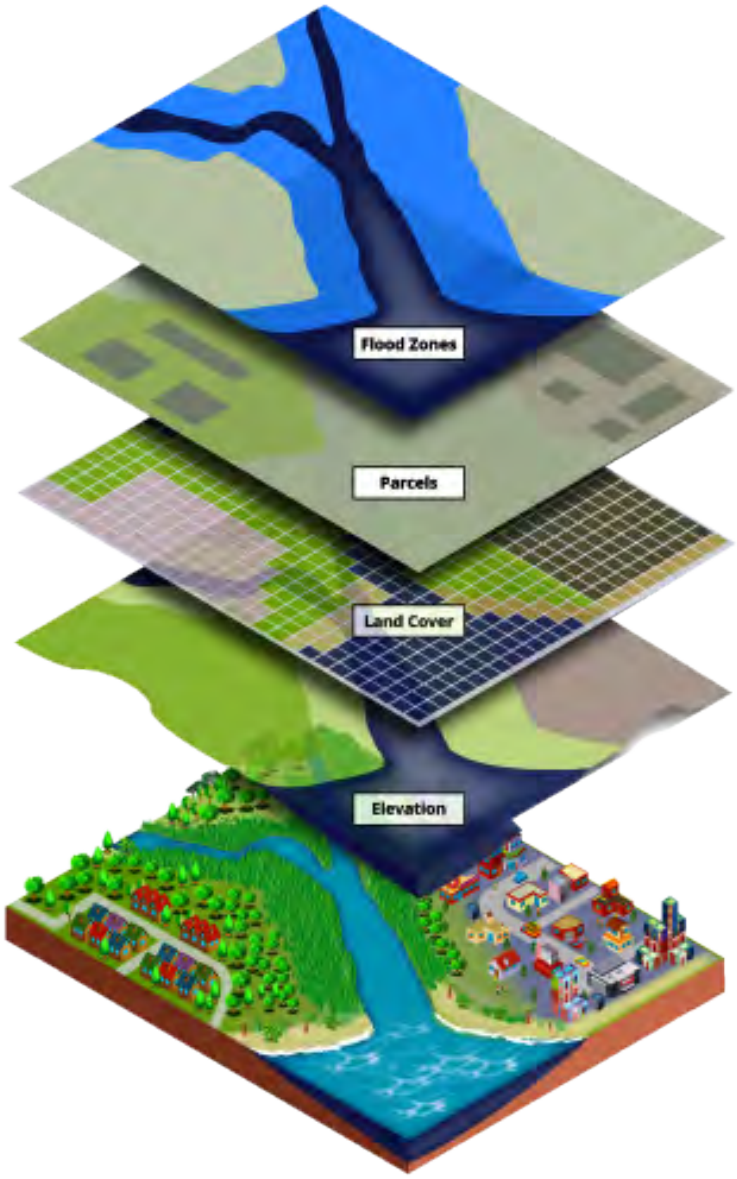
Akkikavu Kadangodu Road

Clarion call for change

On the agenda for long
and since times long gone,
development was the word
that the billboards did hoard.
Made many a marching song,
for those who chose to come along
on the back of hope or for worse
all they could was to sing along.
Stories that were told,
and dreams that got sold
lit up many an eye
for a raise from the humble pie.

In need was a vision
and a team with a mission,
to move ahead in unison
with success, the only rendition.
A vision that could hold
both the young and the old,
in complete hold
and to surge for the gold.
For long times, kept in wait
behold, was to say development.

The road ahead is steep
and there is plenty of sheep.
But, what we get to keep
as part of the epoch-making leap,
is the change from also-rans,
to the ones who forced the change.
To stop the free fall, all this while
remains the clarion call all the
while.



Dr TR Mathew

Application of Geographic Information System (GIS)

in Governance and Finance

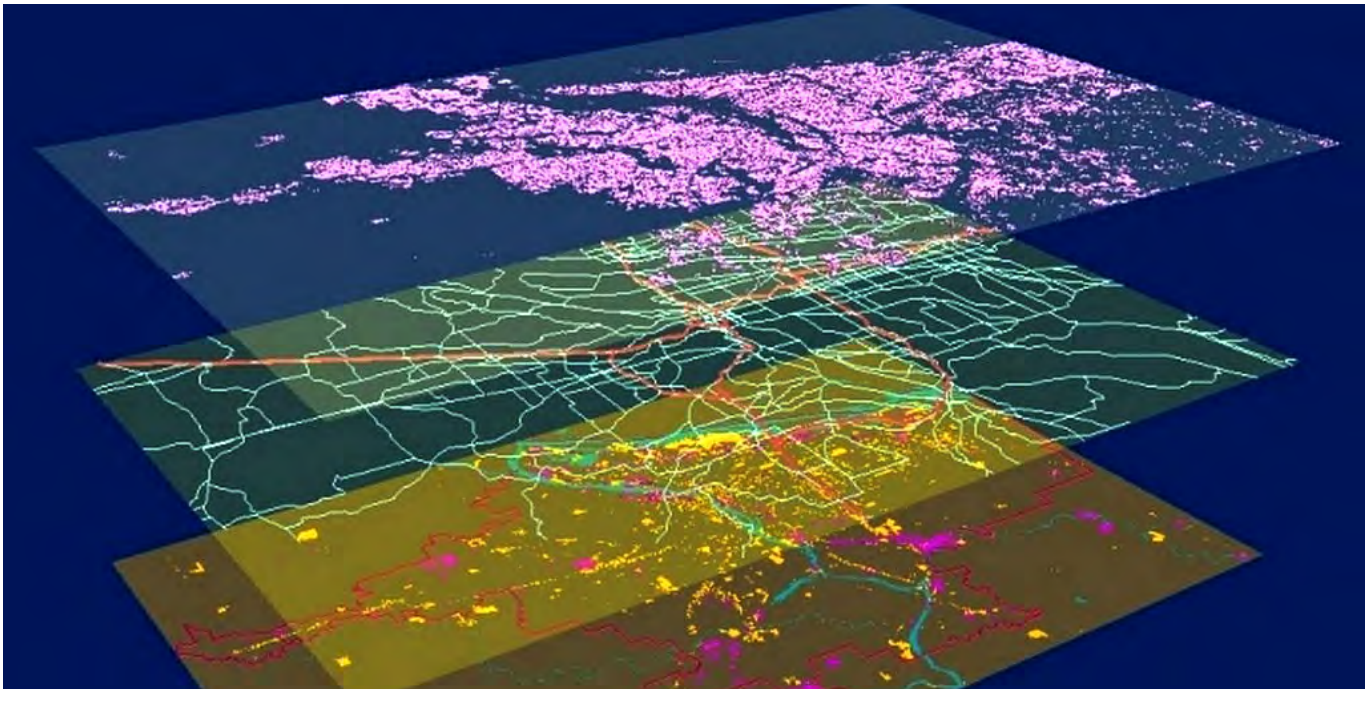
Anoop C Raj, Assistant, Finance & Administration

Today, it is incredibly difficult to locate any industry 'private or public' that has not been impacted by the flood of GIS applications. Geographic Information System is the practise of storing, visualising, analysing, and interpreting geographical data using computer-based technologies. It makes use of information associated with a unique location. This feature of GIS is widely used in the financial sector, government sector, and banking. Data has become more crucial than ever; even financial institutions started using geospatial data to their advantage.

