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Building Project Execution Challenges and Some Remedial Measures

Prof. Ajay Singh[1], Swati Dhiman[2], Ravi Kumar Choudhary[3]

[1]Prof. Ajay Singh, HOD Department of Civil Engineering, Roorkee Institute of Technology, Roorkee
[2]Assistant Prof. Swati Dhiman, Department of Civil Engineering, Roorkee Institute of Technology, Roorkee
[3]Assistant Prof. Ravi Kumar Choudhary, Department of Civil Engineering, Roorkee Institute of Technology, Roorkee, Uttrakhand, India

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Abstract - *Execution of building projects starts in second stage after preconstruction stage. During execution of projects, planning stage plays a vital role for smooth execution of projects. Different types of errors or ignorance are responsible for many types of hurdles, which are faced at the time of executions of works such as; non availability of complete site investigation data, missing drawing detailing, omission of approvals /no objection certificates from appropriate departments, not obtaining prior approval of maps from local authorities. Ignorance of bye laws of municipal corporations, adopting inappropriate specifications, ignoring restrictions of working hours in restricted areas (like: works in army stations and industrial areas), inaccurate bill of quantities, ambiguity in description of items and mode of measurement, unclear description of some conditions of agreement etc. Apart from this during execution non maintaining proper records, providing oral instruction at site, not matching site conditions from provisions taken in drawings and taken in preparation of estimates, are further challenges that affects the smooth execution at site. Planning and scheduling are also failed, if the decisions are delays in resolving above mentioned problems and give rise to litigations and arbitration cases between client department and execution agencies. These problems may be resolved easily or minimized, if at most care is taken in deciding specifications, collection and utilization site data, describing item's language with clarity, obtaining all necessary approvals from appropriate authorities, making clarity in all clauses and conditions of contract agreements. Problems may further be minimized by giving timely and appropriate decisions during execution of works, maintaining well coordination between different execution agencies. This paper will describe some important aspects necessary for smooth execution of building works.*

***Key Words*: Execution, Site Investigation, Specifications, Estimates, Local Authorities, Utilization, etc.**

1. INTRODUCTION

Smoothly execution of a building project is a great challenge for planners, designers, site engineers and decision makers. Every decision affects the progress of work such as; selection of right specifications, evaluation and proper utilization of site investigation data, adoption of appropriate technologies, clarity in agreement conditions and description of item of works are some issues which require at most attention. Timely decisions and approvals add to smooth execution of works. Enforcing labour laws and maintaining hygienic working conditions, following safety and security standards are equally important for maintaining healthy practices and good environmental conditions. Every aspect should be carefully considered which is important for planning and execution of building projects. Award of work to different agencies and coordination between them in such a way that the progress of work of each other is not affected is a great task, which requires good human relations, knowledge and managerial skill. Measurement of items as per standard norms, following proper specifications, getting timely test results of materials to be used and timely payments to the contractors are also important factors helpful in progress of works. Modifications in drawings should be done before execution of relevant items to avoid the cost of redoing. A few such aspects are being discussed in the paper.

2. Acquiring Land and Collection of Site Data

The foremost task is to acquire land for any building project. Then to know the site conditions by acquiring of useful site data for design and execution is an essential part. Obtaining the following site specific details and data are necessary:

- Sub soil investigation data such as; type of soil, depth of different soil strata, bearing capacity of soil, basic properties of soils.
- Data of infrastructure facilities available at site such as; approach roads, water supply lines and sewer line, electric lines, materials storage space covered and uncovered etc.
- Seasonal variations of ground water table.
- Contour map and key plan of site showing position of trees, and infrastructure facilities.
- Existing rain water drainage system.
- Highest flood level of nearby rivers ever recorded with its frequency (if available).
- Metrological data of the region such as; temperature variations, highest wind velocity, seasonal variation in humidity, maximum rainfall intensity with duration.
- Suitability of water for construction works.
- Marking of safe zone from soil stability point of view.

- Availability of local materials including its suitability, quality and rates.
- Availability of local tradesman for execution of works.
- Type of geological formation of rocks in the area.
- Earthquake prone zones.
- Past history of failure of buildings, if any.
- Solid waste management system available in the locality.

All such data are useful for a planner, architect, estimator and design engineers of the project to take appropriate decisions for an efficient planning. This will help in avoiding the site specific uncertainties.

