



KERALA INFRASTRUCTURE INVESTMENT FUND BOARD

# Newsletter

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## Risk Management



## ***From the CEO's Desk...***

This month's issue of the newsletter focuses on Risk Management – a concept that is integral to all types of management functions and in all sectors. Though the approaches towards risk management may vary from sector to sector in micro level practice, the general principles remain valid.

ISO 31000:2018 defines a risk as “effect of uncertainty on objectives”. Here an effect is a deviation from what is expected. In management practice we usually say, “if such and such conditions are not met or changed, things may go wrong”. Actually, this is what broadly constitutes as “uncertainty” in the above definition of risk. We are not certain whether some conditions can be met, or some conditions would stay stable. In all types of management planning, be it short term, medium term, long term, efficient managers constantly grapple with the issue of reducing the influence of uncertainties over their business. While the consequences of all uncertainties cannot be alleviated fully in any business environment, but its impact on the business can be more effectively managed by following certain proven practices.

As per ISO standards risk is often explained through risk sources, potential events, their consequences, and likelihood. One must start from clearly defining the business vision, objectives, listing of functions that can ensure attainment of objectives, and a detailed activity level planning to ensure the functions are carried out in the intended manner. At each level of above process, you must ask yourself and your team to identify sources of risks, possible potential events, what would be the consequences of it? and what is the likelihood of its happening? In short, along with conceiving, planning, and developing the business functions in an organisation, the risk analysis should also happen in an organic manner. It should not be kept aside as a specialised area to be addressed later by some

specialised people. In our day to day lives, we conduct risk assessment in a quite organic manner often without being aware of it and almost involuntarily at times. The same process is relevant in organizational life also, of course, in a more systematic manner. It should become a deep-rooted character and culture of the organization.

From my experience in working with different organizations, any risk is a risk faced by the organization. One cannot compartmentalise risks as belonging to an individual employee or a unit. If a KIIFB funded project fails because the appraisal process did not have adequate risk response mechanisms in place, then it affects all constituents and NOT our Project Appraisal Division alone. Similarly, if our Finance Division is not able to manage payments and funds efficiently from a risk perspective, it affects the entire organisation. This applies to all our functions. It is this interconnectedness that each of our team members should recognise. In KIIFB, the Weekly Staff Meetings are held with the entire senior management listening to the key activities and achievements of all the other Divisions. The reason we make this sharing mandatory is that risk management is a collective responsibility of the organization – everyone is a risk manager! If we must understand organisational risk, every unit should be sufficiently aware of the functions and importance of other units as well.

In KIIFB, we are yet to evolve into the level of introducing risk management into all aspects of our activities and functions. We are now doing our Risk Based Internal Audits (RBIA). This is a good start though done from an audit perspective. Risk management should get integrated into the broad spectrum of our management to yield better efficiency, effectiveness and results.

More in the next edition. Happy reading.....

**Chief Executive Officer, KIIFB**



## ***Chief Editor's Page***

Risk Management is one of the most important management practices in the time of increasing uncertainty. It is impossible to foresee all risks. But, if the top management is conscious of risks, it can be substantially managed. Communicating risk management practices to all stakeholders and especially to all the employees down the line is essential. This edition of the newsletter on Risk Management is a step in the direction of communicating our risk management practices to all stakeholders.

Risk Management is an essential part of KIIFB's strategy. Risks are associated with every activity of the entire project life cycle at KIIFB, SPVs, and at the project level. This involves certain risks such as political and regulatory risk, environmental risk, social risk, tenor, and refinancing risk, construction and completion risk, operating risks, demand risk, force majeure, change in law, etc. The success of an organization depends on how it manages and mitigates these risks while defining the future. Successful execution of effective risk management requires basic attention to various uncertain resources and risks in different steps of the project life cycle. Concerning this, KIIFB has meticulously developed and impeccably executed an internal mechanism in all wings of KIIFB covering identification and assessment of risks, adoption of suitable methods for handling risks, and then control/mitigation of risks through monitoring risk in a dexterous manner.

To control/mitigate the risk, KIIFB has devised a robust risk management mechanism involving corrective instruments through an internal Project Finance and Management System (PFMS) involving project appraisal, contract management, periodic inspection, continuous monitoring and review, risk-based internal audit, work audit, and E&S compliance mechanisms with ESG framework.

This newsletter covers various concepts of risk management along with techniques to be used for controlling and mitigating all types of risks most likely to occur during the entire project lifecycle. In the article titled 'Contract Management Risks: How to Manage and Mitigate' by Sri. K Sherin gives an insight into the categorization of risks along with the risk maintenance cycle. Environmental and Social Risk Management - Monitoring, Mitigation, and Institutional Measures are described in the article by Dr. Subhash M and Smt. Peggy Nepram. Sri. Sooraj TV in his article, "Risk Management in KIIFB" explains how KIIFB has been in sync with the international trends in Risk Management. Another article titled 'Risk Management: A Managerial Process' by Smt. Swapna Lalitha Rajan articulated the risk management process comprehensively. In the article by Sri. M.K Ajaya Prasad has exhaustively narrated the relevance of DPR and its importance in infrastructure projects. The second part of the individual article titled 'Earthquake Resistant Structural Design' authored by Smt. Lekshmi Raj illustrates the earthquake-resistant design requirements as per National Building Code (NBC). Besides this, readers could also familiarise themselves with 'Construction of Regulator cum Bridges' being implemented by the Water Resources Department (Irrigation) through the sector focus article. In the TIW insight by Smt. Anu JS on Economic and Effective design of Piled Raft Foundation is also a must-read article.

The next edition of the newsletter will come to you with the theme 'Environment Social Governance (ESG). To coordinate ESG-related' activities all SPVs have been requested to depute a nodal officer for better implementation of ESG activities.

Happy Reading .....

Regards  
**Chief Editor**

## Sector Focus: Public Works Sector KIIFB Approved Projects - Statistics

Department	KIIFB Approved Projects	
	No. of Projects Approved	Approved Amount (₹. in Crore)
PWD	419	22,820
Agriculture	1	21
Ayush	2	183
Backward Classes Development Department	1	18
Coastal Shipping & Inland Navigation	7	1,836
Culture	17	462
Devaswom	2	130
Fisheries and Ports	26	516
Forest	4	459
General Education	142	2,872
Health & Family Welfare	65	4,877
Higher Education	52	1,100
Home	6	220
Industries	1	62
Information Technology	3	1,413
Labour & Skills	5	85
Local Self Government	21	607
Power	18	5,200
Registration	6	89
Revenue	2	33
SC/ST Development	10	182
Sports & YA	38	778
Tourism	11	337
Transport	3	601
Water Resources	93	5,876
<b>Total</b>	<b>955</b>	<b>50,792</b>

### 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 - Bangalore Industrial Corridor & Gift City - ₹1888.00 Cr		
<b>Total</b>	<b>7</b>	<b>22,846</b>

### KIIFB Approved Projects Grand Total

Infrastructure Projects	955	50,792
Projects under Land Acquisition Pool	7	20,000
<b>Total</b>	<b>962</b>	<b>70,792</b>



# Contract Management Risks: How to Manage and Mitigate

K. Sherin Under Secretary (AIW)

The risks in Contract Management is critical to Kerala Infrastructure Investment Fund Board (KIIFB) which is enacted for channelising funds for large public infrastructure projects in Kerala. Management of the funds of the organization includes raising funds through borrowings and its repayment in the due time so that its investors have confidence in their investment in KIIFB and at the same time making payments to the infrastructure projects at the agreed time so that SPVs and contractors, involved in the projects have the trust in KIIFB that the commitment from KIIFB is honoured.

Identification of risks and efforts to manage and mitigate the associated risks are critical for the sustenance of the organization. Different wings in KIIFB, perceptive of the coupled risks, professionally manage the un-

derlying risks in an agile manner. Implementing proper contract management practices alongside contract management software viz, Project Finance Management System (PFMS) helps keep KIIFB safe through improved risk management.

In the progression towards development, KIIFB rushed to grow and often find itself dealing with more Contracts. It's a positive sign but without proper management, it can become a major issue. A continuous risk assessment process is inevitable to check compliance failures, missed deadlines, ineffective reporting, poor access control, and inefficient approval workflows that can create devastating consequences. Now, KIIFB dealt ever-changing business landscape, technology, and innovation projects play a key role in creating competitive advantages

for our organization. The Contracts made by SPVs with their Contractors were scrutinized by the Administrative Inspection Wing (AIW) of the Inspection Authority so that these risks are mitigated. Whenever the Letter of Acceptance (LoA) is issued, the Agreement is signed, and the SPVs have to generate the identification number from the PFMS. Then the Contracts have to be submitted for verification by AIW. Whenever there are changes in any parameters of the contract same shall be notified to KIIFB so that Asset Liability Management (ALM) system captures these changes to forecast the fund requirements. However certain projects are often hampered by underperformance, cost overruns, and lower than sanctioned value. This seems to indicate the lack of risk management in the way we manage

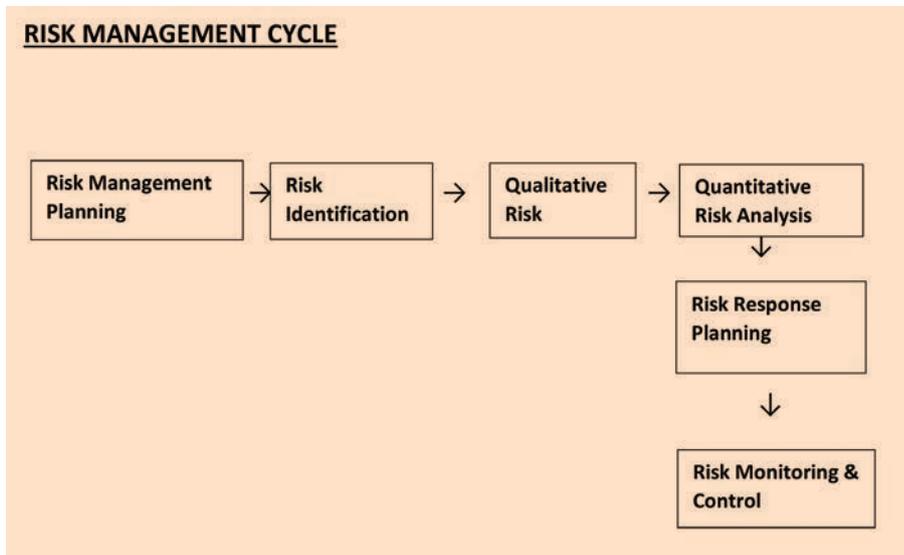
projects. On the other hand, it is impossible to have any projects without risks. Thus, it is essential to have effective risk management rather than trying to eliminate risk from projects.

Unforeseen events disrupt project progression and cause irrecoverable deviation from the plan as one of the major reasons for project delay/failure. Need for effective risk management to avoid project failures and to develop a qualitative improvement in an organizational setup. And realized the need to integrate risk management processes into its project’s life cycle and organizational environment.