In fact, every government and corporate sector uses different GIS models to increase efficiency in daily operations. Governments all across the world depend on GIS technology to streamline operations and services for residents, track and record actions for a better knowledge of government plans and conduct analysis that improves decision-making. There are many benefits of GIS for the government sector. Before sanctioning a new project by the government, GIS helps to understand the need of that project in that location and helps to identify the location of existing projects. Schemes reviewed and implemented in this manner will help to eliminate the misappropriation of funds. GIS enables the approval of projects in a dispersed manner without having to approve similar/same projects in nearby locations. For example, sanctioning many stadiums next to one another adjacently won't be effective. Spatially based information systems at the cadastral level supports investigation, monitoring, proper planning, and decision-making to provide better public utility services. GIS systems can be utilised for surveying areas, flood damage estimation, and for even disaster management.

GIS is used to make financial decisions mainly in areas such as real estate banking, land use analysis, property acquisition, credit risk assessment etc. Spatial customer data can be used to strengthen banking strategies in a variety of ways, including identifying new growth prospects, analysing customer loan distribution across areas, determining the need for a populated branch location for a new bank, etc. GIS aids the banking and finance sectors in evaluating opportunities and risk.

Every area of our society has been impacted by the wave of numerous GIS applications. It is expected that GIS will soon have a greater impact on both the business and government sectors than it does now. By giving them the appropriate data assimilation capabilities, GIS can assist financial institutions in making better decisions and bouncing back from harsh economic downturns.



Ascending ESG Investments in India

Towards Creating a Sustainable Economy

Dr. Subhash M, Sustainability Lead, ESG Wing

Introduction

In recent years, there has been a transformation in the investment flow, pattern, and structure with a specific thrust on the sustainability of investments and Environmental, Social, and Governance (ESG) investments. This has been both a global as well as a domestic phenomenon spreading across several economies in the world. It is progressively recognized that investors are going beyond the conventional norms of financial statements of business units and laying more emphasis on ESG investments. One reason for this is that ESG investing has evolved from socially responsible investment philosophies into a distinct form of responsible investing. While earlier approaches used exclusionary screening and value judgments to shape their investment decisions, ESG investing has been spurred by shifts in demand from across the finance ecosystem, driven by both the search for better long-term financial value, and a pursuit of better alignment with values.

ESG integration - Global Scenario

Globally, ESG investments have received momentum as a mechanism attracting both investors and consumers. There are at least three major direct drivers of such a rise in ESG investments as follows:

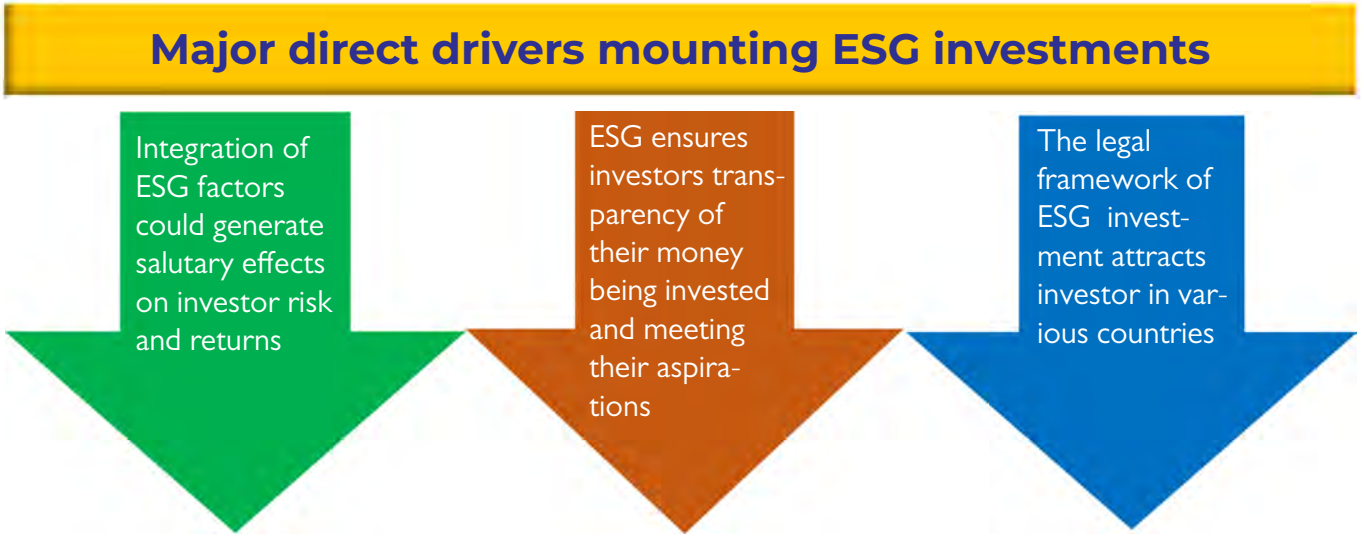


Figure: I

It has been observed that there has been rising importance on ESG integration in investment decision-making processes worldwide, with an annual growth rate of 24%. Geographically, the United States and Europe are the largest contributors. Although ESG integration is yet to be accelerated in Asia; however, it is found that there has been surging demand for ESG investments in Asian countries. Countries like Japan are the front runners, and several other countries are picking up their ESG investments.

The Global Sustainable Investment Alliance reports that "do good" investment is fast rising globally and is considered by investors as a lucrative business option. Recent information drawn from the Morgan Stanley Capital International (MSCI) indices reveals that Information Technology (IT) as a sector has become the leader in integrating ESG in the investment decision-making processes, followed by the healthcare and financial sectors. The declaration of the UN SDGs has further reinforced the need to drive investments in a more sustainable manner. Some estimates suggest that climate commitments enshrined in the Paris Agreement and goals set in the SDGs require approximately $7 trillion per year. Importantly, it is expected that a substantial chunk of this investment is expected to be mobilized through private finance and by private investors. Available information shows that the value of ESG investments globally doubled in the last 4 years and reached a new high of $40.5 trillion in 2021. Even ESG-integrated investment indices have outperformed their peers during the COVID-19 period, which implies an increasing appetite for such investments among investors and business houses.