3. Approvals from Concerned Authorities

As per requirements planning for buildings and amenities is done including works like; electrical, plumbing, water supply, sanitary, communication, water supply over head tanks, roads, drainage, horticulture development, rain water harvesting, fire fighting scheme etc. Architectural and structural drawings along with specifications are prepared. Before preparation of bills of quantities and estimate the following approvals from concerned authorities are needed:

- Approval of map and drawings from municipal bodies or development authorities, which includes the approvals of building layout, architectural and structural drawings along with details, installation of lift or escalators as per bye laws.
- No objection certificate from forest department.
- No objection certificate from environment department or pollution control department.
- Approval of fire safety department along with fire fighting scheme to be adopted.
- No objection certificate from ancient monument department (if needed).
- No objection certificate from traffic control department.
- No objection certificate from water supply and drainage departments.
- No objection certificate from electrical department.
- Bore well registration certificate.
- Permission for excavation and royalty payment, if applicable.
- No objection certificate for installation of electric sub-stations.
- Hording location approval.
- No objection certificate for rain water harvesting.
- Registration of principal employer under labour law from labour department.
- Certificate for all electrical installations.
- Approval for connection of water supply, sewer lines, electricity and communication lines.

Prior approval of all the above mentioned items will help in minimizing many barriers during project execution.

4. Accuracies in Estimates

Smooth executions of works are mainly dependent on accuracy of preliminary and detailed estimates (which are based on drawings, specifications and site data). Preliminary estimates are generally prepared for obtaining financial sanctions and fund allocations. These are the backbone of all necessary execution plans. Omission of any needed items may affect many decisions, as each item has a financial implication. Financial limits of detailed estimates are also decided by the preliminary estimates of the works. Many times the estimators miss some important provisions like; rain water harvesting, grassing, tree plantations/shrubs and potted plants, vertical plantations, central call bell system, third party quality assurance, ramps, toilets for physically challenged persons etc. and addition of these items during execution may give rise to extra items or litigations between client department and contractors. One more important factor in any project is, its completion time. If the completion time allowed is more than one year, then per year cost escalation clause should be provided in the contract agreement. This provision should always be added in the estimates also. All possible items related to energy efficiency improvement measures and use of green materials, should be mentioned in the drawings, specifications and included in the estimates If some specifications are not be sketched in drawings, they should be covered in the form of notes along with drawings. Estimate items should cover all possible items with clear descriptions and accuracy in take off.

5. Establishing on Site Test Laboratories and Manufacturer's Certificates

For measure projects, material testing laboratories are established at site for conducting day to day tests, while some tests are conducted at test houses or in laboratories. But for some supply items, site engineer may ask for the manufacturer's test certificate of that particular lot. Many a time such a situation arises that the work has been executed and test results are being evaluated later on (for example in case of laying concrete). In such cases problems arises, if the samples are failed, the works have to demolish and redone. This may be a great cause of hindrance, time delay and litigation. To avoid such situations some prior tests of sample tests may be helpful in solving the problem by reducing unexpected results. Sometimes below standard materials like sand, bricks etc. are dumped at site and on failing in tests these materials has to remove. This situation gives rise to disputes and delays the projects. As far as possible the material samples should be tested before delivery of materials to site.

6. Quality of Supervision

For good supervision site engineers should be experienced. They should follow all the norms and specifications for maintaining the quality of works. They should take prior approvals of extra items, if not included in the agreement. They should study the drawings and if there is an ambiguity, they should get it corrected well in time. They should maintain all the necessary records of site work. They should certify the bills after ascertaining the quality of works. They should keep watch on workmanship of the works. As far as possible zero defect policy should be followed. For meeting uncertainties they should have a contingent plan to deal with the situations. Appreciation for good works is also the key of success. All possible planning or modification in scheduling should be done at appropriate time. To avoid litigations timely decisions and approvals are needed. The work should not be held up due pending decisions. A most important aspect is maintaining coordination in all execution agencies, so that the works of one agency does not suffer due to delay in works by the other agencies. Every possible help should be available to supervising engineers from the higher authorities. They have to take care of labour welfare also, which includes their safety measures, payment of fare wages, providing hygienic living conditions, first aid facilities etc. Good supervision always improves the construction quality, reputation, good will and good human relations.

7. Project Works Insurance

Normally, the insurance cost for construction projects in developing countries is much higher. Their policies cover the compensation for risk of accident, tsunami, floods, theft, fire etc. Being higher insurance cost contractors try to avoid it. But in case of untoward incidence, the contractor has to bear heavy financial losses and on the other hand the progress of work is badly hampered. All programs and targets already set are disturbed due to financial losses. The value of insurance is realized at this time. However, for claiming losses from insurance company, all necessary site records should be properly maintained to fulfill necessary requirements of claims. A duplicate copy of records should be maintained at head office also. Timely reporting and evaluation of losses is also essential. So, project insurance is very useful for smooth running of a project and avoiding losses on account of uncertainties.