### Common Risk Types

#### Contractual Risk

The terms and conditions integrated into a contract should protect the interest of all the stakeholders. Ensure the legality of the contract conditions standard bid documents/ contract documents are insisted based on state/ central/ international funding agency documents, which mitigate the risks involved while drafting a contract. Rarely Term of Contract (ToC) may expire and the project may run without a valid contract. Mitigating the risk, sanction of Extension of Contract Term (EoT), execution of supplementary agreement, and extension of performance guarantee to cover the Defect Liability Period (DLP) are vital.



#### Tender Risk

Contractors selected by the SPV’s must be based on competitive bidding. The government have prescribed guidelines for the formation of Technical Sanction & Tender Acceptance Committees to overlook the tender process which reduces the risk involved in the tender processes. The tender conditions published by the SPVs at times exceed the authority given in the manuals/ codes and prevailing Government orders.

#### Financial Risk

Financial risks are contract risks associated with money loss due to exchange rates difference, bond yield rates, missing a key contract date, cost escalation, DSR rate change, arbitration, etc contribute to the associated financial risk. Planned and structured project mechanisms at KIIFB could override the risk factor.

#### Security Risk

The Performance Guarantees submitted to SPVs as part of the contract will be impacted extension of contracts. The Defect Liability Period gets enlarged and they arise the need for extended Performance Guarantee. Similar is the case when revised estimate including extra and additional items, DPR should be prepared with proper study. The conditions for the DPR preparation should be completely followed during the process. The lack of proper design results in not getting approvals.

#### Administrative Risks

Administrative personnel of SPVs being changed due to deputiation and continuous transfer system. Changes of SPVs in the execution of the same projects due to non-performance in line with scope of the projects. Changes in legal and statutory compliance.



## Environmental Safety & Health Risk

ESG wing of KIIFB ensures a construction ecosystem which incorporates international best practices, for managing wastes, creating of conducive work-

ing atmosphere for labourers, addressing social and environmental mitigation measures, and sustainable use of construction materials and techniques. Health risks associated with the safety of workmen are moni-

tored and reviewed to maintain standards. Risks are inherent in every activity and the success of an organization is depending on how we manage and mitigate these risks while defining the future.



**KIIFB Funded School Projects**  
*GHSS Chundagapoli*

# Environmental and Social Risk Management - Monitoring, Mitigation, and Institutional Measures

Dr. Subhash M, Sustainability Lead

Ms. Peggy Nepram, Sustainability Expert

## Introduction

Commitment to Sustainable Development is an integral part of a project’s risk management. Risk management can be seen in terms of identification of risk, mitigation of the identified risk, and a structured attempt to eliminate adverse environmental and social risks through keen monitoring and institutional measures. KIIFB is striving to guide SPVs through an appropriate process like ESMP to identify risks and impacts as a measure of sustainability, including stakeholder engagement and grievance redressal mechanism about project-level activities. The timely management of Environment, Social, and Governance (ESG) risk and its impact are critical for the long-term sustainability of the projects in all the sectors



like buildings, roads, power, and water supply, to name a few. Risk management can be internalized into the decision-making process from the inception/project iden-

tification to the final evaluation stage. Hence, during the project development cycle, the organization shall initiate processes such as identifying the project risk;



**ESG** KEY AREAS OF FOCUS : ENVIRONMENTAL



Resource Depletion



Loss of Biodiversity



Pollution



Climate change

risk management, and reporting progress with prompt follow-ups.

**Assessment of Project Risk – Internal Institutional Mechanism in KIIFB**

KIIFB shall encourage Special Purpose Vehicles (SPVs) to manage risks by working beyond the regulatory requirements of the project and moving towards enhanced environmental and social

associated management system at the organizational as well as SPV level. This will strengthen the appraisal and execution of projects from an ESG perspective. Broadly, KIIFB shall assess the risks across the following spectrum.

KIIFB shall mandate that SPVs carry out an ESG specific risk assessment of the project based on the broad criteria detailed in the table below to understand the risks and impacts of the project

throughout the project life cycle.

The assessment shall be proportionate to the potential risks and impacts of the project, and should assess, in an integrated way, all relevant direct, indirect, and cumulative environmental, social, and governance risks and impacts throughout the project life cycle. It shall be evaluated using risk rating tools which will provide scores for each of the identified issues based on the ‘likelihood of occurrence’ and ‘severity of potential impact’ it can cause. Based on this assessment and rating, SPVs are mandated to address the risks and adopt suitable strategies, which range from exploring alternatives to adopting mitigation/compensation strategies.

**Risk Assessment Process – Project Development Cycle**

- Reflect institutional aims to address Environment Social and Governance (ESG) risks and impacts in projects and

Environmental	Social	Governance
Resource Depletion – land, water, etc.	Loss of land and possessions	Non-compliance to mandates set out by by-laws and regulations.
Loss of Biodiversity and ecosystem services	Threats to human security	Lack of trained functionaries
Pollution	Health and safety issues	Ethical standards
Climate change	Discrimination against vulnerable groups	Risk and control
	Risks to cultural heritage	Risk audit

ensure that every project of KIIFB is environmentally, socially, and financially sustainable.

- Provide a robust structure for managing operational and reputational risks of KIIFB and its stakeholders in relation to projects' Environmental, Social, and Governance risks, and impacts at all stages.
- Risk identification and assessment of potential risks and impacts of projects to be implemented by adopting suitable strategies as Avoid-Offset-Mitigate-Compensate
- Take the lead in key issues and trends related to sustainability within the state of Kerala by focussing on resource optimization and utilization.
- Enable stakeholders to identify and manage ESG risks and impacts of projects, including those of climate change, during the project preparation stage.
- Support integration of ESG aspects of projects into the decision-making process by all parties and ensure that all institutions involved adopt Good Governance practices.
- Provide a framework for public consultation and disclosure of Environment Social and Governance information in

**ESG** KEY AREAS OF FOCUS : GOVERNANCE 



Non compliance to mandates set out by laws and regulations



Lack of trained beneficiaries

- relation to projects by maintaining the risk and impact.
- Improve development effectiveness and impact to increase results on the ground, both short- and long-term.

**Risk Management Through ESMP**

An Environmental Social Management Plan (ESMP) is a guidance document to measure and achieve compliance with the environmental/social protection and mitigation requirements of a project, which are typically requirements for project permits/approvals. Environmental and Social Management Plan or “ESMP” means a plan, approved by the

organization (SPVs/KIIFB) for the Project, to be prepared by the recipient, if required by the Environmental Social Management System (ESMS), proposing appropriate mitigation, monitoring and institutional measures designed to mitigate potential adverse environmental and resettlement impacts. The guidelines for the preparation of ESMP have been developed by different development financing institutions to ensure that their funding plans are for a sustainable development approach. The guidelines for ESMP developed by IFC are considered exhaustive and worth considering for major infrastructure developments. The IFC performance standards artic-



1.	Structure decontamination and dismantling plan
2.	Contaminated material and site management plan
3.	Construction management plan for excavation/backfilling at the site, transportation of construction material
4.	Minimizing access disruption for structures/shops/houses/public buildings
5.	Dust management plan
6.	Noise management plan
7.	Lighting and illumination management plan
8.	Construction, demolition, and other solid waste management plan
9.	Surface water, groundwater, and contaminated runoff management plan
10.	Wastewater and sewage management plan
11.	Traffic management plan
12.	Equipment operation and maintenance plan
13.	Hazardous materials and hazardous wastes management plan
14.	Labor influx and worker accommodation management plan
15.	Worker medical checkup, vectors, and disease management plan
16.	Occupational health and safety management plan
17.	Site access control and community safety management plan
18.	Emergency response plan
19.	Stakeholder engagement and grievance mechanism
20.	Security management plan
21.	Contractor/sub-contractor management plan

ulate how IFC integrates environmental and social considerations into its decision-making and operations to effectively manage environmental and social risks and impacts and to improve outcomes. IFC has developed international best practices for incorporating the following themes for ESMP, including 21 plans as listed in the above table.

The ESMP will become an integral part of the project proposal.

The ESMP has the following content:

- Project description including log frame and project activities, location, and geographic extent of the project.
- A brief reference to the legal framework in the host country relevant for environmental and social management and how the projects ensure compliance.
- Complete list of identified negative effects that specific

project activities may cause and their significance.

- Planned measures to avoid adverse environmental and/or social impacts, minimize them to acceptable levels, or compensate for them, including responsibilities (staffing) and schedule for implementing the mitigation measures, their technical feasibility, cultural appropriateness, and expected effectiveness in pro-

viding mitigation to all affected groups.

- Reference to plans required by the Standards (e.g., indigenous peoples plan, action plan access restrictions, etc.) and whether mitigation measures have been included or not in the ESMP.
- Cost estimates for the proposed mitigation measures and for ensuring compliance are to be included in the budget of the project proposal.
- Description of the executing entities' capacity to implement the ESMP; where needed, provide for capacity building measures (to be included in the ESMP budget).

Hence, ESMP will propose practical and effective mitigation measures to prevent or reduce any potential negative implications of the construction and operation of the planned project. ESMP serves as a report of environmental and social risk management and quality control. Identification of environmental and social risk is an important step in identifying the risk. Mitigation measures that are sustainable to both the stakeholders and the environment can be drawn out only when these risks are carefully assessed for their correspondence to statutes and other institutional criteria.

### **Assessment and Management of Environmental and Social Risks and Impacts**

ESMP adopts a mitigation strategy to anticipate and avoid or where avoidance is not possible, minimize and where residual impacts remain, compensate, offset for risks and impacts to workers, affected communities, and the environment. It aims to promote and provide means for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.

Not only does this help in identifying risks and impacts, but it also supports the use of an effective grievance mechanism that can facilitate early indication of and prompt remediation for those who believe that they have been negatively affected by the project.

SPVs shall establish and maintain a process for identifying the projects' environmental and social risks and impacts. The project's type, scale, and location guide the scope and level of effort devoted to the risks and impacts identification process. The risks and impacts identification process will be based on recent environmental

and social baseline data at an appropriate level of detail.

### **Public Participation in Risk Management**

The inclusion of the views of the affected and interested public helps to ensure that the decision-making process is equitable and fair and leads to more informed choices and better environmental and social outcomes. Consulting people entails an implicit "promise" that, at minimum, their views will be considered during the decision-making process.

For projects that have environmental and social impacts, the consultation will not be a single conversation but a series of opportunities to create understanding about the project among those it will likely affect or interest and to learn how these external parties view the project and its attendant risks, impacts, opportunities, and mitigation measures. Listening to stakeholder concerns and feedback can be a valuable source of information that can improve project design and outcomes and help an institution identify and control external risks. It can also form the basis for future collaborations and partnerships. For stakeholders, an institution's consultation process is an opportunity to get informa-



### Five Process Steps of Grievance Mechanism for Risk Management



tion, as well as to retrospection about the local context in which a project will take place, to raise issues and concerns, ask questions, and potentially help shape the project by making suggestions for the institution to consider and respond to.