ESG Investment Panorama in India

Considering India's development priorities, integration of ESG elements in the investment process becomes crucial to address the persisting societal conundrums and increasing environmental and climate threats. This is in tune with meeting the country's SDGs. Studies point out that meeting the SDGs in India requires an annual investment of $0.7 trillion. The current thrust on climate change and focus on upscaling green energy investments point to the country's focus on and need for ESG investments. Even global commitments made by the country such as reducing carbon emissions by 30% by 2050 and procuring 40% of the energy from non-fossil fuel sources by 2030 are clear indications of the country's focus and imperative to integrate ESG factors in the investment process. The Government of India is increasingly realizing the importance of ESG integration in business processes and has been actively promoting it through various reforms and regulations, since the last decade. Latest developments in this sphere are evident in the 2021–22 Economic Survey released recently, which emphatically points out the need to streamline financing for sustainable development.

Recent Initiatives of Indian Corporates

One such initiative is the participation of Indian corporations in the RE100 (RE100 is a commonly used term representing Renewable Energy 100 group) global movement, which urges corporate entities to go green. This is also in tune with the business value proposition of business entities in India, as industrial electricity consumption in India constitutes more than 40% of the total electricity consumption. Many Indian corporate houses such as Infosys, Mahindra and Mahindra, Dalmia Cement, and Tata Motors have become part of RE100 and have voluntarily commit-

ted to sourcing their energy from renewable sources. Likewise, several Indian corporate entities have initiated the same such as Mahindra, Godrej Consumer Products, Infosys, Tata Motors, Glenmark, Havells India, M&M Financial Services, Hindalco Industries, Tata Steel, Tech Mahindra, Wipro. Similarly, a host of voluntary initiatives have also been undertaken by several Indian companies. For instance, several cement companies in India have undertaken initiatives in a waste-to-energy system, where the electricity produced through this process would eventually reduce their reliance on fossil fuels. Quick mapping of these sustainability initiatives of Indian corporate entities reveals that many of them are doing well in terms of reducing their carbon footprint by integrating green energy into their operations and adopting energy-efficiency principles.

ESG integration - Indian Corporate spectrum

Indian corporate entities are increasingly integrating ESG factors in their business decision-making processes. For instance, asset management companies such as Axis Mutual Fund, ICICI Prudential, and Aditya Birla Sun Life have launched ESG-integrated schemes and are increasingly adopting ESG norms in their investment decision-making processes. Information revealed by the National Stock Exchange shows that ESG-indexed companies have fared well compared to non-ESG-indexed companies.

A study carried out an evaluation of 50 listed companies in India by NSE -2021 (National Stock Exchange) revealed some interesting facets of ESG performance by Indian companies. For instance, it found that companies have performed comparatively better in terms of policy disclosure compared to other ESG factors such as governance, environmental, and social factors. Within ESG factors, governance factors have emerged as the most prominent factor compared to environmental and social factors. Social factors received the least priority by corporate entities. Further, out of these 50 companies, the top three industries are found to be automobiles, chemicals, and consumer goods, whereas metals and mining emerge as the bottom-listed industries in terms of performance. A sectoral comparison of ESG performance indices reveals that the IT sector has emerged as a leader with 26% weightage, followed by energy (close to 25% weightage). Hence, the IT and energy sectors are effectively integrating ESG factors in their investment plans and decision-making processes in a much better way compared to other sectors.

Performance of ESG factors among Indian corporates

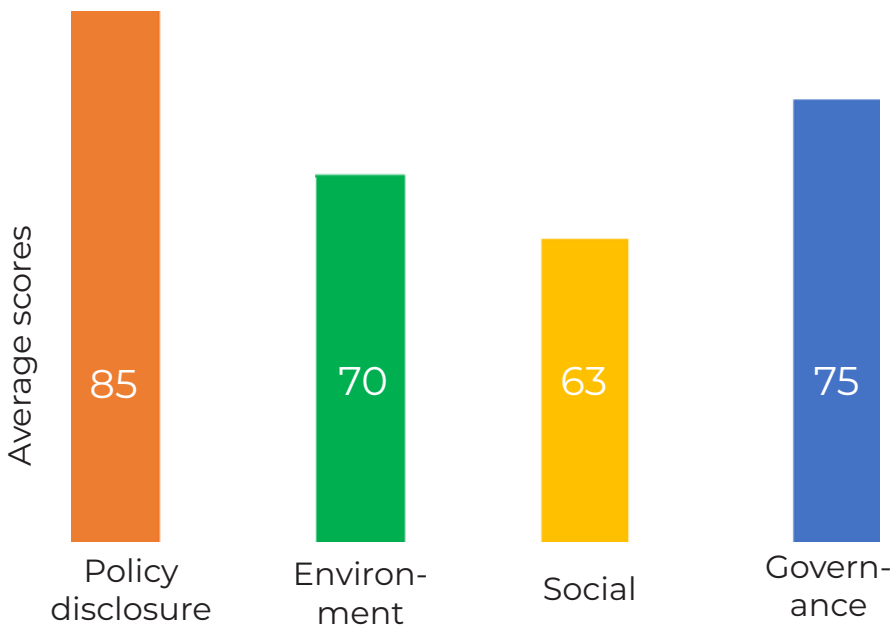


Figure:2

Summary and conclusion

It can be summed up that (i) there is an increasing appetite for ESG-integrated assets and (ii) the performance of ESG-integrated investments stands better compared to their counterparts non-compliant to the ESG, even during the COVID-19 pandemic. Companies are found to have done relatively better in policy disclosure and governance parameters compared to environmental and social factors. Among all factors, social factors have received the least priority. To achieve a sustainable planet, the financial allocation must be changed based on environmental, social, and governance (ESG) criteria. Thus, the importance of ESG investment and green investment is widely considered today in various national as well as international platforms. Hence KIIFB is striving to adopt International national best practices and disclosure reporting systems aligned with different rating agencies (Sustainability Accounting Standards Board (SASB), Global Reporting Initiative (GRI), and International Integrated Reporting Council (IIRC). Taskforce on Climate-related Financial Disclosures (TCFD), Climate Disclosures Standards Board (CDSB), and Business Responsibility and Sustainability Report (BRSR)) with different criteria for ESG investment currently, and how this affects effective ESG and green investment in the spectrum of infrastructural development of Kerala.

Adakkaputhur Kalluvazhi Road

Akkikavu Kadangodu Road

Adakkaputhur Kalluvazhi Road

Tirur - Kadalundi road

Tirur - Kadalundi road

Level Cross Free Kerala

Construction of 10 Road Over Bridges (Steel Composite Bridges)

Chandran Chandresh, Assistant Project Manager
Saleel K, Transportation Engineer

Level crossings in India have been the major crossing point of Rail/Road accidents. Level Crossings not only generate the risk of accidents but also create inconvenience for passengers by slowing down traffic. There are approximately 428 level crossings in the state of Kerala itself with over 143 level crossings of high volume (TVU Count >1,00,000 TVU). Both Government of India and the Government of Kerala are desirous of eliminating critical level crossing to ensure a safe and seamless travel.