8. Sub-contracting the Works

Many a times, the main construction agencies, use to award the works to some other contractors, without prior approval of the client department. These sub contractors mostly are not bound with any agreement with client departments, hence they are not serious about the instructions given by the client department. Thus the quality of the work may hamper and could be a cause of conflict between client department and contractors. As far as possible this practice of subcontracting should be avoided. If it is at all essential, prior approval of competent authority should be obtained.

9. Changes in Regulations

There should be a clause regarding change in Rules and Regulations from time of time, clarifying the responsibility of bearing extra financial or social burden if arises due to these changes during the currency of works. For example, change in rates of tax structure, banning the quarries from certain areas, minimum wages to labour, labour laws etc. may affect the cost of construction. This clause will help in sorting out the disputes, if arises on these accounts. Regulations may change at any time for transporting construction materials from one state to another state. Clarity in agreement clauses may resolve the problems.

10. Compensation to Contractors

A clause of this affect should be provided in the works agreements, so that the compensation to contractors may be paid for all hindrances and delays caused due to improper decision of client departments or causing delays in giving decisions. On the other hand some incentive clause should also be there for good works executed by the contractor and handing over the structures to the client departments before completion time allowed. This will boost the working efficiency of the contractors and certainly saving in the useful time. On the other hand financial penalties should be avoided in case delays in construction which are due to unavoidable circumstances beyond the control of contractor, such as heavy flood at site, extreme weather conditions etc.

11. Defect Liability Period

Generally, defect liability period after handing over the project is kept 6 months to one year. During this period if any defect is observed, the contractor should be informed well in time in order to rectify it. Contractor's security money is released after successful completion of defect liability period. Many times client department informs the contractor to rectify the defect at the time of releasing the security money, even though defect liability period is over. This further give rise to the disputes and litigations and should be taken care on time.

12. Arbitration

It is a dispute solving process as per clause of contracts. In case of disputes between client department and contractor sole arbitrator hears both the parties and his decision will be binding on both the parties. If the department does not allow the arbitration case, the contractor may go to court of law to decide the arbitrator for hearing his case. Main causes of arbitration cases are ambiguity in description of items, mismatching of architectural and structural drawings, execution of extra items not included in bill of quantities of

agreement, penalties to contractor for delays and not allowing extension of time without penalty, oral instructions at site, missing NOC's from respective departments and delay in processing, change in tax structures, delays in payments, not providing all the details and drawings on time to the contractor etc. Delays in test reports of materials and holding the works on this account may also give rise to disputes. As far as possible all care should be taken for smooth execution of works. Non coordination between different agencies may also give rise to disputes. For mass works, help of third party for quality assurance may be taken. Priorities and sequence of works should be decided judiciously taking contractors in confidence (if possible). All the site related problems should be solved as soon as possible. All related documents and measurement records should be properly maintained at site. The arbitration cases may be reduced by taking care of all possible measures related to site problems by proper and timely judgments.

13. CONCLUSIONS

Major building projects execution is a highly challenging task, as every improper or delayed decision disrupt the progress of the project and may cause of disputes. All precautions should be taken at every stage like; in collection of site data and information, planning, design and detailing of projects, obtaining necessary approvals and NOC's, preparation of estimates, allocation of funds, phasing of projects, deciding priorities, preparation of agreement documents, awarding of works etc. Execution plans and schedules should be prepared carefully after including all possible uncertainties. Inter personal relations between client department and contractors should be maintained good. Subcontracting should be avoided. Decisions should be given in writing and well in time. Land should be acquired before award of work. Ambiguity in drawings, works items, languages of item or agreement should be resolved before execution of works. So, if careful and thoughtful correct decisions are taken at appropriate time the progress of works will go ahead smoothly. Efforts should be done to execute quality work following zero defect programs by good supervision. In case if sub-standard work found at any stage, it should be immediately rejected and intimated to the contractor in writing for taking corrective measures.

REFERENCES

[1] CPWD, New Delhi Plinth area rated 2019.
[2] Construction Project Scheduling and Control 3rd Edition by Saleh Mubarak.
[3] Faster Construction Projects with CPM Scheduling by Murray Woolf.
[4] Practical Schedule Risk Analysis by David Hulett.
[5] Integrated Cost and Schedule Risk Analysis by David Hulett.

BIOGRAPHIES

Prof .Ajay Singh is working as Head of Department in civil Engineering at Roorkee Institute of Technology, Roorkee. He has vast experience of R &D and landslide control measures, construction sites, cost economics and analysis of buildings and roads during his services in CBRI Roorkee.

Miss Swati Dhiman is working as assistant prof. civil engineering department at Roorkee Institute of Technology, Roorkee.

Mr. Ravi Kumar Choudhary is working as Assistant prof. civil engineering department at Roorkee Institute of Technology, Roorkee.