## Grievance Redressal Mechanism in Risk Management

The grievance redressal mechanism can be seen as one of the pillars of stakeholder engagement. A redressal mechanism is often designed after accessing the extent of risks and adverse impacts of the project. All issues arising over the life of a project cannot be anticipated and preempted during the assessment process. This shall be addressed in the ESMP. Grievance Redressal Mechanism can be described in 5 principles, which are:

**I. Proportionality:** Identifying risk and adverse impacts on

affected communities

**II. Cultural appropriateness:**

The mechanism shall be designed considering culturally appropriate ways of handling community concerns

**III. Accessibility:** The mechanism shall be clear and understandable and shall be accessible to all segments of the affected communities at no cost

**IV. Transparency & Accountability:**

Transparency and accountability shall be maintained for all stakeholders affected by the project. This shall include the processes of conveying grievance and the process used to address the grievance.

**V. Appropriate Protection:**

The process shall prevent retribution and shall not impede access to other remedies.

How an institution responds to grievances is important and can have serious implications on the

overall performance of the project. The mechanism shall be scaled to fit the level of risks and impacts of a project. Thus, from a basic risk management perspective, spending time and effort to develop a well-functioning process is a good investment for the project.

## Conclusion

Risk management in the context of ESG mostly deals with the risk associated with environmental and social outcomes. Identifying such risks through environmental assessment, public participation, and structuring a solid process of grievance redressal mechanism are effective keys to risk management. This is consolidated in the Environmental and Social Management Plan as it integrates all the findings of such assessment and consultative studies. If the ESMP is meticulously executed, the project shall be sustainable.

# Risk Management in KIIFB

Sooraj T V,  
Financial Assistant, Finance & Administration

Risk management is the identification, evaluation, and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor, and control the probability or impact of unfortunate events or to maximize the realization of opportunities.

KIIFB has always endeavoured to ensure efficiency, effectiveness, transparency, and accountability in its operations. Over the last few years, KIIFB could achieve considerable degree of advancement in all its areas of operations and has been consciously and successfully following international best practices and designing policies required to meet its objectives.

The decision of the 40th meeting of the General Body of KIIFB held on 13th October 2020 to implement Risk Based Internal Audit (RBIA) at KIIFB is a major step in this direction. KIIFB's vol-

untary decision to adhere to the International standards underlines the organization's proactiveness in implementing widely accepted standards to safeguard the public interest.

Institute of Internal Audit (IIA) defines RBIA as a methodology that links internal auditing to an organization's overall risk management framework. RBIA allows internal audit to provide assurance to the Board that risk management processes are managing risks effectively, in relation to the risk appetite.

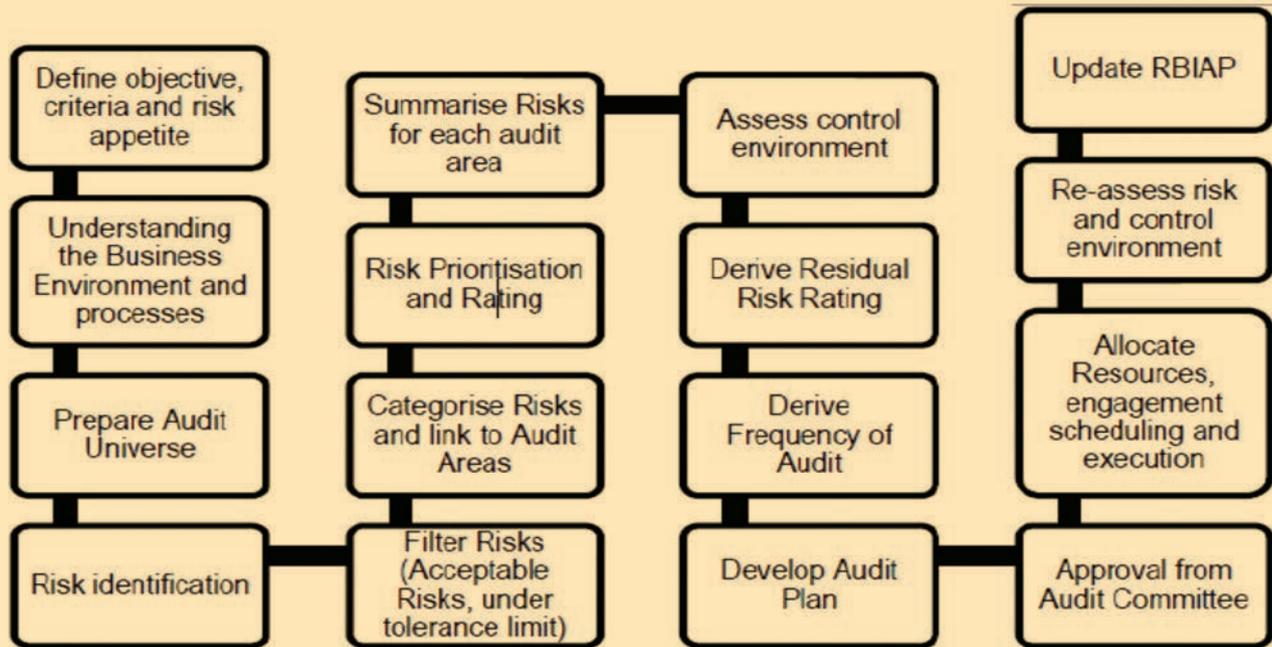
The objective of RBIA is to create 'best in class' Audit Framework for the Board and to conduct the Risk-Based Internal Audit according to the policy and framework approved by the Audit Committee of the Board. Subsequent to its Board decision, KIIFB engaged a consultant firm for preparing audit framework under

Risk Based Internal Audit & Procedures for Conducting Internal Audit in accordance with the Risk Based Internal Audit guidelines issued by the Global organizations.

RBIA starts with undertaking an independent risk assessment of the entity and its processes and formulating a risk-based audit plan. This audit plan is prepared after carefully considering the inherent risks associated with the activity and the effectiveness of the existing control systems in place.

Based on the Terms of Reference (ToR) approved by KIIF Board, the RBIA at KIIFB shall undertake a programme of reviews of key functional areas, processes, and systems to ensure that material risks are identified and managed. These will include reviews of design and operating effectiveness of the internal governance structures

## Key process in RBIA



and processes of the organisation, the setting of and adherence to risk appetite, the risk, and control culture of the organisation, capital and liquidity risk, key corporate events, and outcome of processes. It will also evaluate and assess emerging risks and their potential impact on the KIIFB's operations. In the audit follow-up part, it will provide an independent assessment of the progress made by management in implementing

actions to manage risk issues and control weaknesses reported in external and internal audit reports. In brief, RBIA framework shall provide assurance about the governance, risk management, project, and financial controls, and its quality assurance processes.

The RBIA at KIIFB is being conducted by an independent external auditor with coordination support from the Internal Audit Wing of KIIFB.

Since its inception, KIIFB has undergone significant upgrades in terms of functionality to ensure that it acts effectively and efficiently to manage its operational risks. The best international practices adopted by KIIFB and a standardized risk management approach are the driving forces that make its success in the implementation of Infrastructure Projects in the state.

*Reference:- Wikipedia, ISO 31000 guidelines.*

# Earthquake Resistant Structural Design

## Part 2 NBC 2016

Er. Lekshmi Raj APM- PAD

### As per the NBC 2016

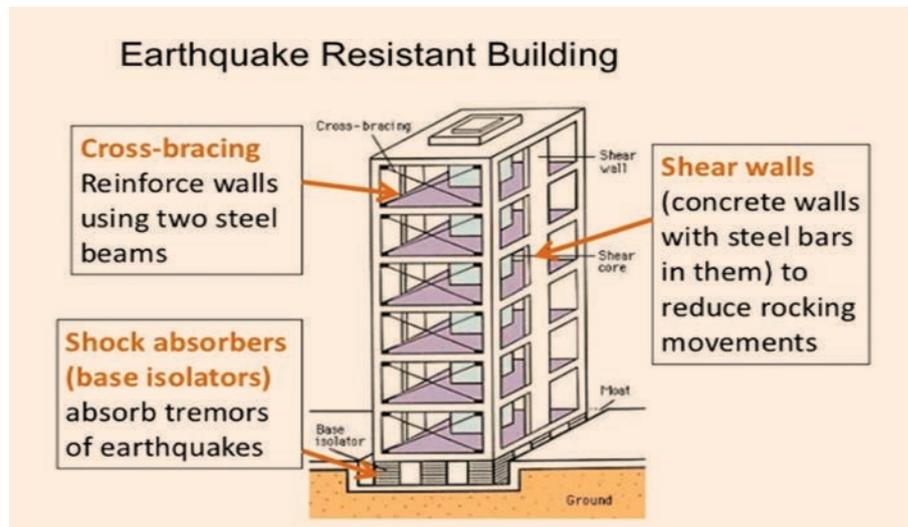
Minimum sizes of the structural members of an earthquake-resistant RC building.

The minimum sizes of concrete beam and column are prescribed to:

- Meet structural safety requirements to provide sufficient stiffness, strength, and ductility,
- Ensure good durability and resistance to fire, which is ensured through the sufficient concrete cover to reinforcement, and
- Permit ease of construction.

The minimum sizes of structural members in earthquake-resistant RC buildings are:

- Minimum width of beam shall be 200 mm;
- Minimum width of column (that is part of the lateral load resisting system) shall be larg-



With Bracing system, Shear walls, base isolators, etc.

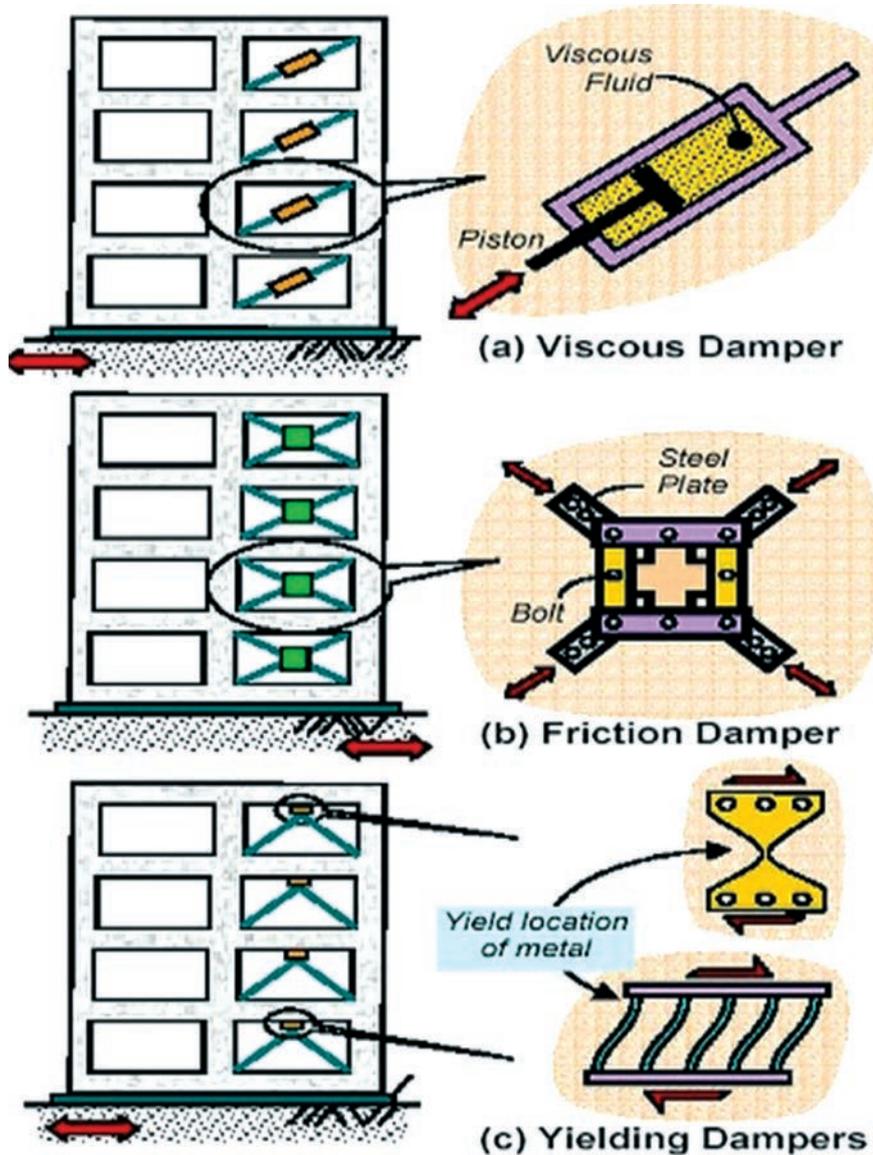
er of 300 mm or 20 times the diameter of longitudinal reinforcement.

