Analyzing and Managing Bridge Cum Bandhara Construction Project: A Review

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***Abstract*—Bridges offer many opportunities for imagination and innovation. The design should be as attractive as possible. The building must be compatible with the environment. The proportions of different parts of the bridge should be proportional. Maharashtra has tradition of constructing Bridge Cum Bandhara (BcB). In such structures bridges are used for dual purpose of crossing the river and also create a limited storage. They are popular as they can serve dual purpose of crossing as well as a water storage structure. Such structures have been used to tap post monsoon flow to create storage not exceeding 3.50m. The paper discusses the outcome of this study, reasons for good or poor performance, and difficulties in functioning, area which needs attention**

Keyword: Bridge, Bandhara

1. INTRODUCTION

Maharashtra has tradition of constructing Bridge Cum Bandhara (BCB), where bridges are used for dual purpose i.e. crossing the river and also to create limited water storage. They are popular as they can serve dual purpose of crossing as well as a water storage structure. Such structures have been used to tap post monsoon flow to create storage not exceeding 3.50 m. There is urgent need of time to save and utilize the after monsoon water that would have been flown away. In most part of the state the steams run dry only a short period after the end of monsoon. In many areas artificial water is supplied by tankers just after monsoon. It is urgent need of time to plan and extend the purpose of bridges infrastructure to harness the water. New projects as well as existing bridges can be extended to tap the water with suitable necessary arrangements. Administrative reforms shall be planned to elevate the water availability of arid areas. The Bridge cum Bandhara (BCB) can be a water storage structure can be used for ground water recharge, irrigation, and drinking or industry purpose. Because of percolation of water to ground below, it acts like a reservoir where evaporation loss is minimal. To create awareness and ease of construction for such structures, simple and ready to use standard type plan for BCB are prepared by Public Works Department (PWD) Maharashtra. It can be used for the site condition for bridge site where rock is available at shallow depth. The Type plan can be used for new bridge projects as well as to convert existing bridge into water harnessing structures

Fig 1 Bridge Cum Bandhara

1.1 Risk management

Risk management is the process which identifies and manages the risk which occurs during the project implementation. Risk are measured by the probability of occurrence and impact in the project. Compared to other construction projects, bridge construction has more uncertain factors during execution. Bridge construction has high risk because it requires high capital and lots of resources, intricate site condition and size of the project. The scope of the project is to improve the project performance by effective risk management of time, cost and quality. If risk management is not considered, the project cannot be delivered on time, budget and with the desired quality. Risk has both positive and negative impact in the success of the project. The potential risks were found through literature survey, expert opinion and

field observation. Survey is conducted to determine the risk which has highest contribution during pre-construction, construction and post construction stage and then the data is analyzed using SPSS software. The probability of occurrence and the relationships between each of the risks has been found. The last step involves providing risk mitigation measures in order to reduce time, cost over runs and improve quality of construction.

1.2 Critical Chain Management

Delay in completion of infrastructure projects in India has become normal and frequent occurrence. Such delays are caused by a number of reasons such as contractual issues, shortage of manpower, delay in obtaining environmental clearances, delay in tendering, redundant laws and rules etc. The above number of reasons are actually the limiting factors (i.e. constraints). The effect of such delays not only lead to loss of profits and cost overruns but also to a compromise in the quality of construction, disputes between contractors and buyers. On construction projects, as well as on other projects where a schedule is being used to plan work, it is not uncommon for delays to occur. It is what is being delayed that determines if a project or some other deadlines, such as milestone, will be completed late. Delays are categorized in four basic ways,

- Critical or noncritical,
- Excusable or non-excusable,
- Compensable or non-compensable,
- Concurrent or non-concurring.

2. STATE OF DEVELOPMENT

1. Puja C et. al. "Analysis Of Bandhara For Existing Bridge (Bridge Cum Bandhara)" Archives.

After rainy season many rivers flow dry hence it is important to store post monsoon flow for various purposes such as drinking, irrigation etc. Bridge cum Bandhara (BCB) is used for dual purpose of crossing the river and also creates limited water storage by creating barrier to surpasswater. This paper emphasizes the analysis of Bandhara system for different type of shape and material used. Design forces are taken for Bandhara system using IRC: 6-2010. Analysis is done with commercial software and compared with parameters namely stresses and displacement. This paper include uses and concept of gate, material and its specification. The outcome of paper shows in case of shape, curved shape is found to be more effective than flat shape and in case of material, FRP gate is found to be more effective than steel gate.

2. Prachi S. Tetu, et. al. "Bridge Cum Bandhara – A Crossing And Storage Bridge Structure" International Journal of Mechanical And Production Engineering 2016

In our country where many rivers run dry after the end of monsoon, it is a need of the day to block the post monsoon flow for drinking, irrigation etc purposes. Bridge cum Bandhara (BCB) system is a dual purpose bridge structure which fulfills both crossing as well as water retaining motives. This paper emphasizes the analysis and design of different type plans of Bandhara system for different soil strata. Design forces are taken for Bandhara piers using IRC: 6-2010 and stability of structure is checked against overturning, sliding, uplift and for maximum and minimum pressures at the base. A parametric study is carried out to decide optimum dimensions of Bandhara piers for various heights of retained water. Moreover quantities are estimated for all the type plans and compared. The study reveals that with the judicial optimum design, the cost of BCB would be well within financial norms depending upon the storage on U/S side.