An extensive and wide network of Railways comprising of Southern Railways exists in Kerala. These Railway Lines cross the existing road network at many places. Priority is given to Railway Traffic and hence, when a Railway crosses the junction of a road and rail, the road traffic is halted for a particular time duration. At a few places, the road traffic is regulated by manned level crossings and there exist unmanned level crossings in many places on Major District Roads. Many accidents have occurred in the past due to the negligent and hasty behavior of road commuters and drivers on these level crossings. Safety of the road users is of paramount concern and is given due importance by GoK and the MoRTH. The Hon. Supreme Court has also directed to form road safety cells and has underlined the importance of replacement of maimed/unmanned level crossings by Road Over Bridges/Road Under Bridges. Hence, it is necessary to construct Road Over Bridges (ROBs) and Road Under Bridges (RUBs) for the safe and smooth operation of vehicular traffic at such level crossings.

Due to the high importance of constructing ROBs, KIIFB had given higher priority in constructing ROBs and has accordingly given FS for 57 ROBs so far.

Steel Composite Bridges

Steel Composite bridges are becoming more and more popular around the world because they combine some advantages of steel bridges with some key qualities of concrete bridges. In a steel composite bridge, Pier, Pier cap, and girder are of steel structure and the remaining components such as pile, pile cap, and deck slab are made up of RCC.

A composite bridge has the following advantages:

- Steel components i.e. pier, pier cap, and girder are much easier to erect when compared to the construction of concrete structures.
- A light structure, which imposes smaller loads on foundations, hence the design will be more economical than conventional bridges.

The deck slab is constructed using RCC due to the following advantages:

- It is easier to build than a steel orthotropic deck slab
- A higher mass, which induces fewer vibrations, noise, and dynamic loads on the supporting structure

- RCC deck slab allows for easy paving with traditional methods, whereas, in steel decks, it is difficult to create strong bindings.

A steel structure is usually more expensive than a concrete structure with respect to material costs.

Well-designed composite bridges have proven to be competitive with concrete bridges in all small and medium spans and competitive with steel bridges in spans up to 120 m.

Construction of 10 ROBs as steel composite structures

As a pilot project, Order Vide GO(Rt) No.535/2020/PWD dated 19/06/2020, the Government has decided to construct 10 ROBs using steel composite structures since steel can be reused and is an environment friendly material which reduce time for construction. 10 ROBs are:

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1. Chirayinkeezh ROB
2. Eravipuram ROB
3. Maliyekkal ROB
4. Guruvayoor ROB
5. Chirangara ROB
6. Akathethara ROB
7. Vadanamkurissi ROB
8. Thanur-Teyyala ROB
9. Koduvally ROB
10. Chelary-Chettippadi ROB

Accordingly, Financial sanction was accorded for the project 'Construction of 10 Nos Road Over Bridges across Kerala with Steel Concrete Continues Composite Super Structure on Design Build and Transfer mode' for an amount of Rs 222.79 Cr, and the works of ROBs at Koduvally, Tanur Theyyala, Chelary Chettippady, Akathethara, Vadanakurissi, Chirangara, Guruvayur, Maliyekkal, Eravipuram, and Chirayinkeezhu were tendered as a single package on Design Built Transfer (DBT) Mode using steel Concrete composite structure. Roads and Bridges Development Corporation of Kerala(RBDCK) is the SPV of these projects. The work was awarded to M/s SPL Infrastructure Pvt Ltd. And an agreement was executed for an amount of Rs 251.48 Cr. KIIFB appointed M/s RITES as the Proof Checking Consultant and Project Management Consultant for Supervision of the Project. IIT Madras was appointed as the Third-party design vetting agency.

Chirayinkeezh ROB

The proposed Road Over Bridge is at Chirayinkeezh town very near to the railway station in lieu of the existing level crossing in Attingal-Kadakkavoor road in Thiruvananthapuram District. Total length of ROB is 700 m (16.5 x 4+ 14.56 + 21.51 + 23.45 x 5 + (15.58 x 2+ 25.08) (Railway Span) + 279.32 Approach Road on A1 side + 145.12 M approach Road on A2 side).

Piling works completed (Excluding railway portion). 8/11 Pile cap completed, and Balance is progressing. 8/9 Pier and pier cap erection completed.

Eravipuram ROB

The proposed ROB at Eravipuram in lieu of the existing level crossing in Eravipuram Pallimukku Road in Kollam District. Total length of ROB is 550 m (21.2 x 5 + 22 x 5+ (11.51 x 2 + 25.61) (Railway Span) + 130.685 m Approach on A1 side + 154.685 Approach Road on A2 side).

Piling works completed (Excluding railway portion). 8/10 Pile cap completed.

Maliyekkal ROB

The proposed Road Over Bridge at Maliyekkal in Karunagapally-Kottarakkara Road stretch in Kollam District, which merges Kanyakumari-Panavel National Highway (NH66). Total length of ROB is 650 m (21.6 x 7 + 18 x 2 +20.5 x 4 + 50.05 (Railway span) + 163.775 m approach on A1 side + 166.975 approach on A2 side).

Pile, Pile cap, Pier and Pier cap (Excluding railway portion), and Abutment walls completed. Erection of Girders of 11 span (44 no.s) completed out of 13 spans. Deck slab concreting 6/13 spans completed. Reinforcement and shuttering for deck slabs of balance spans are progressing. Drain, Service Road, and retaining wall works are in progress.

Guruvayoor ROB

The proposed Road Over Bridge at Guruvayoor – Choondal Road (SH49) connects Guruvayoor with Thrissur. Total length of ROB is 550 m (22 x 4 + 23.7 x 2 + 21 x 4 + 19.8 (Railway span) + 165.4 m approach on A1 side + 145.4 m Approach on A2 side).

Pile, pile cap, pier, and pier cap works are completed (excluding railway portion). Erection of Girders of 8 span (32 nos) completed out of 10 spans. Deck Slab, Drain, and service road works are in progress.

Chirangara ROB

The proposed Road Over Bridge at Chirangara on the Koratty Bazar Road Connecting Salem, Kochi Highway (NH-544) and Pullikakadavu in Thrissur District. The total length of ROB is 330 m (21.5x3 + 17.2x2 + 17.95x2 + 33.4 (Railway span) + 76.2 m approach on A1 side + 85.6 m approach on A2 side).

Presently Pile, Pile cap, Pier & Pier cap (Excluding railway portion), and abutment wall work are completed. Girder erection is completed for 5 span (20 nos). Deck Slab, retaining wall, service road, and Drain works are in progress.

Akathethara ROB

The proposed Road Over Bridge at Akathethara in Palakkad District is in lieu of the existing level crossing situated in Olavakkode-Malampuzha Road which is connecting to NH 966. This is the main road connecting Palakkad town to Malampuzha , which is one of famous tourist spot in Kerala.

