

CS-240 Japanese Construction Technology and Management Applied to a Bridge Project in India

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1. Introduction

Obayashi Corporation (the Corporation) contracted the construction of the "Indo-Japan Friendship Nizamuddin Bridge" (the Project) in India in 1996, which was the first civil infrastructure project granted by the Japan's ODA. The Project was planned to replace the deteriorated existing bridge with the new bridge.

It was also the first project for the Corporation in India, and none of the Japanese contractors had ever contracted road bridges in India before. Therefore, local contractors were unfamiliar with Japanese contractors, construction management style, technology, nor culture.

This paper will report subcontractor evaluation criteria, Japanese construction technology and management applied, and the impact of our performance on the Indian construction industry.

2. General Information about the Project

The Project was to construct a road bridge on the National Highway No.24 (Photo-1). The general information about the Project is listed below.

Bridge Length: 551.2m (42.4 m @ 13 spans)
Bridge Width: 22.6 m
Superstructure: 10 PC girders / span
Foundation: Open caisson(Oval Shape 15m×7m)
Client: The Ministry of Surface Transport,
the Government of India
Consultant: Nippon Koei and
Katahira Engineers International
Construction Period: 2/7/1996 – 3/15/1998 (25months)
Contract Amount: ¥ 2,601 million
(about US\$ 21.7 million)

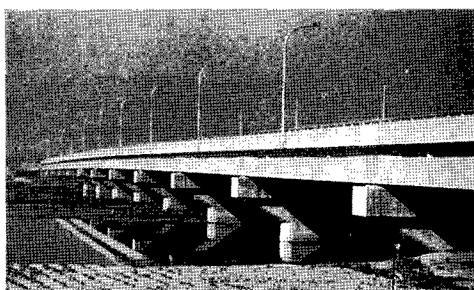


Photo-1 General View of the Project

3. Short Construction Period and Severe Working Conditions

The construction period was short in terms of the project scale. In fact, another concrete bridge project, which was similar in size and located about 2 km away from the Project site, took about 6 years for completion by a local general contractor. Therefore, the working of day/night shift and 7 days a week was essential right after the commencement day of the Project in order to accelerate the progress.

The working condition was severe in climate; i.e. 45°C from April to June, more than 90% of humidity from July to September, and near 0°C during January. Furthermore, local disease such as Dengue Fever and Malaria hit local people. Some workers and local engineers left the site for a while because of local disease. The said conditions made the productivity of construction lower.

4. Finding Contractors and Setting the Evaluation Criteria

In order to find out competent subcontractors, many interviews were made to local contractors. These contractors were ranging from top 5 general contractors in India to a small business contractor in New Delhi. After interviews, evaluation criteria were formulated for subcontracting. The items of evaluation are shown on Table-1.

Table-1 Subcontractor Evaluation Criteria

No.	Item	Importance
1)	Quoted price	◎
2)	Similar work experience	◎
3)	Mobilization capability	◎
4)	Knowledge of the site condition	◎
5)	Financial Position	○
6)	Personnel on site	○
7)	Documentation / presentation	○
8)	Location of headquarters	○
9)	Function of Delhi local office	○

Key Words : Management, Jack down System, Overseas project, Subcontractor evaluation
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5. Troubles of Subcontractor's Work

Even though we were confident of the above evaluation, the subcontractor's performance was much less than our schedule at the first 6 months. These troubles were, delayed mobilization of major construction machines, poor quality of steel form work, frequent breakdown of machines/equipment, a loss time between a preceding work and a successive work, etc. Those troubles caused 3-month delay of the schedule.

6. Jack Down System Applied for Open Caisson, First in India

A jack down system was applied for caisson-sinking. Six numbers of a 250-ton jack were applied to give vertical pressures from the top. The system was newly introduced to India. **Photo-2** shows the caisson sinking applied to the Project.

The jack-down system was so new in India that local engineers and labors engaged in the system took much time to be familiar with the system. However, they gradually came to understand its operation, and finally were able to manage the system by themselves under the supervision by the Japanese specialists.

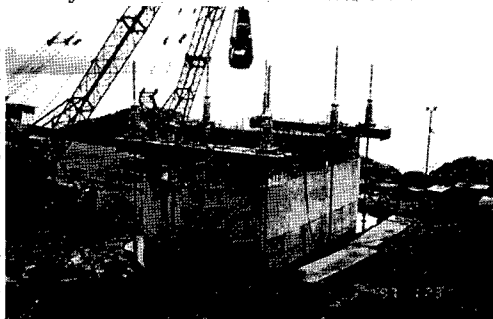


Photo-2 Jack Down System

7. Japanese Management Style Applied

Any delay, if occurred, should be immediately reported, the reason of it should be investigated, and the number of days required for recovery should be estimated. Therefore, communication between the Corporation and subcontractors were essential.

In order to facilitate such communication, daily meetings attended by the Corporation staff and subcontractors' engineers were held every evening to confirm the items listed in **Table-1**. The items would be normally discussed if the Project were held in Japan. However, the said meeting was new to local subcontractors, and was effective in order to avoid idle time among consecutive work items.

Table-1 Items Discussed in the Daily Meeting

<i>For today's work</i>	<i>For tomorrow's work</i>
Confirmation of completion of today's work item	Tomorrow's work item The name of supervisor assigned to each work item The number of workers assigned to each work item The item and number of major machines applied to each work item

Further to the daily meeting, weekly meetings were also held. This meeting was aimed to discuss anticipated future problems and to set up solutions. The meeting was effective, especially for inexperienced works for a subcontractor, such as making a suspended working platform under PC girders. The subcontractor came to understand what the Corporation intended to do.

8. Impact on the Indian Construction Industry

The jack down system gave much impact on the Indian construction industry. Many Indian bridge and road engineers visited the site, and asked technical questions of the system. The system has been repeatedly reported by the local Government engineers to several symposiums and/or seminars in India since the completion of the Project.

9. Conclusion

The Project was successfully completed two weeks ahead of the schedule. The jack down system contributed to its early completion, and local people attributed its early completion to the system. However, Japanese management system such as daily/weekly meetings as well as elimination of idle time also contributed to the early completion. Even though the said Japanese management did not require any special knowledge, the emphasis should be given to the point that the daily practice of the said management has been hardly made in India and our target was to make it done precisely. The Japanese construction management has been transferred to the Indian contractors engaged in the Project, and is hoped to further enhance the improvement of the Indian construction industry.