3. Aakash S. Pawar "A Review of Phad Irrigation System and River Development in Maharashtra" International Journal of Innovative Research in Science, Engineering and Technology 2017

Diversion head techniques was introduce from very long years ago in the world. The one of the traditional techniques in divert water from river to irrigation land is Phad Irrigation System. In this paper we are introducing the benefits and demerits of Phad irrigation system on the basis of various reviewers and analysers.The main aim of the review study of this system was to find out improvement in methods before and after transfer of irrigation management. The paper discussesthe outcome of this study, reasons for good or poor performance, and difficulties infunctioning, area which needs attention, challenges in silting and chocking of canal etc., and the steps taken by the researcher to solve the difficulties in progress of system. The Phad irrigation system produces overcome technique to worldwide scarcity of water, food and land management.

4. Anjay Kumar Mishra, Kailash Kumar Moktan (February 2021) "Identification Of Constraints In

Project Schedule Management" International Journal of Research, Volume 7 Issue 2

In this paper according to the authors saying, in the early days management of project was of short duration with more stable environmental conditions. Whereas modern projects have complex site nature, they consume more time, cash flow is not balanced and the contractual agreements are also complex. The authors undertaken project was a rural road project namely Sankosh - Tipling Road and Bhimdhunga-Lamindanda Road in Nepal having sufficient human resources available with Nepal construction firms. The undertaken project had many constraints resulting into delay of the project.

5. Avinash Adinath Chougule, Dr. D.N.Mudgal, Prof. S. B. Patil, (July 2019) "A review paper on quantifay the different constraints for delay in infrastructure construction project work and recommending corrective measures for the same", International Research Journal of Engineering And Technology, ISSN: 2395-0056 , Volume 6 Issue 07 July 2019

In this paper identified the constraints on infrastructure construction project. The scope of the paper was to study and identify the constraints in construction industry for residential building scheme. The major root causes of financial related problems that would lead to delays in project was identified. Opinions of the parties upon the actions that they undertake to manage the financial problem was investigated. Quantitative techniques were used to analyze causes in order to give suggestive recommendations to reduce the delay problems by considering case study. Study was carried out based on literature surevy and questionnaire survey. Author concluded that identifying and removing constraints from bottleneck activities help to reduce uncertainties in construction process and increase the transparancy of project management.

6. Azar Izmailova, Diana Kornevab, Artem Kozhemiakinc (2016) "Effective Project Management with Theory of Constraints" 5th International Conference on Leadership, Technology, Innovation and Business Management, Science Direct.

The overall project consists of many critical and non-critical activities which has a clear time frame, giving a unique result in the form of products, services achievements and extending according to a predetermined plan. According to author any project task may take longer time but the entire project should complete in time. This paper introduced the implementation of critical chain project management which is a TOC tool used for planning and project management. Author used three steps i.e. i) coordination of conveyor of project with restriction, ii) time planning of project implementation, iii) using buffer for management decision. The result of applying these three steps accelarated the flow of work and completion of the project. According to authors study companies using this concept completed their project more than 95% on time and ptoject duration was reduced by 20-25%.

7. Prof. Sawant R.R "Drought Management By Economical Bandhara" International Research Journal of Modernization in Engineering Technology and Science 2021

The agriculture industry is the backbone of the Indian economy, accounting for a significant portion of the country's GDP. Agriculture losses have increased in recent decades as a result of monsoon irregularities and changes in meteorological conditions across the Indian subcontinent. Maharashtra is the most developed and industrialised state in the country, with the biggest GDP contribution to the Indian economy. The current study examines the impact of droughts on the environment, agriculture, and socioeconomic position in Maharashtra from 2011 to 2016. The state accounts for half of the drought-prone area. The state experiences a rainfall deficit once every 5 to 6 years, and severe drought conditions once every 8 to 9 years. From 2011 to 2015, the percentage of regular rainfall in Maharashtra state has gradually decreased. It demonstrates considerable geographical variability in rainfall across Maharashtra throughout the year, confirming that the divisions of Marathwada, Nashik, Amravati, and Nagpur experienced less rainfall in 2014 and 2015. From 2012 to 2015, the Aurangabad division has the lowest water availability in Maharashtra's reservoir. The entire agricultural produce in the Kharif and Rabi seasons has declined significantly in 2014-15, with a near 50 percent shortfall in pulses, oilseeds, and cotton compared to the previous year. Individuals and communities in the Cotton Belt divisions of Aurangabad, Amravati, and Nagpur are under strain to cope with drought and its repercussions. In comparison to the years 2011 to 2014, there were more farmer suicide instances recorded in 2015

3. CONCLUSION

All Because of the availability of surface water deployed in dams for household, agricultural, and industrial needs. As the severity of the drought worsens, it has a direct impact on the state's agricultural industry and economy. People from drought-affected areas began migrating to urban regions in other parts of the country in search of work. Drought impairs agricultural productivity, and the balance between supply and demand for agricultural goods is disrupted, leading to higher inflation. The study's findings suggest that in the early days management of project was of short duration with more stable environmental conditions. Quantitative techniques were used to analyze causes in order to give suggestive recommendations to reduce the delay problems by considering case study. Authors concluded that identifying and removing constraints from bottleneck activities help to reduce uncertainties in construction process and increase the transparancy of project

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7. Prof. Sawant R.R “Drought Management By Economical Bandhara” International Research Journal of Modernization in Engineering Technology and Science 2021