Total length of ROB is 823.7 m (23.7 x 9 + 21.9 x 7 + 23.7 + (20.1 x 2 + 38.315) (Railway Span) + 117.652 m approach road on A1 side + 237.233 m approach road on A2 side).

Pile and pile cap works are completed (Excluding railway portion). 12/14 Pier & pier caps are completed. Balance 2 Pier and pier cap fabrication works completed at fabrication yard. Girder for 3 spans reached at site and erection in progress. Fabrication of girders for 5 span is in progress at fabrication yard. Service road works in progress. 30% of Drainage works completed.

Vadanamkurissi ROB

The proposed Road Over Bridge at Vadanamkurissi is on Shornur – Perinthalmanna road and Palakkad – Ponnani Road (State Highway-23). The level crossing is located near the Vadanamkurissi Railway Station. Total length of the ROB is 660 m (22 x 7 + 25.3 x 2 + 16.1 + 21.6 + 24 x 4 + 37.554 (Railway Span) + 102.4 m Approach Road on A1 side + 181.745 m Approach on A2 side).

Piling works are completed (Excluding railway portion). 14/15 pile cap are completed. 10/13 pier & pier cap completed. Fabrication of 3 Pier cap completed at Fabrication yard. Pedestrian under pass work is in progress

Thanur-Teyyala ROB

The proposed Road Over Bridge in Thanur town-Teyyala Road is located between Tanur and Parappanangadi railway stations in Malappuram District. Total length of ROB is 450 m (24 x4 + 23.2 x 2 + 20.4 x 4 + 37.28 (Railway Span) + 63 m approach road on A1 side + 125.72 m approach road on A2 side).

Pile, pile cap, pier, and pier cap works completed (excluding railway portion). Drainage at A2 RHS side and Abutment wall works at A2 side are in progress. Fabrication works of Girders are progressing at the yard.

Koduvally ROB

The proposed Road over Bridge at Koduvally in lieu of the existing level crossing situated in Thalassery – Mambram Highway in Kannur District. Total length of the ROB is 360m (20.5 x 7+ 18 + 18.5 x 2 + 32.6 (Railway Span) + 111.7 m approach road on A1 side + 17.2 m approach road on A2 side).

Pile & Pile caps works are completed (Excluding railway portion). 06/08 Pier and pier cap completed. Fabrication of Girders for 4 spans (16 no.s) are completed at fabrication yard and balance in progress. Drainage works in progress.

Chelary-Chettippadi ROB

The proposed Road Over Bridge is between the Parappanangadi and Vallikkunnu Railway Station, connecting NH 66 and Chelari in Malappuram District. Total length of the ROB is 337.3 m (21.4 + 16.5 + 19.5 x 4 + 31.4 (Railway Span) + 90m Approach Road on A1 side + 100 m approach road on A2 side.

Work is on hold since KRDCL and Railways suggested some modifications in the alignment due to the Silverline alignment. Revised GAD was submitted to Railways on 15.03.2022 and approval was given by the Railways on 19.09.2022.

Fabrication of steel structures and bearings are being done at factories located at Calcutta, Bhopal, Trichi, Puducottai, etc.

An Alternative Sustainable Practice

Scrap Rubber-Sand Mixture as Backfill Material in Retaining Structures

Anjali K. P, Intern, ESG wing*

Abstract. The disposal of scrap tyres is one of the major environmental issues in recent years. Several experimental studies proved that scrap rubber-sand mixture can be effectively used as reinforced backfill material in retaining structures. However, studies on the interaction properties between rubber-sand mixture and geosynthetics are needed for effective backfill designing. Hence this article is mainly focused to evaluate the shear behavior of a rubber-sand mixture with various rubber contents and also estimates the interface shear strength properties of a rubber-sand mixture with geogrid reinforcement when this material is used in mechanically stabilized retaining walls. It was observed that the maximum peak strength was obtained for a rubber content of 30% and there is a significant increase in shear strength with an increase in the size of the rubber. The interface shear strength responses of the rubber-sand mixture and geogrid showed that there is no significant difference in the interfacial frictional strength when the rubber-sand mixture is reinforced with geogrids. The findings lead to a sustainable as well as a cost-effective design of retaining structures.

Introduction

The waste tyre rubber has many applications in construction and geotechnical fields like replacement material for bitumen and asphalt in roadways, a replacement for railway sub-ballast layers, soil stabilization, seismic isolation of buildings, lightweight backfill material for retaining wall backfills and embankments, etc. Many experimental studies proved that the use of tyre rubber-sand mixture mixed in various proportions can effectively improve the backfill stability by increasing its shear strength properties Hence, a series of large-scale direct shear tests are done to understand the variation of shear strength on varying rubber content in the sand, mean grain size ratio of sand and rubber, and applied normal stresses. These effective incorporations of waste tyre rubbers in various civil engineering works can reduce the tyre disposal problem in an economically and environmentally beneficial way.

Materials

The locally available sand was used. According to IS.1498-1970, the sand is classified as poorly graded (SP). Two sets of granulated rubber R1(<4.75 mm) and R2 (<12 mm) have been used. Commercially available geogrids made of high-density polyethylene (HDPE) were used as the planar reinforcement. The materials used in the current study are shown in Fig.1

Fig. 1. Materials used a) Sand b) rubber samples, R1 c) Rubber sample, R2 d) Geogrid

Experimental program

The stress-strain behavior and interfacial friction angle of the rubber-sand mixture reinforced with geogrids were found by conducting a series of large-size direct shear tests. The length, breadth, and height of the test box were of dimensions 300 mm x 300 mm and 150 mm respectively. The effects of rubber size, normal stress, and rubber percentage on the shear strength of the rubber sand mixture were also analysed from direct shear. The rubber sand mixtures have been prepared at ratios 0:100, 10:90, 30:70, and 50:50 by volume. Two scenarios were considered: reinforced and unreinforced.

The rubber sand mixtures were thoroughly mixed by hand and transferred to the shear box in different layers for getting uniformity and proper compaction was given to obtain the prescribed related density. For the reinforced scenario, geogrid samples of length 300 mm and breadth 250 mm were taken and placed in between the upper and lower halves of the direct shear test box with rubber sand mixtures for obtaining the interface shear properties. The geogrid was placed in the shear box by clamping one end to the wooden clamping block using bolts and cover plates. The shear box filled with rubber sand mixture sample with the placement of geogrid is shown in Fig.2.