Unless detailed engineering is not done, limit the number of storeys.

### Improvements in Seismic Codes

Earthquakes, though tragic, also provide momentum to the

process of improvements in seismic codes and construction practices. A spurt in the seismic-related professional activities in India in recent years shows that there is significant enhancement in awareness towards earthquake activities. However, there is a need to channelize this interest towards better construction practices, and it must be done before this inter-



### Seismic Energy Dissipation Devices

est fades away. In recent decades, observations from past earthquake damage through reconnaissance visits and the major advances gained in the seismic design of RC structures have become major factors in improving and changing the building codes. For example,

the Uniform Building Code was modified to include some ductile detailing requirements as a result of the 1964 Alaska earthquake. Many reinforced concrete buildings in Ahmedabad (zone III) collapsed in the 2001 Bhuj earthquake, modified the ductility

requirements in IS 13920. Therefore, ductile requirements were made mandatory for all structures in zone III, IV, and V. Recent earthquakes continue to teach important lessons for practicing engineers, such as the high vulnerability of existing structures and the need for proper assessment and retrofitting of these buildings to improve their seismic performance against future earthquakes.

The advanced earthquake resistance techniques are aimed at, not only strengthening the building but also reducing the earthquake-generated forces acting upon it.

The following techniques are employed for earthquake resistance;

1. Structural systems (Shear walls, diaphragms, and moment-resisting frames)
2. Base Isolation Method
3. Energy Dissipation Devices
4. Bracing Systems

The main points towards ensuring Earthquake Safety as per NBC guidelines are listed below:

### The DO's

Ensure that the ground on which the building is being built is competent, either on hill slopes or on plains. Ensure that the building is:

- (a) neither too long nor too tall,
- (b) simple without any bend in plan, and
- (c) uniformly wide along with the height, if not wider at the base.

Ensure that masonry buildings have walls with:

- (a) regularly shaped masonry units,
- (b) bands,
- (c) proper masonry courses,
- (d) relatively small door and window openings, which are away from wall corners, and
- (e) buttresses supporting long walls.

Ensure that RC Frame buildings have:

- (a) structural walls along with the full building height,
- (b) 1350 hook ends in transverse ties, and
- (c) additional horizontal RC elements to break slender masonry infill walls into smaller panels.

Ensure that good quality materials are used in construction.

In buildings built of stone masonry, only dressed stones should be used.

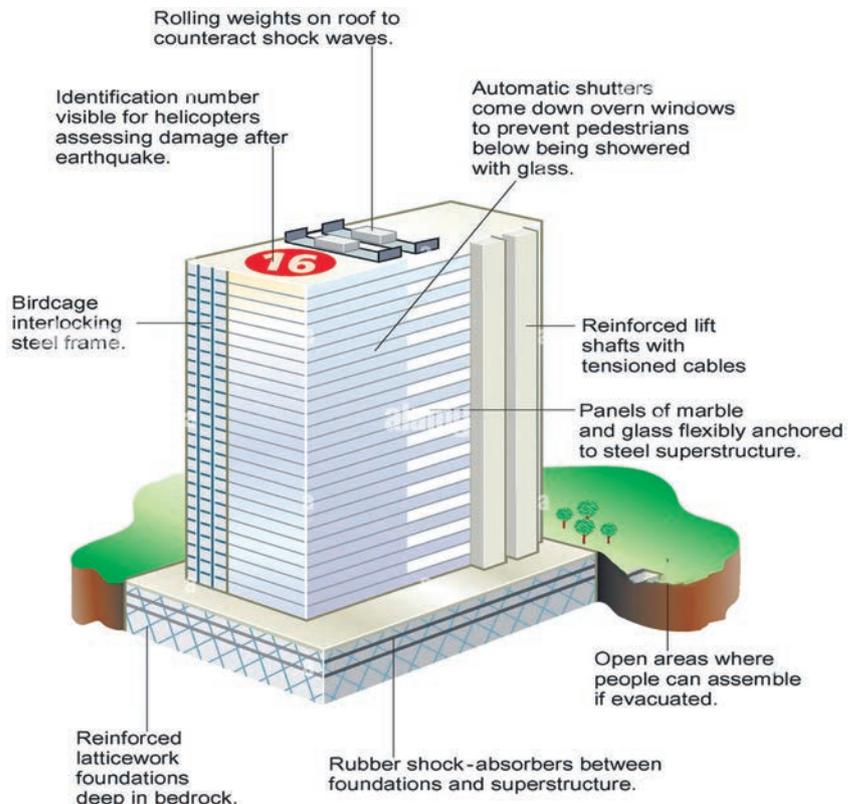
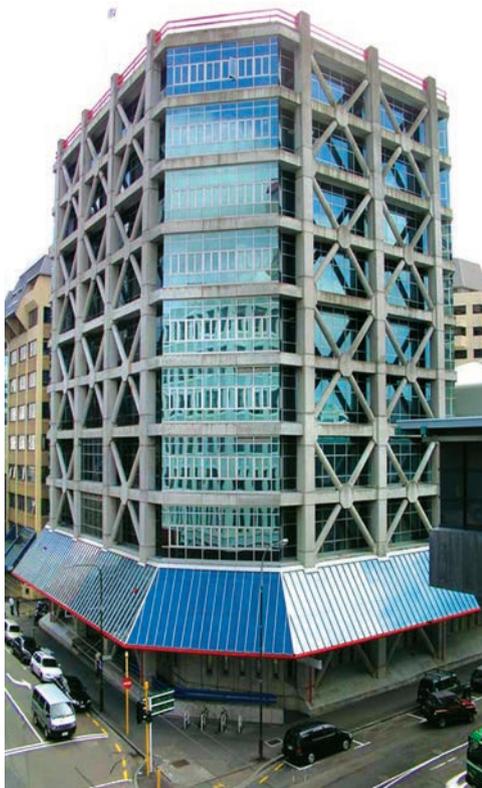
Ensure that masonry and RC

works are cured for the prescribed duration using potable water.

Secure properly the following to RC members and never to masonry walls:

- (a) heavy objects (like water tanks), and
- (b) utilities (like electric, gas and water lines). Ensure regular maintenance of buildings and repair of:

- (a) Minor structural and non-structural damages,
- (b) Plumbing items and water leakages from joints,



Earthquake-Resistant Building



- (c) Electrical items,
- (d) Aesthetics and painting, and
- (e) General cleaning of roofs, balconies, and ledges.

Seek services of competent Professionals for design and construction of the house, and skilled Artisans for construction.

### The Don't's

1. Do not purchase any land for construction if it is under dispute.
2. Do not start construction until the plot of land is marked by the Surveyor from the Municipal Office and approvals are provided for construction by the Municipal Office.
3. Do not use false ceilings excessively in the house.
4. Do not use excessive ap-

pendages (like façade, stone cladding) or large-sized glass windows/walls in the building.

5. Do not buy a building that is not certified to be earthquake-resistant by a competent Structural Engineer.

During transferring the knowledge to practice, the latest developments in earthquake engineering, such as active and passive control of structures, non-linear analysis, soil-structure interaction, and seismic risk assessment, are needed.

There are also a number of research problems which are unique to India and for which the solutions cannot be sought from other countries. For instance, strong motion characteristics

of Indian earthquakes, low-cost earthquake-resistant houses, and seismic behavior of masonry buildings. Vigorous research in earthquake engineering is very much necessary to attend such problems. It is felt that maximum gains towards earthquake disaster mitigation will be made by improving seismic codes based on case studies and by better training and involvement of professional engineers in earthquake engineering.

### Reference & Source

1. Simplified guidelines – Earthquake Safety of Buildings- National Building Code of India 2016
2. IS 1893,2016 Earth quake Zone.

## KIFB Funded School Projects

GVHSS Poovachal



## Sector Focus: Water Resources Department (Irrigation)

### Construction of Regulator cum Bridges

In Kerala, about 78,041 cubic meters of water is lost annually through rivers in the form of runoff. Out of this, only about 10,300 cubic meters form part of the subsurface water, i.e., less than 14%. Several obstructions like check dams and regulators will be useful for soil and water conservation measures. In most

cases, these structures take the form of a barrier across the river that causes water to pool behind the structure. These structures are commonly used to decrease the extent of water scarcity by arresting the excess flow. The water thus stored recharges the groundwater. Regulators are barriers constructed across rivers and streams for the purpose of water harvesting.

Through the Budget Speech 2017-18, the Government had announced an amount of Rs.600 Crore for the 'construction of 30 regulators under Irrigation Department being implemented by Kerala Irrigation Infrastructure Development Corporation Ltd (KIIDC) as the Special Purpose Vehicle, through KIIFB funding. KIIFB has so far approved 12 RCB projects across the state worth ₹ 503.71 Crore as detailed below.