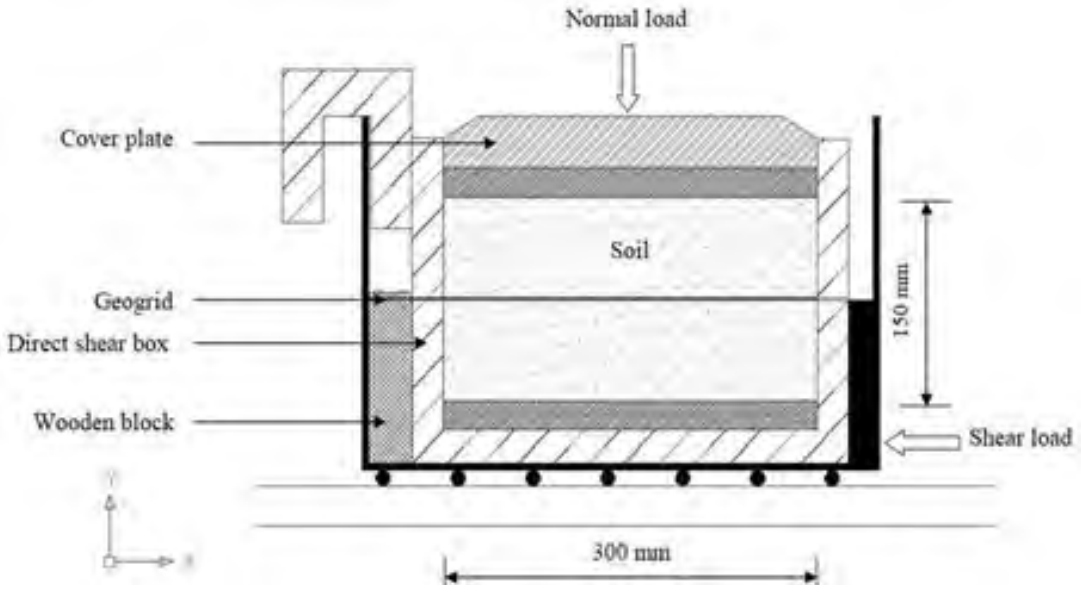

Fig. 2. Schematic diagram of the direct shear test box

The tests were conducted for three normal stresses of 50 kPa, 100 kPa, and 150 kPa to cover the stress range in field applications of lightweight fill used in embankment construction, and the shear strain was applied at a constant rate of 1.25 mm/min.

Results and discussions

The shear strength parameters for rubber sand mixtures were obtained from the large-scale direct shear tests for both geogrid reinforced and unreinforced cases.

Effect of rubber content on shear strain behavior: Initially, the stress-strain behavior of rubber sand mixtures for various percentages of rubber content was analysed. Fig. 3 shows the stress-strain behavior at different rubber content for R1 and R2 under normal stress of 150 kPa. An increase in the shear stress was observed with an increase in the percentage of rubber, up to 30%, and then decreases. The initial increase is contributed by the filling of voids with rubber but after reaching a specific rubber content, segregation occurs and thus the rubber-sand mixture behaves less like reinforced soil and more like a rubber mass with sand inclusions. It is noted that the addition of rubber has increased the axial strain at which the maximum stress was observed. The experimental results showed that R30S70 mixture has the highest shear strength values.

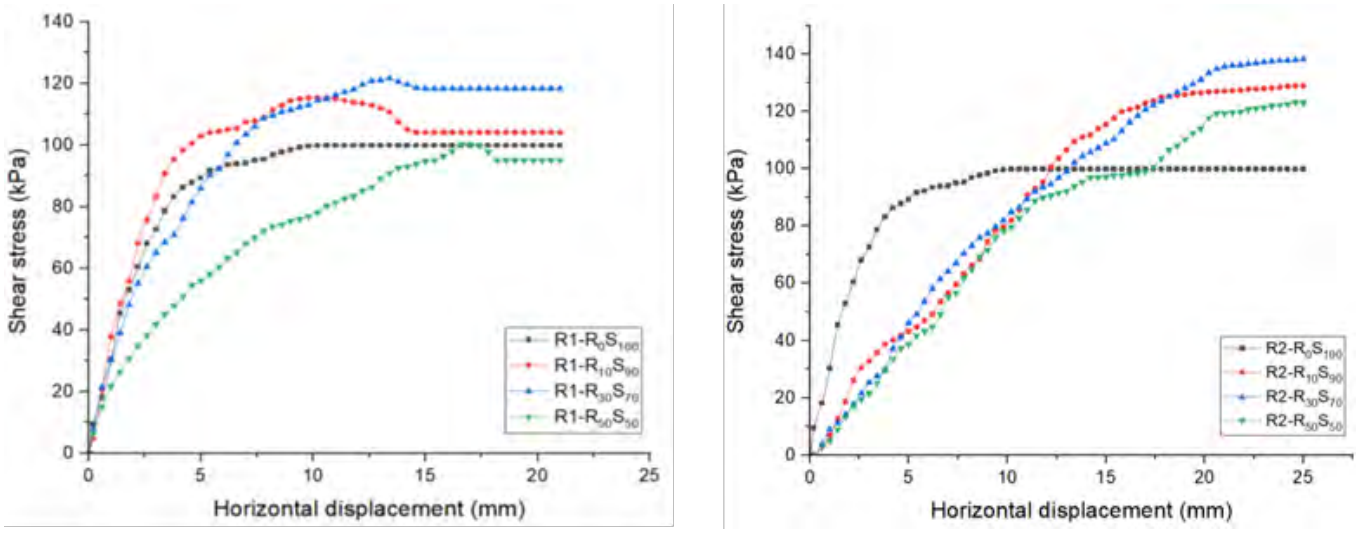

Fig. 3. Shear stress vs. horizontal displacement curve for R1 and R2 mixture at 150 kPa normal stress

The variation of the internal friction angle of rubber sand mixtures with varying rubber contents for R1 and R2 rubber types shows that the internal friction angle increases with increasing rubber content and reaches a maximum value when the rubber content is 30% and then decreases for rubber contents beyond this value as shown in Fig.4. The decrease in friction angle at higher rubber contents may attribute more rubber in failure plane which increases rubber to rubber interaction and reduces rubber-sand and sand-sand interactions. This mechanism ultimately results in a reduction in friction angle and shear strength.