Sl. No.	Sub Project Name	Project Outlay (Rs. In Crore)	SPV Name	LAC	District	Work Status
1	Construction of RCB across Kuppam River at Kooveri, Kattampally in Chapparapadavu panchayath, Thaliparamba Thaluk, Kannur District	₹ 26.06	KIIDC	Thaliparambu	Kannur	Work in progress
2	Construction of Regulator cum Bridge u/s of Perincheri Kadavu across Kuttiyadi River Gulikapuzha in Kozhikode District.	₹ 68.37	KIIDC	Vadakara	Kozhikode	Work in progress
3	Construction of Regulator cum Bridge across Kadalundi river at Puzhankavu in Manjeri Municipality in Malappuram	₹12.07	KIIDC	Manjeri	Malappuram	Work in progress



4	Construction of RCB across Thoothapuzha at Kezhmurikkadavu, Moothikkayam in Moorkkanadu Panchayath, Malappuram District	₹ 67.64	KIIDC	Mankada	Malappuram	Work in progress
5	Construction of Regulator cum Bridge at Kankankkadavu across Bharathapuzha in Kuttipuram Panchayath, Malappuram District	₹ 125.61	KIIDC	Kottakkal	Malappuram	KIIFB Approved
6	Construction of RCB across Chittur puzha at Vadakarappally Palathulli in Peruvembu Grama Panchayath	₹ 19.84	KIIDC	Chittur	Palakkad	Work in progress
7	Construction of regulator with lock across Anjarakandy river at Parapram in Pinarayi panchayath	₹ 46.37	KIIDC	Dharmadam	Kannur	Work in progress
8	Construction of regulator with lock across Konothupuzha river at Puthenkavu in Udayamperoor panchayath, Ernakulam District	₹ 25.76	KIIDC	Thrippunithara	Ernakulam	Work in progress
9	Construction of RCB across Thoothapuzha river at the downstream of Kaladikkunnu LIS in Thiruvengupura in Palakkad District	₹ 29.48	KIIDC	Pattambi	Palakkad	KIIFB Approved
10	Construction of RCB across Poonur Puzha near KWA pumping house at Poolakkadavu	₹ 25.11	KIIDC	Elathur, Kozhikode North	Kozhikode	Work in progress
11	Construction of RCB across Ummenchira Puzha at Chekkupalam in Pinarayi Panchayath	₹ 30.03	KIIDC	Dharmadam	Kannur	KIIFB Approved
12	Construction of Kanathodu RCB in Pudukkad Panchayath	₹ 27.38	KIIDC	Puthukkad	Thrissur	Work Tendered
<b>TOTAL</b>		<b>₹ 503.71</b>				

## **Project Focus:-**

### **1. Construction of RCB across Kuppam River at Kooveri, Kattampally in Chapparapadavu panchayath, Thaliparamba Thaluk, Kannur District**

The proposal of the project is to construct a Regulator cum Bridge across Kuppam river at Kooveri-Kattampally in Chapparapadavu Panchayath. The site is 12 km Northeast of Taliparamba Taluk HQ. The Poovam-KattampallyChapparapadavu road and Chapparapadavu-Taliparamba road are two roads passing near the river parallel to its opposite banks. The Kuppam River is one of the major river in the Kannur District. It is one of the main sources of water for drinking and irrigation purposes in the District. The peak discharge of the river at this portion is about 312.748 M<sup>3</sup>/sec. Tidal effects are observed in this portion of the river and saltwater intrusion is a major problem here, mainly during summer as the flow becomes very lean. The Chapparapadavu Panchayath is an agricultural Panchayath, and the people here depend mainly on monsoon rain for their agricultural activities. They find it very difficult to irrigate their crops such as coconut, areca nut, pep-

per, plantain, paddy, etc. uring summer season. The proposed regulator will be a solution for the saltwater intrusion as well as irrigation and water supply.

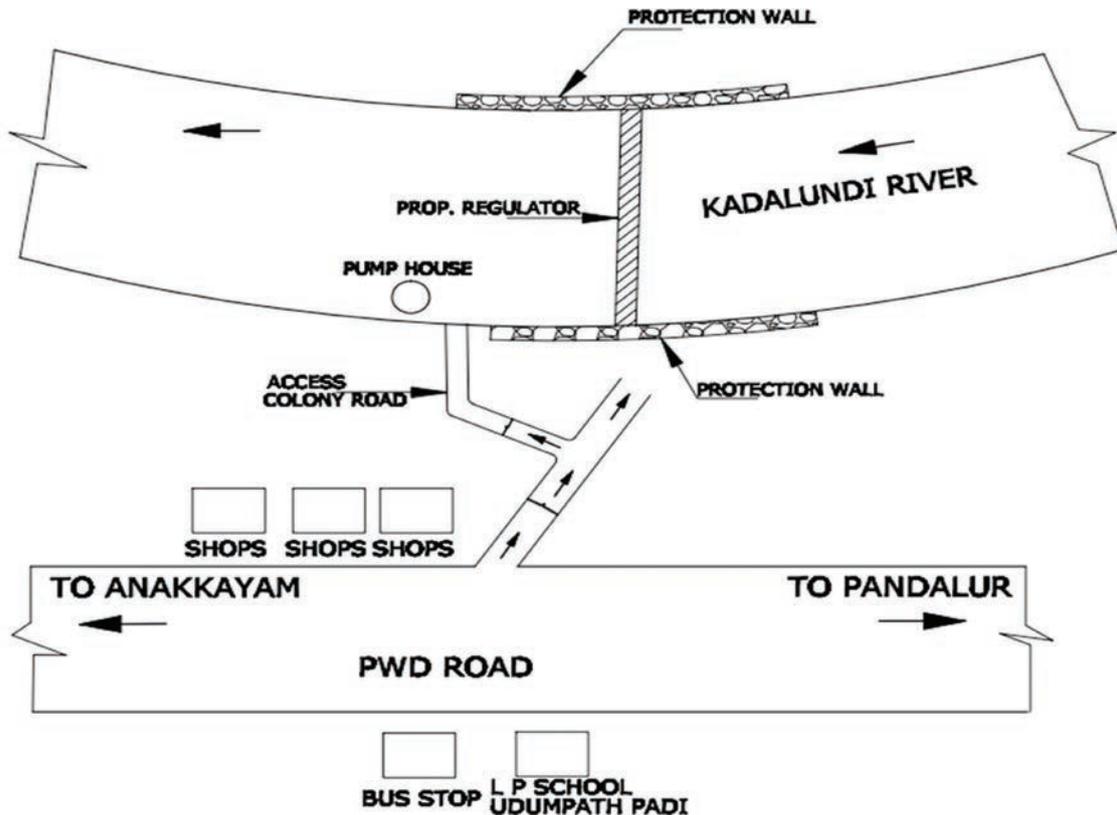
### **2. Construction of Regulator cum Bridge u/s of Perincheri Kadavu across Kuttiyadi River Gulikapuzha in Kozhikode District**

This Project is to construct a Regulator-cum-Bridge across Kuttiyadi river at Perinchery kadavu. The proposed bridge shall connect Vatakara and Koyilandy Taluks of Kozhikode District. The site is located across Kuttiyadi River about 2 km downstream of Gulikapuzha bridge. The site can be reached through Thiruvallur-Meenpalam-Gulikapuzha road. Kuttiyadi river is one of the major rivers of Kerala flowing through Kozhikode District. It is the main source of water for drinking and irrigation purposes for the entire District. The river originates from Narikota in the Western Ghat region and empties into Arabian sea at Murat. The basin area of the river is 583 sq. km, and the length of the mainstream is 74 km. Peruvannamuzhi dam of Kuttiyadi Irrigation Project and Kakkayam dam of Kuttiyadi Hydro Electric Project is in the upper reaches of the river. Apart

from these, two dams in the upper reaches, no other structures are built across the river for the utilization of water. Nowadays, due to excessive sand mining, the riverbed is lowered considerably in Kuttiyadi river. Consequently, the intrusion of saltwater takes place even up to Kuttiyadi town located about 35km away from Murat river mouth. This project aims at preventing saline water intrusion from Arabian sea and thereby protecting the agricultural land- mainly paddy cultivation scattered in various panchayaths including Thulattunada wetland and Avalapandi.

### **3. Construction of Regulator cum Bridge across Kadalundi river at Puzhankavu in Manjeri Municipality in Malappuram**

This project is regarding the construction of a Regulator across Kadalundi river at Puzhankavu in Manjeri Municipality. Backwater can be stored up to a length of 10km on the upstream side of the project. The project aims to construct a Regulator of 5m height at Puzhamkavu across Kadalundi river ( right bank at Manjeri Municipality and the left bank at Anakayam Panchayath at Malappuram District). This project was mainly benefited for District Sports



Council Stadium at Payyanad and the storage water can be utilized for Manjeri medical college too.

The site is located across Kadalundi River about 5 km from Manjeri and 40 km from Calicut Airport. Kadalundi river is one of the major rivers in Kerala which flows through the Malappuram District.

**Benefits:** The river originates from hilly tracks, flash floods occurring during the monsoon cause bank erosion and cause damage to crops and other living beings. During summer, the major portion of the river gets

dried up causing losses to plantations, crops, living beings, etc. Since there are no proper regulator projects in the river, all the river water is just draining to the sea. There are some check dams and temporary bunds constructed across the river, which are not so effective while considering the long-term sustainability and it does not serve the need. The construction of RCB will help in recharging of water resources like wells, ponds & small tributaries. An extent of 600 Ha of land can be irrigated with this project.

#### **4. Construction of RCB across Thoothapuzha at Kezhmurikkadavu, Moothikkayam in Moorkkanadu Panchayath, Malappuram District**

This Project is proposed to construct a Regulator across Thoothapuzha at Keezhmurikkadavu, Moothikkayam in Moorkkanadu Panchayath, Malappuram District. The river spread in the Districts of Palakkad and Malappuram Districts. In Malappuram Districts, this river is bounded by the towns are Aliparamba, Thootha Elamkulam, Pulamanthole, Moor-

kanad, and Irimbiliyam, etc. The site is located at Keezhmurikadavu across Thoothapuzha, 3Km away from Vengad and 12Km upstream side of thoothapuzha from Bharathapuzha confluence (Koottakadavu). The Proposed RCB connects Vengad in Moorkanad Panchayath of Malappuram District and Nedungottur, Vilayur of Palakkad District. The location is 25 Km away from the District Head Quarters of Malappuram. Vengad is a place located on Perinthalmanna Valanchery road, 15Km away from Perinthalmanna and 11Km to Valanchery.

**Benefits:** This scheme is useful for irrigating about 6536.25 Ha of land for the 1st, 2nd and 3rd crops of paddy in the four Grama Panchayaths namely Moorkanad, Vilayur, Thiruvegapura, and Pula-manthole. The introduction of irrigation in the unirrigated area and the extension of irrigation of paddy irrigated areas are also possible by this proposed scheme. Besides, the scheme is very helpful to several water supply and irrigation schemes are existing in this area, such as Moothikkayam Lift Irrigation scheme by Minor Irrigation Department, Nilaparamba Water Supply Scheme of Kerala Water Authority, Mundammalkunnu and Alikkal Water Supply Scheme etc, and many water supply and irriga-

tion schemes in Palakkad District also.

### **5. Construction of Regulator cum Bridge at Kankakkadavu across Bharathapuzha in Kuttippuram Panchayath, Malappuram District**

The proposed work is to Construct a regulator cum bridge across Bharathappuzha at Kankakadavu in Kuttippuram panchayath (Kuttippuram village) in Tirur Thaluk of Malappuram district, 8 km d/s of Koottakadavu. Length of the regulator cum bridge is 418 meters with 7.5 m roadway. 30 shutters are proposed with the mechanically operating system. The height of the shutter is 2.5m from the weir body. The site is located at Kankakadavu across Bharathappuzha, 1 km away from Kuttippuram Junction and 8 km downstream side of Thootha river and Bharathappuzha confluence. The proposed RCB connects Kuttippuram Kuttippuram Panchayath of Malappuram District) with Kumbidi (Anakkara Panchayath of Palakkad District). Total length of the river is about 209km. Discharge of the river is about 161m<sup>3</sup>/sec. Basin area is about 6180 km<sup>2</sup>. The length of the proposed RCB is 418m and maximum height of

storage is 2.50 m.

**Benefits:** It is assessed that about 8.km water will be the back up in the river course on completion of the scheme. Apart from this benefit, transportation facility can make available between Kuttippuram and Anakkara.

### **6. Construction of RCB across Chittur puzha at Vadakarappally Palathulli in Peruvembu Grama Panchayath**

The Project is to construct a Regulator across Chittur Puzha at Vadakarappally Palathulli in Peruvembu Grama Panchayath of Palakkad District. The main objective of the project is to increase the sub soil water table and thereby enriching the wells in the nearby locality.

**Benefits:** The realization of this regulator will strengthen the ayacuts of Chittur Puzha Project and assured quantity of drinking water can be supplied to the Villages on both banks of the river. Also, private pumping can be allowed which will increase the cultivation of cash crops. The reservoir thus created will help in fish farming. Excess flow of water from the river to the sea during the monsoon season also can be regulated. LISs maintained by the farmers and



various drinking water schemes maintained by the Kerala Water Authority will be benefitted with surplus water. The existing wells and ponds on the banks of the regulator also will be flourished by the increased ground recharge and by this the enhanced productivity will improve the standard of living and reduce the draught.

### **7. Construction of regulator with lock across Anjarakandy river at Parapram in Pinarayi Panchayath**

This Project is to construct a Regulator with Lock across Anjarakandy River at Parapram in Pinarayi Panchayath. The site is 10 km North-East of Thalassery Taluk HQ. The regulator across Anjarakandi River at Parapram is proposed to prevent saltwater intrusion into about 1200 acres of land spread in Pinarayi, Vengad, Anjarakandi and Peralasseri villages and to make use of the fresh water on upstream side of the regulator for irrigation. Benefits: Anjarakandy River is one of the main sources of water for drinking and irrigation purpose in the district. The peak discharge of the river at this portion is about 909 Cumec. Tidal effects are observed in this portion of the river and saltwater intrusion is a ma-

ajor problem here, mainly during summer. Pinarayi panchayath is surrounded with water bodies on three sides and the residents are facing with acute drinking water problem for about five months in a year due to salinity intrusion. Implementation of the project will resolve the drinking water scarcity in this area and in alike areas in the basin. Kerala Water authority Schemes depending on the Anjarakandy River also suffers from the salinity problem in peak summer season. By this way also, the project makes it beneficial to the drinking water sector in the area.

### **8. Construction of regulator with lock across Konothupuzha river at Puthenkavu in Udayamperoor Panchayath, Ernakulam District**

The Konothupuzha River is one of the major river in Ernakulam district and a freshwater body lying parallel to Thripunithura -Vaikom road, connecting Vembanad back waters to Kochi Back waters. It flows south – north direction through Tripunithura Municipality, Chottanikkara, Mulanthuruthy, Udayamperoor and Amballoor Grama panchayaths. Northern part of this river merges at Champakkara canal and southern

part breaks from Poothotta area to Vembanad lake and Murinjapuzha in Kottayam district. This is one of the main sources of water for drinking and irrigation purpose in the district. The peak discharge of the river at this portion is about 653.66 M<sup>3</sup>/sec. At present it is known as Vettuvellipuzha in Vettuvellikadavu part, Kaniyavalli puzha in the middle part and Poothottapuzha in Poothotta, which was a fresh water source for people residing in the nearby area.

**Benefits:** Nearby ponds and wells are being recharged from this river. More than 200 fishermen families are earning their livelihood from this river. Moreover, nearby Pokkali paddy fields covering an area of about 3500 acre including Thottarappunja meets the irrigation requirement from this water source. Konothpuzha is a river covering an approximate length of 17.0 km and a depth ranging from 1.50m to 3.0m. Tidal effects are observed in this portion of river and saltwater intrusion is a major problem here, mainly during summer as the flow becomes very lean. The agricultural activities in Thripunithura Municipality, Chottanikkara, Mulanthuruthy, Udayamperoor & Amballoor Grama panchayaths are dependent mainly on monsoon showers. The

farmers find it difficult to irrigate their crops such as coconut, areca nut, pepper, plantain, paddy etc., during summer season. The salt-water intrusion from the Vembanad lake destroys the crops in the nearby lands and causes big loss to the farmers. The existing RCB is 58 yrs old, the shutters of which are severely rusted and not operational since years. But the bridge has been used for vehicular traffic at present. Hence an annual cost of Rs. 20 lakh is being incurred for putting up temporary bund across Konothpuzha for preventing salt-water intrusion thereby protecting the cultivation in the aforesaid areas and the sources of drinking water. This expenditure can be avoided by this project.

### **9. Construction of RCB across Thoothapuzha river at the downstream of Kaladikkunnu LIS in Thiruvengupura in Palakkad District**

This Project is to construct a regulator across Thoothapuzha at the downstream of LIS Kaladikkunnu in Thiruvegapura Panchayath. The main objective of this Regulator is to preserve water collecting during rainy season and to meet the irrigation and drinking water requirements of the nearby localities, viz Thiruvegapura Panchyath

and Irumbiliyam Panchyath, about a length of 3.5 km of upstream area. In addition to this, the regulator will have a carriageway of 4.75m width for single line traffic for the people to pass from one side of the river to the other. This will connect the Panchayaths of Thiruvegapura in Palakkad District and Erumbiliyam Panchayath in Malappuram District. This road bridge is also essential for the operation and maintenance of the shutters during emergency situations.

### **10. Construction of RCB across Poonur Puzha near KWA pumping house at Poolakkadavu**

This Project is to construct a Regulator-cum-Bridge across Poonur puzha at Poolakkadavu in Kuruvator Panchayath of Kozhikode District. The bridge proposed shall connect Parambil Bazhar in Kuruvator Panchayath and Poolakkadavu in Kozhikode Corporation. The site is located across Poonur puzha about 14 km away from Kozhikode railway station. Poonur puzha is the main source of water for drinking and irrigation purposes for the natives. The length of the mainstream is 54 km. Nowadays, due to excessive sand mining the riverbed is lowered considerably.

**Benefits:** The pumping stations of KWA is situated at upstream of the proposed Regulator Cum Bridge. So, the project can be made use of for providing drinking water to Kozhikode Corporation and adjoining Panchayaths. The scheme is also proposed to supply Irrigation water to the afore mentioned areas where cultivation of agricultural crops such as paddy, coconut, areca-nut etc. are the main livelihood of the villagers. The proposed RCB will become an important connectivity between Parambil Bazhar in Kuruvator Panchayath and Poolakkadavu in Kozhikode Corporation. The bridge portion of the project has a unique advantage of substantial reduction in travel distance 10 km from Parambilbazar to Medical College, savings of congestion in various towns and saving in cost of fuel, improvement of environment quality and enhanced economic activities.

### **11. Construction of RCB across Ummenchira Puzha at Chekkupalam in Pinarayi Panchayath**

The Ummenchira puzha is one of the major rivers in Kannur district. It is proposed to construct a Regulator cum Bridge across the river at Pinarayi Gram Panchayath. The



site is 6 km East of Thalassry Taluk HQ. The peak discharge of the river at this portion is about 99 Cumec. Tidal effects are observed in this portion of river and saltwater intrusion is a major problem here, mainly during summer as the flow becomes very lean. Pinarayi and Eranholi panchayath are agricultural panchayaths and the people here depend mainly on the monsoon rain for their agricultural activities. They find it very difficult to irrigate their crops such as coconut, arecanut, pepper, plantation, paddy etc., during summer, from January to May. The proposed regulator will be a solution for the saltwater intrusion as well as irrigation water supplies.

## 12. Construction of Kanathodu RCB in Pudukkad Panchayath

Kanathodu RCB is proposed across Kurumalipuzha at Kundukadavu in Puthukkad Panchayath, Mukundhapparam Taluk of Thrissur District. The RCB connects Pudukkad panchayath and Parappukara Panchayath. The water released from Chimmony dam passes through this location to Kole lands. This is located at about 10 Kms upstream of Manjamkuzhy regulator and 3.18 Km downstream of Attappilly Regulator. Lift Irrigation Schemes namely Urankulam additional, along the right side, Nandhipulam and Panchallurpadam along the left side of the river are at the upstream side

of proposed RCB. Also, there are a number of Kerala Water Authority pumping stations. Kurumalipuzha is not a perennial river and the water availability depends on the release from Chimmony Dam.

**Benefits:** With the construction of this RCB, more water can be stored and can be utilized for second crops in Kole lands. Also, agriculture production can be increased in both panchayaths. On completion of this project, efficient operation of the same would ensure the availability of potable water for the inhabitants living on the outskirts of Pudukkad Panchayath, Parapookkara Panchayath, Mattathoor Panchayath and also for irrigation purposes.

കേരള  
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ചാലകശക്തി



ഉറപ്പാക്കുന്നു

ധനലഭ്യത  
ഗുണനിലവാരം  
സമയക്രമം

# Preparing Good DPR in Infra Projects – Its Importance

M K Ajaya Prasad

Project Manager – Appraisal Division

For making a project successful, a blueprint consisting of a detailed and elaborative outline of the project along with resources and tasks required for its implementation and the operational process has to be prepared. Such a blueprint is called Detailed Project Report (DPR).

A DPR is the output of planning and design phase of a project. It is a detailed plan indicating the overall programme of the project including the different roles and responsibilities, the activities and the resources required, policy guidelines and its impact on the project life, financial viability of the project, and details regarding risk management and risk mitigation. It is the basis for specifications, contract drawings, detailed technical feasibility, and

implementation of the project from a practical point of view. It should also highlight the nature of inherent risks and potential external risks which will influence the project along with their mitigation measures. Thus, a DPR depicts a practical viewpoint in the implementation of the project.

The factors used to measure the success of project are:-

1. Whether the project was completed on time.
2. Whether actual cost of the project was within reasonable limits of escalation.
3. Whether after completion, the project was able to deliver the products of desired quality and adequate quantity to the client's satisfaction.

Structure of a Detailed Project Report

A DPR must include the following information.

- An Executive Summary
- Salient Features
- Introduction & Scope including project background
- Project Feasibility Studies including Requirement Analysis
- Various Surveys & Investigations
- Functional & Engineering Design and its Feasibility
- Financial Estimates including project finances and its sources
- Risk Assessment and Risk Mitigation
- Project Management including roles and responsibilities of personnel
- Contract Management including implementation schedules and Quality management



- Government Approvals including statutory clearances
- Operations & Maintenance Plan

## Elements of DPR

The basic elements which should be present in a DPR are:

1. Basic information and objectives of the project: A project report must furnish details about the project and the sector to which it belongs. It should also contain the reasons for starting the project and the intricacies involved in its implementation.
2. Organisation particulars: The project report also needs to state information about the organization/agency that has initiated the project idea and the details on ownership and their financial standing.
3. Attributes of the project: It must include the details of the project, such as:
  - Site location
  - Sources of raw material
  - Fuel and energy requirements
  - Labour requirements both skilled and unskilled
  - Technology requirements and its feasibility
  - Production requirements
  - Marketing techniques: The detailed report must include the marketing strategies considered while marketing the

product, as the case may be. The expected demand for the product and the pricing, and other details needs to be added to the report.