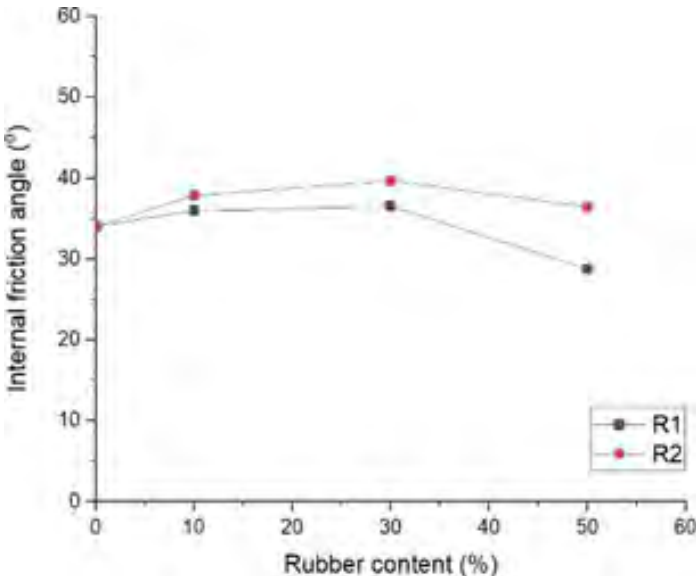

Fig. 4. Variation of internal friction angle

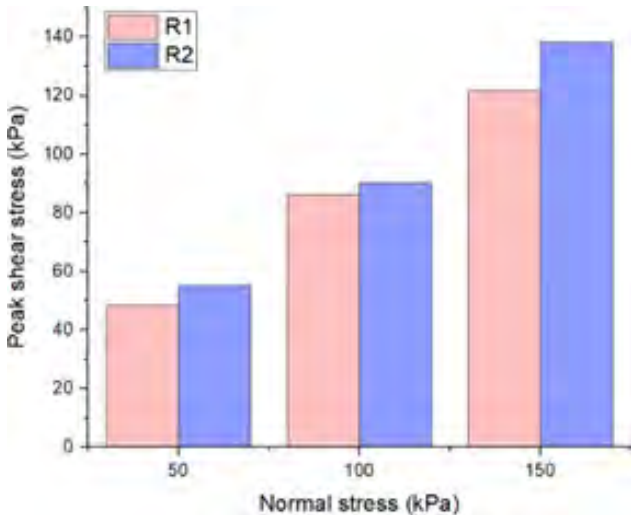

Fig. 5. Variation of peak shear stress at $R_{30}S_{70}$

Effect of rubber size on shear strength: The variation of peak shear stress for both R1 and R2 mixtures at 30% rubber content shows that with the increase in rubber size from R1 to R2, the peak shear strength increases as shown in Fig.5. This variation in shear strength with size of rubber particles can be due to the more interlocking capacity of bigger particles than the smaller particles. It is found that when the size of the rubber is increased the shear strength and flexibility for all percentages of rubber content is increased which enables reducing the cost of shredding by using bigger tyre shreds.

Interfacial shear strength coefficient: The interfacial shear properties between the rubber-sand mixture and the geogrids were studied for two sets of rubber sizes at varying normal stress at 30:70 by volume mixture ratio of sample for which the maximum shear stress was observed. The interface shear parameters between geogrid and rubber sand mixtures such as adhesion and interface friction angle between rubber sand mixture and geogrid were also determined from large direct shear tests. The shear parameters were found to be higher at R30S70 proportion in both R1 and R2 cases. The interface friction angle between the rubber sand mixture and geogrid was found to be similar to that of the unreinforced case.

Conclusions

The shear strength properties of different percentages of rubber sand mixtures were analyzed by large-scale direct shear test. The incorporation of tyre rubber shreds into the sand increases the shear strength of the sand in both unreinforced and geogrid-reinforced cases. With the increase in the percentage of rubber content, the shear stress has increased initially up to 30 % and then decreases beyond this value. This explains the sand-like and rubber-like behavior shown at different rubber percentages. As the size of the rubber granules increases, shear strength and flexibility increased for all percentages of rubber content. This reduces the cost of shredding by using bigger tyre shreds. The shear strength parameters were also found to in-

crease initially with increasing percentage rubber content and later found to decrease. The shear strength variation of the geogrid reinforced case with varying rubber sizes is similar to that of the unreinforced case. The findings from experimental studies lead to a sustainable as well as the cost-effective design of retaining structures.

Implications

The above findings lead to a sustainable as well as a cost-effective design of retaining structures. Further analysis of other material properties shall be conducted to arrive at an optimized design before implementation at the site and open up future directions for research in this area. Adopting this model will lead to savings in infrastructure development as well as preserving the resource for the future._

* *The study has been conducted as part of M. Tech Program at NIT Calicut during the academic year 2019 -2021*

Reference

[1] *A. Mohajerani, L. Burnett, J. V Smith, S. Markovski, and G. Rodwell, "Resources, Conservation & Recycling Recycling waste rubber tyres in construction materials and associated environmental considerations: A review," Resource, Conservation and Recycling, vol. 155, no. January, p. 104679, 2020.*

[2] *H. Pincus, T. Edil, and P. Bosscher, "Engineering Properties of Tire Chips and Soil Mixtures," Geotechnical Testing Journal, vol. 17, no. 4, p. 453, 1994, doi: 10.1520/gtj10306j.*

[3] *J. H. Lee and Salgado, "Shredded Tires And Rubber-Sand as lightweight Backfill," Journal of Geotechnical Engineering, vol. 125, no. February, pp. 132–141, 1999.*

[4] *T. Tanchaisawat, D. T. Bergado, P. Voottipruex, and K. Shehzad, "Geotextiles and Geomembranes Interaction between geogrid reinforcement and tire chip – sand lightweight backfill," Geotextiles and Geomembranes, vol. 28, no. 1, pp. 119–127, 2010, doi: 10.1016/j.geotexmem.2009.07.002.*

TIW Insight

INTERVENTIONS OF DESIGN REVIEW PROCESS IN EXECUTION STAGE

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Sreelakshmi H B, Intern, PSC Buildings
Shaijal K M. Technical Assistant Trainee, PSC Buildings

Occasionally, certain design review interventions are necessary to ensure the functionality of a building, even during the execution stage. No concessions can be made in the structural stability and serviceability of the building, and it is imperative to take future aspects into consideration when designing the structure, particularly in a land-constrained area.

A similar situation occurred with the project, Dr. BR. Ambedkar Memorial Government Arts and Science College, located in Balussery constituency in Kozhikode district. The proposal comprises the vertical expansion of the existing blocks (Main block and block 1), construction of a new Block 2 (G+1) for academic building, a Canteen block (G+1), and a Hostel Block (G).

The existing single-storeyed structure where the vertical expansion is proposed was built by a different SPV, and the original structural drawings were prepared by them. When the work was handed over to the new SPV, they sought assistance from one of the prime Institutes in India to determine if it would be feasible to expand the structure to G+2 storeys. As per the report from the Institute of Prime Stature, models of the existing structure were unavailable to ensure stability for vertical expansion, and there were no documents submitted outlining the detailed analysis and procedure used to design the structural drawings, hence could not determine if seismic loads were considered in the original design. They came to the conclusion that if the seismic analysis were carried out in the past, it was based on IS 1893 - Part 1 (2002).

The current SPV has carried out a re-analysis of the existing structure. The documents revealed that IS 1893 (Part 1): 2016 (Sixth revision) with appropriate design parameters had been used for the re-analysis. Apparently, some of the existing columns did not comply with design stipulations as per the IS code provisions.

The SPV forwarded the structural model to the Institute of Prime Stature, to get an expert opinion regarding the feasibility of constructing two more floors above the existing ground floor. The two options made by the institute were as follows:

1) A re-analysis of the structure could be carried out with reduced dead load - by using light weight building blocks like aerated concrete blocks - to explore the possibility of G+2 vertical expansion, with suitable retrofitting of existing deficient columns, if required. "IS 15988 - Seismic evaluation and strengthening of existing reinforced concrete buildings - Guidelines" may be referred to.