- Financial details: The financial information viz. cash flow statements, cost, and benefit, etc. should be present so as to analyze whether the project would reap profit and is economically viable.

## Types of Feasibility Studies

### (a) Pre-Feasibility Study

A pre-feasibility study is the most crucial aspect of any project. It measures the viability of the project with respect to the real-world challenges and the benefit that it would bring to the organization. The results of the pre-feasibility study are the basic information which is taken into consideration by the decision-makers and funding agencies. It acts as a basis if an organization wants to carry out a major expansion program.

### (b) Feasibility Study

It is an analysis that takes into consideration all the economic, technical, legal, and scheduling aspects of a project. The goal is to ascertain the likelihood of completing the project successfully, within the stipulated timeline. It is used to weigh the pros and cons

of taking up the project before allocating time and resources. Thus, the aim of a feasibility study is to evaluate and then remove all uncertainties that may tend to arise in the project.

## Areas of Feasibility Study

- **Technical Feasibility** — This study entirely focuses on the technical resources that are available in the organization. It helps to determine whether the technical resources meet the capacity and whether the team is skilled enough to convert the ideas into working systems. In fact, whenever relevant risks are identified by means of a detailed technical feasibility study, the best resources can be allocated to mitigate such risks.
- **Economic Feasibility** — This assessment typically includes a cost-benefit analysis of the project. The goal of this study is to help organizations determine the viability and the probable cost and benefits associated with the project before the allocation of the final resources.
- **Legal Feasibility** — This assessment thoroughly analyses whether any aspect of the project is conflicting with the legal requirements like zoning



laws, data protection acts, social media laws, etc., and can help to save a lot of time and money.

- **Operational Feasibility** — This assessment involves conducting a study to analyse and determine whether the needs of the organization can be met after the completion of the project. It also analyses how the project plan will cater to the requirements.
- **Scheduling Feasibility** — This assessment involves undertaking a study in order to analyse and determine whether the project will be completed within time. With this, the

organization calculates how much time the project will take to complete.

### Importance of DPR

DPR is an extensive document that gives intricate details about the proposed project including the different strategies that would be taken into account in order to implement the plan. It enables proponents to obtain investors for the project as per requirement. Moreover, it will help in eliminating many future obstacles so that the project is completed on time and, helps to keep transparency about the budget among those involved in the project's

working so that the budget is not exceeded.

The key benefits of DPR and why it is essential for the successful completion of any project are:

#### 1. Tracking

The most basic advantage of DPR is 'tracking'. DPR helps the stakeholders to keep track of the progress/ proceedings of the project and the method implemented. Some items that are necessary to keep a track include tasks, issues, risks, budget, and the overall condition of the project.

#### 2. Identifies Risks

Identifying risks in time is a key step to turn any project into a success. With the right reports, it is very easy to spot a risk early and take necessary action or ask project stakeholders for help. Reporting the risks also makes it easy for the team to work on the problem.

#### 3. Cost Management

With regular reporting, the expenditure of the project can be monitored clearly, and the budget can be managed effectively with complete visibility.

#### 4. Visibility

Visibility is one of the most important aspects of project



management. Reporting increases visibility into the projects and provides full insight into how the project is performing, be it positive or negative.

### 5. Control

Needless to mention, reporting puts managers in complete control of the project. It allows them to see and analyse the progress, bottlenecks, regress of certain elements, how team members are performing, and the quality of work completed within a specified time.

### 6. Learning

Information provided by the team drafting the DPR helps the decision-makers for further course of action.

### 7. Drives project success

If in-depth reporting is done, the team members would get daily feedback, and no part of the project will be left out.

### Relevance of DPR in Infrastructure projects

Essentially, an infrastructure project starts with conceptualizing & designing the scheme based on the socio-economic factors, preparation of DPR, preparation of tender documents, calling for bids, award of contract, and finally implementation. Implementation is the toughest part and bid documents framed with loosely prepared DPR as base, makes it tougher.

In short, the DPR is a blueprint that on paper details the necessity of funding for a feasible and

desired project. The top management policy guidelines, its impact on the project life, appraisal in terms of technical & financial viability are dealt with in great detail. The DPR is the basic of-specification, contract drawings, detailed technical feasibility, financial feasibility, execution of the project with ground realities and it is a very extensive and elaborate outline of a project, including essential information such as the resources and tasks to be carried out in order to make the project turn into a success. It also addresses the roles and responsibilities along with the safety measures, if any issue arises while carrying out the plan. Hence effective measures must also be stated so that the execution of the project can be carried out hassle-free.

സമയക്രമം പാലിച്ച്  
പദ്ധതി പൂർത്തീകരണം



ഉറപ്പാക്കുന്നു

ധനലഭ്യത

ഗുണനിലവാരം

സമയക്രമം

# Risk Management

## A Managerial Process

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Risk is an uncertain event or condition that if it occurs includes a positive or negative effect on the project objectives. A risk features a cause and a consequence. When a risk occurs, it will impact the price, schedule, and quality of the project. The risk is assumed as a deviation from the desired level. It can be positive or, which most often happens, it can be negative. Therefore, the analysis of the risk is so important for project selection and coordination of construction work. Risk analysis is regarded as the analysis of adverse events even at the stage of planning and programming a construction project. This analysis enriches the decision-making process and provides additional arguments, which help to select the optimal variant of a construction project

using the multi-aspects approach.

Risk Management attempts to acknowledge and manage potential and unforeseen trouble spots that will occur when the project is implemented. Risk management identifies as many risk events as possible (what can go wrong), minimizes their impact (what will be done about the event before the project begins), manages the response to events that do materialize (contingency plans), and supply contingency funds to address risk events that truly materializes.

The chances of a risk event occurring are greatest during the beginning stages of a project. This is often when uncertainty is highest. When the project progresses towards completion, risk declines as the answers to critical issues

are resolved. The price impact of a risk event, however, increases over the life of the project.

The major components of the risk management process are depicted in the Figure - I.

### Step I: Risk Identification

The risk management process begins by trying to induce an array of all possible risks which may affect the project. Typically, the project manager pulls together, during the planning/design phase, a risk management team consisting of core team members and other relevant stakeholders. The team uses brainstorming and other problem-identifying techniques to mark potential problems.

Organizations use Risk breakdown structures (RBS) in conjunction with work breakdown

structures (WBSs) to support management teams to spot and eventually analyzing risks. The key target at the commencing should get on risks which may possibly affect the whole project, as against specific sections of the project. The use of the RBS reduces the probability, a risk event is missed. On large-scale projects, multiple risk teams are organized around specific deliverables and submit their risk management reports to the project manager.

A Risk profile is another important tool. A risk profile could be a list or also be a questionnaire that addresses traditional areas of uncertainty in an exceedingly high-risk project. This questionnaire can be developed and refined from the case studies on delays, incidents, additional financial commitments, and penalties imposed on the previous similar projects.

Good risk profiles like RBS are tailored to the type of project in question. Risk profiles recognize the unique strengths and weakness of the firm. Furthermore, technical and management risks are addressed in a good risk profile.

Usually, the personnel from the project office will prepare and maintain the risk profiles. During the post-project audit,



Fig 1. Risk Management Process

risk profiles are updated and refined. These updated risk profiles are often a robust resource within the risk management process.

The risk identification process shall not be limited to only the

core team. The feedback from the stakeholder, clients, subcontractors and suppliers also should be honoured.

The RBS and risk profiles are useful tools for ensuring no stones are left unturned.



## Step2: Risk Assessment

Step1 produces a list of potential risks. Not all these risks deserve attention, however. Managers must develop methods for sifting through the list of risks, eliminating inconsequence or redundant ones, and stratifying worthy ones in terms of importance and need for attention.

Situational analysis is the easiest and most widely used technique for risk analysis. Team members evaluate the importance of each risk event in terms of

- Probability of the event
- Impact of the event

Simply stated, risks need to be evaluated in terms of the likelihood the event is going to occur

and the impact or consequences of its occurrence.

The quality and the credibility of the risk analysis process requires that different levels of risk probabilities and impacts be defined. These definitions may change and should be fit to the specific nature and demands of the project.

The impact of the project ultimately needs to be assessed in terms of project priorities; different kinds of impact scales are used. Risk assessment scales either rank by order descriptors (Eg. Low to Very High) or with numeric weights (E.g. 1 to 5).

The assessment team is not only evaluating the severity and

probability of risk events but also assesses when the event might occur and its detection difficulty. Detection difficulty is an indicator that shows how much warning we have. It is a measure of how easy it is to find out when an event is going to happen while taking mitigation action.

Often the organizations find it useful to categorize the severity of different risks into some form of a risk assessment matrix. The risk assessment matrix is usually arranged around the impact and potential of a risk event. The matrix is represented by different color zones based on the severity of the risks. Commonly Red, Yellow, and Green is used to represent Major, Moderate, and Minor risks.

The risk severity matrix provides a basis for prioritizing which risks are being addressed. The red zone receives priority, followed by yellow zone risks. The green zone risks are typically considered inconsequential and ignored unless their status changes.

## Step3: Risk Response Development

When a risk is identified and evaluated, a decision must be made on what is the correct response to the exact event. Classification of the risk responses can be separated into Mitigating,



Avoiding, Transferring, Escalating, and Retaining.

### **Mitigating Risk**

Reducing risk is the first alternative considered. These are basically two strategies for mitigating risk.

- Reduce the likelihood that the event will occur
- Reduce the impact that the adverse event would have on the project.

Most of the risk management team should focus first and foremost on reducing the likelihood of risk events, as if successful this may eliminate the costly second strategy.

### **Avoiding Risk**

Risk avoidance means changing the project plan to eliminate the risk or conditions that lead to risk. Practically it is impossible to eliminate all risk events or to identify risks, however, some specific risks can be put off by avoiding some specific tasks before you launch the project.

### **Transferring Risk**

Transferring risk to another party is common. This transfer doesn't change the risk. Passing risks to a different party almost always result in paying a premium for this exemption.

### **Escalating Risk**

Escalating Risk is the risk when the project faces a threat outside the scope of the project as well as outside the authority of the project. Once these risks are identified the response should be notified to the manager in charge of the organization that creates a threat to the project.

### **Retaining Risk**

If the risks are so large it is not practical to transfer or reduce the event so the owner of the project accepts the risk as it assumes the chance of such an event occurring is very less. A Contingency plan shall be developed in this case to implement if the risk materializes.

### **Contingency Planning**

A contingency plan is an alternative plan that can be used if a potential risk becomes a reality. The contingency plan represents activities that mitigate or mitigate the negative impact of a risk event. The main difference between contingency plan and risk response is that the response is a part of the initial implementation plan, which means the action is taken before the risk is materialize, but a contingency plan is not part of the initial implementation plan and only goes into effect after the risk is recognized.