(or)

2) Limit the vertical expansion to G+1 storey, as suggested by the current SPV.

Upon a detailed review of the structural analysis and the review of the expert opinion from the Institute of Prime Stature, the SPV decided to restrict the vertical expansion to one floor above the ground floor i.e., to limit the structure to G+1 storey. However, in view of the limited land availability, the college authorities made a request to proceed with the construction of two more floors above the existing single-storey building using lightweight building blocks (which has been suggested by the Institute of Prime Stature) since they are in need of more classroom space.

Furthermore, the design review team in KIIFB has reviewed the submitted models and identified that even the latest structural analysis model of the new block, submitted by the current SPV to the Prime Institute for verification, had significant defects, and was observed to be unsafe under seismic load analysis. As per KIIFB's evaluation of ETABS models, the following major points were noted:

1) Response spectrum analysis had not been performed.
2) The Effective length factor in all the models was limited to 1.2.
3) Although the building is of circular shape and has non-parallel members with curved beams, the orthogonal load combinations haven't been taken into account.
4) Torsional effects were neglected in all the models.

The design review team has updated and analyzed the models and identified that changing the effective length factor to the default value caused some columns to fail, and the reinforcement in some other columns exceeded 4 % and by incorporating torsion into the analysis, the beam reinforcement was increased. Additionally, some of the columns had insufficient reinforcement.

In the report submitted to the SPV, KIIFB has recommended using lightweight materials like aerated concrete blocks throughout the top storeys to avoid major column failures. The SPV has reworked the model by accepting the suggestions made by KIIFB and reduced the number of column failures. KIIFB has then suggested retrofitting the failed columns by jacketing them.

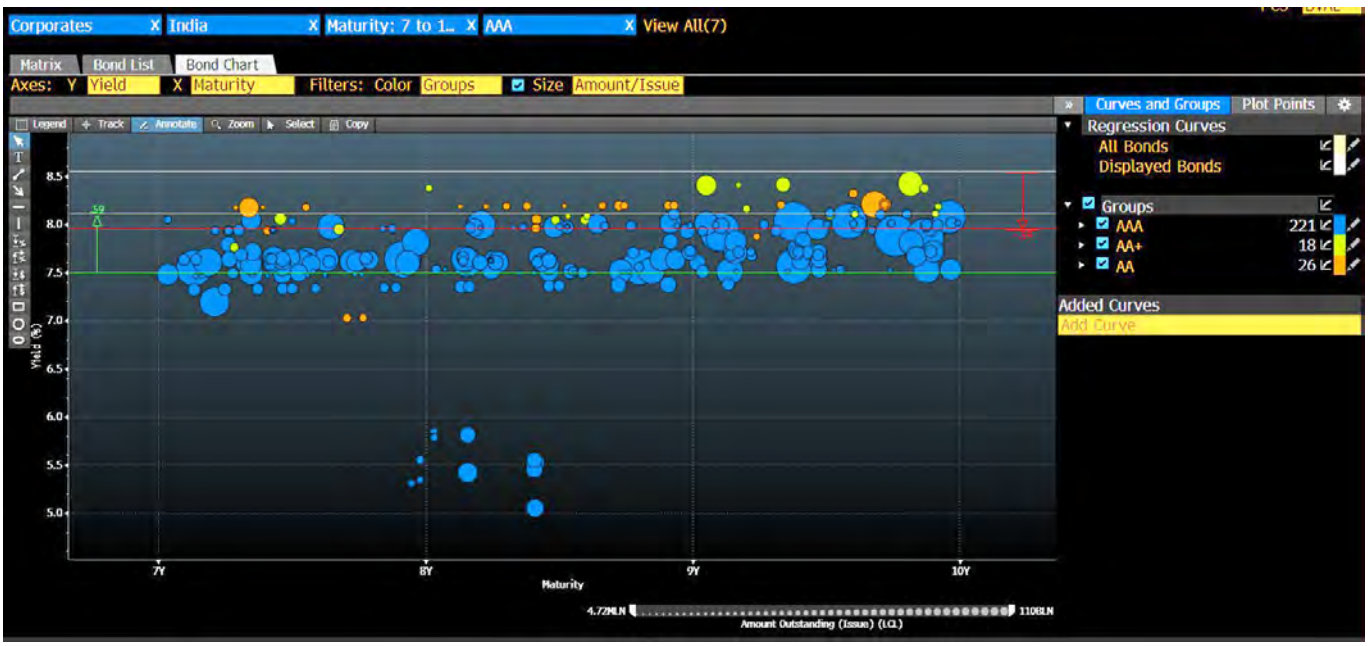
When constructing a building as important as an educational structure, besides meeting the current requirements concerning limited land availability, the safety and stability of the structure should also be primary concerns. It's common knowledge to think about the future generations the structure is going to withstand. Buildings with unconventional configurations require wider perspectives in designing.

Economy & Market Watch

Ajosh Krishnakumar DGM, F&A

In this edition of economy and market watch, we look at the yields for corporate bonds in India with CRISIL rating in the range (AA, AAA). Additionally, we also look at the yield spreads between 10-year G-Sec, 10-year AAA rated corporate bonds, and 10-year AA corporate bonds in India currently.

For all the current outstanding corporate bonds of 7+ year maturity, we look at the current yields for AA and AAA rated corporate bonds against years to maturity.



In the above chart, the blue dots indicate outstanding AAA rated corporate bonds with 7+ years maturity and the green/orange dots indicate AA+/AA rated corporate bonds with 7+ years maturity. As seen from the chart, for AA+/AA rated corporate bonds, the yields are in the range of 8% to 8.6 % (based on years to maturity) whereas for the AAA rated corporate bonds, the yields are in the range of 7.5% to 8.1% (based on years to maturity).

We also looked at the yield spreads between 10-year Gec, 10-year AAA rated corporate bonds and 10-year AA rated corporate bonds for the past 12 months.

As may be seen in the chart above, yields have been rising consistently since November 2021 till June 2022 for the bonds. Subsequently, from June 2022 to September 2022, yields have slightly fallen before strengthening again since September 2022. Currently the yield spread between 10-Year G-Sec and 10-year AAA rated corporate bonds is ~ 32 bps and the yield spread between 10-year AAA rated corporate bonds and 10-year AA rated corporate bonds is 81 bps.

PRAVASI Chitty Statistics as of 31th October 2022

Total number of customers	156042
Total number of subscribers	46115
Total amount collected	INR 1940.12 Cr
KIIFB Deposit bond subscribed	INR 667.00 Cr
KIIFB Security bond subscribed	INR 133.90 Cr

PRAVASI Dividend Scheme

Total number of registrations	47894
Total no. of depositors	3993
Total amount deposited	INR 309.47 Cr

Akkikavu Kadangodu Road

Akkikavu Kadangodu Road

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