### **Step4: Risk Response Control**

Results of the first three steps of risk management process are summarized in a formal document called risk register. The risk registers detail all identified risks, including descriptions, category, probability of occurring, impact, responses, contingency plans, owners, and current status-which is backbone of risk management process. Risk control includes implementing a risk response strategy, monitoring triggering events, initiating contingency plans, and monitoring new risks.

Project managers need to create an environment where participants can raise concerns and admit mistakes. The norm should be that mistakes are acceptable and hiding mistakes is intolerable. Problems should be embraced, not denied. To identify problems and new risks, participants should be encouraged. A positive attitude by the project manager towards risk is the key. On large complex projects, it may be prudent to report the risk identification assessment exercise with fresh information. The Risk Register should be updated with the collective discussion of all relevant stakeholders. While this may not be practical on an ongoing basis, project managers should hold

special stakeholder meetings to review the status of risks on the projects.

The second key to controlling the cost of risk is accountability. Each identified risk should be assigned by mutual agreement of the owner, project manager, and the contractor or person having line responsibility for the work package or segment of the project.

### **How KIIFB deals with Risk Management in projects.**

Project Examination by Technical Inspection Wing are conducting based on the Quarterly Inspection Plan, which was prepared based on the Risk Analysis of the project. SPVs are not taking appropriate action to resolve the issues are noted at the time of site examinations. Some of the major issues faced are

- Conflicts arising in the Contracts due to ambiguity in the implementation of the contract.
- Project Interface issues like hindrances in getting clear site due to land-related and utility shifting issues.
- Technical issues mostly unanticipated at the time of approving the projects and the difficulty of SPVs to handle them effectively.
- SPVs are unable to handle sit-

uations requiring a higher level of technical interventions.

- Wilful default of the contractors and supervisory lapses from the part of the SPV personnel.

The projects with the above issues are identified during various examinations and Inspections of the Inspection Authority are categorized under “High-Risk Projects”.

The inspection, Monitoring, and Control (IM&C) team of Technical Inspection Wing maintains a Performance Register where the Overall Project Performance of each project is evaluated based on various attributes namely which are classified mainly into 5 categories namely

1. Project Execution Document
2. General Co-ordination
3. Quality Aspects and Documents
4. Progress
5. Inspection Status.

Based on the above-mentioned attributes, the overall risk Index calculated of each project is calculated and Quarterly Inspection Plan (QIP) is prepared based on the Risk indices.

If the overall Project Risk Percentage falls in “High Risk” category, Inspection by Chief Project Examiner and Sr Consultant were proposed.

The high-risk projects identi-

fied in such a manner are intervened in the execution stage and Risk-Based Project Intervention Meetings are conducted on 2nd and 4th Wednesday of every calendar month.

The meeting is chaired by the Chief Project Examiner in the presence of representatives of SPVs, Contractors along with the Project Management team of KIIFB. Way forward solutions are arrived at the meetings are implementation of the same is ensured through the project management team.

The Work Break Down structures of Each Project are strictly monitored and any changes in the scope of the project, time schedule, and budget of the project are ensured to be reflected in the revised Baselines.

### **Way Forward**

KIIFB recognizes that the essence of project management is risk management. At KIIFB, Risk management is taken up as an iterative process that occurs throughout the span of the project and our experience in project management clearly indicates that using a formal, structured process to handle possible foreseen and unforeseen project risk events minimizes surprises, costs, delays, stress, and misunderstandings.



## KIIFB Funded School Projects



GBHSS Vaikom



GHSS Perigome



**KIIFB Funded School Projects**

*GHSS Vechoochira*



*GHSS Charamangalam*



## Piled Raft Foundation: Economic and Effective design

Anu J S, Technical Assistant

Revising the architectural and structural drawings of the proposed structures due to changes in requirements, after the stage of appraisal and technical evaluation is one of the major obstacles faced in the several ongoing KIIFB funded projects. Hence, only preliminary estimate & BOQ can be prepared, which may have huge variation in cost at later stages.

District Hospital, Chengannur is an example of this scenario. After the completion of the structural design, reinforcement steel quantity exceeded the original BOQ of the submitted estimate.

The design review team of KIIFB had suggested SPV to look for alternate methods of foundation or optimization of reinforcement quantity. Finally, the KIIFB design team themselves redesigned the foundation and changed the 53m deep pile foundation to a raft foundation on 13m deep piles.

Piled raft foundations are typ-

ically used for large structures, and in situations where the soil is not suitable to prevent excessive settlement. Since the water table at DH Chengannur is high, these rafts should resist the buoyancy forces from the groundwater and must transmit all the net loads from the structure to the piles to be carried to deeper and stronger layers of underlying soil/rock.

The addition of piles to a raft increases the effectiveness of the foundation and can help resist horizontal loads. This will improve the performance of the foundation by reducing the amount of total settlement as well as differential settlement. Usually, the piles offer most of the stiffness same time the raft delivers additional capacity at the ultimate loading. When the piles undergo settlement at ultimate load, the raft will carry the additional load and reduce the settlement.

The soil profile at the proposed site is yellowish-brown silty

fine sand with clay content having the low safe bearing capacity and a water table was encountered at a depth of 1.5 m. grade slab was proposed since it is a B+G+5 structure with a high-water table, which can be avoided by adopting piled raft foundation.

During in-house design process, the optimum number and position of piles, pile diameter, reinforcement, and length were determined to ensure stability of the structure. In addition to this, the structural model was fine-tuned and the excess wall loads, filling loads, dead load etc. were reduced, due to which the column loads were reduced by 25%. This has in turn contributed to a reduction in the concrete quantity by 1000cum and the steel quantity by 70tons.

This KIIFB project will be considered as proof of optimization and a fine model for upcoming projects.

# Economy & Market Watch

Ajosh Krishnakumar DGM, F&A

Sooraj T V Finance Assistant F&A

In this edition of economy & market watch, we look at a few high frequency indicators of real economic activity in the country to analyse how the Indian economy has fared in the last 12 months.

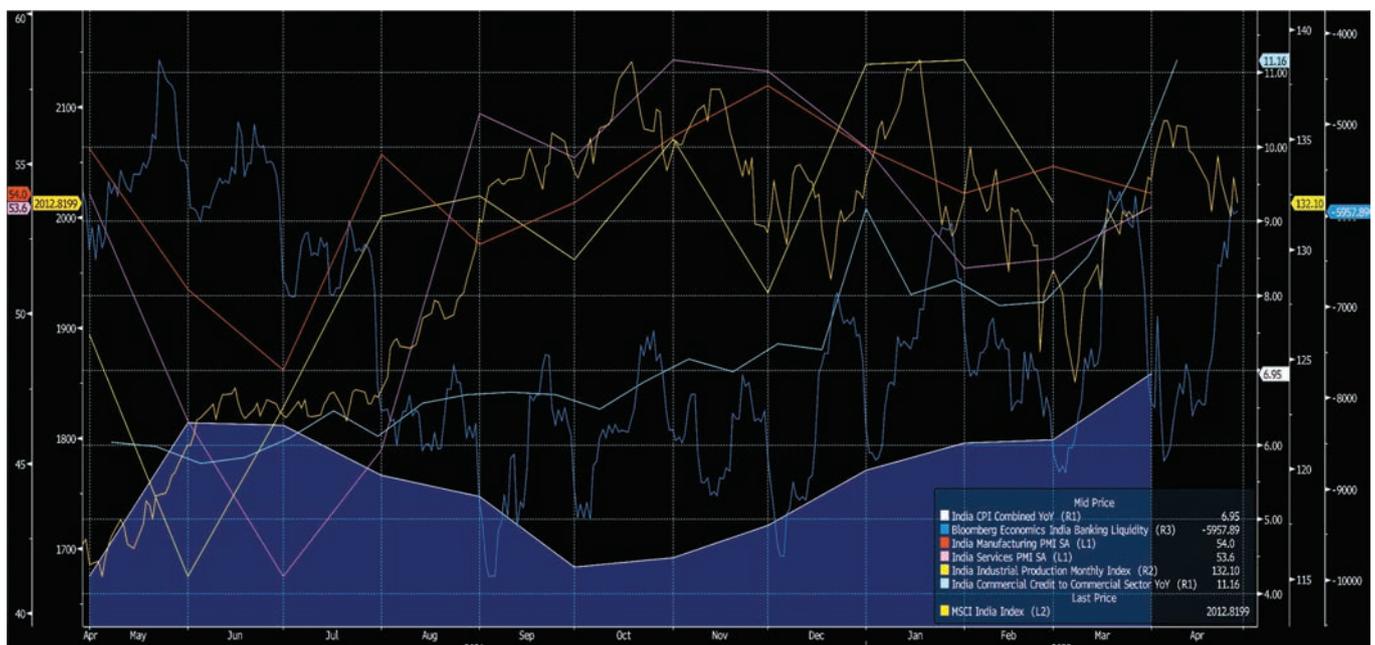
The following chart shows how the PMI data, growth in commercial sector credit, Index of Industrial Production, CPI and MSCI India Index fared in

the last 12 months.

The IHS Markit India Manufacturing Purchasing Managers' Index (PMI), Seasonally Adjusted, was at a joint past 6-month low of 54.0 in March 2022, compared to 54.9 in February 2022. However, Manufacturing PMI has been consistently above 50 for the last 6 months, indicating growth/ expansion. The index was at 48.1 in June 2021.

The India Services PMI (SA), compiled by IHS Markit, improved to a 3-month high of 53.6 in March 2022, compared to 51.8 in February 2022 and 51.5 in January 2022. It may be noted that Services PMI has also been consistently above 50 for the last 6 months, indicating growth/ expansion. The index was at 45.4 in July 2021.

Bank commercial credit growth





on a year-on-year basis had hit a 12-month high of around 11.2% YoY in March 2022, compared to 9.2% YoY in December 2021.

Regarding India's Industrial growth, basis provisional estimates of IIP for February 2022, Industrial growth improved to 1.7% YoY in February compared to 1.5% in January 2022

and 0.4% YoY in December 2021. The muted improvement IIP growth in February was primarily on account of mining and electricity, while manufacturing growth was only at 0.8% YoY.

MSCI India Index which is designed to measure the performance of the large and mid-cap segments of the Indian market was

at 2012.82 on 28th April 2022 compared to last year's close of 2036.53, indicating a moderate fall YTD for the calendar year 2022.

India's headline inflation rate based on the Consumer Price Index (CPI) jumped to 6.95% (highest in last 12 months) in March 2022, compared to 6.07% in January 2022.



### PRAVASI Chitty Statistics as of 30<sup>th</sup> April 2022

Total number of customers	110161
Total number of subscribers	41085
Total amount collected	INR 1415.31 Cr
KIIFB Deposit bond subscribed	INR 560.00 Cr
KIIFB Security bond subscribed	INR 109.10 Cr



### PRAVASI Dividend Scheme

Total number of registrations	46183
Total no. of depositors	3785
Total amount deposited	INR 297.93 Cr

GGHSS Thrippunithura



GHSS Kuzhimanna

