

DIFFERENT CONTRACT SYSTEMS

- *Evolution of Construction Contracts*
 - *Need for Suitable Forms*
 - *Evolution*
 - *Specific Items*
 - *Discrepancies in the Contract Agreement*
 - *Advance for Mobilising Plant & Machinery*
 - *Excess / Deficit Over Tendered Quantity*
 - *Period of Completion*
 - *International Competitive Bidding (ICB)*
 - *Local Competitive Bidding (LCB)*
-

EVOLUTION OF CONSTRUCTION CONTRACTS

Introduction

The system of construction contracts in India is based on or derived from the UK System. It is permissible by law to rely on and cite English case law in all applicable situations. Likewise, the Construction Industry is also patterned on its counterpart in the UK which utilises standard contract documents as far as possible. The professional institutions have evolved standard terms and conditions, which are generally acceptable to owners and contractors alike. In the buildings section of the Construction Industry, the first of the standard contracts was evolved by the Royal Institute of British Architects in 1902. This standard contract has undergone several editions. Although still referred to as RIBA Contract, the documents are prepared by a joint Contracts Tribunal, which is a forum of representatives of architects, building contractors, quantity surveyors, municipal authorities, specialist sub-contractors and lawyers. The Tribunal has also drawn up a standard form of sub-contract for use between the main contractor and the sub-contractors. However, for engineering works, there is more likelihood of employers preparing adhoc contracts. The Institutions of Electrical and Mechanical Engineers have also drawn up standard contracts for undertaking overseas works, referred to as 'Export Contracts'. Altogether, the system of contracting is well established, mutually acceptable and respective rights and obligations are honoured. The owners rely on consultants to sort out practical problems which arise during execution of contracts and the general experience is that they carry out their task satisfactorily.

Conditions in the USA, with its multiple agencies – Federal, State and local – are more similar to those in India. While various professional institutions have evolved standard forms, attempts to adopt such forms have been, by and large, not quite successful. Each organisation tends to evolve and adopt its own forms, although in practice, some of the terms and conditions, especially those relating to legal rights and liabilities, are fairly similar.

NEED FOR SUITABLE FORMS

The Tender document is the life-line of a project and it acts like a computer. If the input is appropriate, it gives best results; otherwise, the consequences are disastrous. The success of execution of any project lies on proper documentation at the tendering stage and unless this is correct and balanced from the point of view of both the parties, the results may not be upto expectations. A properly worded contract which is equitable and fair to both parties and which takes into account all factors affecting the execution of a project, is the first vital step for a successful and result oriented contract management.

Though several major projects were taken up for construction immediately after independence, the tender documents, more or less, retained their pre-independence format and content. They were mostly short forms, designed mostly to safeguard interest of the Government and stipulating materials and equipment to be supplied. The provision about quality was that the work should be done to the satisfaction of the Engineer and no quality standards were specified. Most of these earlier forms vested absolute powers for interpretation of the contract in the Engineer. The contractor had practically no say in the matter and was expected to comply with all orders of the Engineer. The agreements were mostly one sided: the contractor had virtually no rights but only responsibilities to execute the work as per the dictums of the engineer.

An interesting study, relating to a clause by clause analysis of construction contracts, has been reported by C. Williams Ibbs and David B. Ashloey. They studied the impact of various construction clauses, on a variety of performance criteria, such as cost schedule, quantity and quality through a mail questionnaire survey followed by holding detailed discussions with senior executives concerned with the projects. The salient conclusions are reported below:

- a. The principal clauses, causing disputes, fell under three groups or families; namely;
 - i. Contract variations or adjustments (change family)
 - ii. Physical work (work scope family), and
 - iii. Control and reporting aspects (project control family)
- b. The change family related to the methods and mechanisms for dealing with changes in design, construction time schedule or quantities as also the changes arising from errors and omissions in clauses relating to the scope of work. Differences relating to such changes lead to major disputes in a contract which affected the project performance negatively.
- c. The work scope family was essentially to accept those clauses which covered the following parameters:

- i. Physical work to be carried out
 - ii. Minimum standards acceptable
 - iii. Procedural guidelines for performing the work, and
 - iv. Technical documents depicting the work e.g. drawings and specifications
- d. The project control family established and defined the following:
- i. Systems, methods and personnel necessary to monitor and approve project performance (in terms of cost and schedules).
 - ii. Methodologies to conform compliance with contracts.
 - iii. Methodologies to correct unacceptable variations in the contract.

A clause by clause analysis gave the following indications:

- i. The owners gave more emphasis to design changes, work scope definition and schedules; the contractors stated that documents and definition of costs were the most troublesome clauses. Both, however, considered that clauses relating to 'work scope' definition and 'design changes' needed improvement.
- ii. The perception of risk varied between owner and contractor with reference to the same clauses, specially regarding the work scope definition, warranties, design revision and sub surface work. Contractors considered these clauses as high risk areas, but owners did not share this view.
- iii. The contractor would like the owner to assume full risk in respect of work scope, sub-surface, force majeure and design revision, while the owners want the contractors to share the risk to a substantial extent in case of work scope and sub surface investigation.

As the size and complexities of the projects increased in India, it was observed that the old forms were no longer applicable. The contract document needed to be broad based considering the large requirements of various types of natural and manufactured items of materials needed for execution of projects. The technological improvements that were brought about after the Second World War and the steady advances made in the development of new equipment and construction technology also produced contractors with different specializations to suit different jobs, and in this background, the old contract forms became practically obsolete. Further, a number of major projects were stalled on account of disputes between owner and contractors, and settlement of these disputes through departmental procedures, arbitration and litigation took a very long time. It became obvious that the contract forms in vogue needed drastic changes (instead of adhoc additions/alterations) and that there was a need to make them more equitable and fair to both the parties. There has, more or less, been a unanimous demand from the contracting community that the large reservoir of arbitrary decision-making powers vested in the engineer-in-charge be thinned down and these should specifically be limited to technical matters involving quality, layout, designs and specifications. Contract

documents needed changes to obtain better results on project performance.

EVOLUTION

Every Central and State agency executing works has its own standard formats for call of tenders and these have been used in the formulation of contracts. The earlier forms in use were mostly for smaller works of shorter duration and whenever some difficulty arose, certain clauses of the contracts were modified to overcome the specific difficulty. Thus, with the taking up of works of larger magnitude and longer duration adhoc changes were made in the contract forms in use to be specifically applicable to a particular project. The contracting community clamoured for sweeping changes in the contract documents to cover the investments required and to obtain a smooth cash flow consistent with the works executed. They also sought to modify some of the clauses vesting considerable power and authority in the employer which was often used arbitrarily and not with discretion. Thus, a contract document which was equitable and fair to both parties became a prime requisite for smooth execution of the works as against the documents in use.

The Government also felt the necessity for preparation of such a document in the over all interest of the economy and smooth and timely execution of works. The initiative at the Central level was taken by the Planning Commission. The standard contract forms for construction works were compiled by the Commission in February, 1968. This was followed in 1973 by the Bureau of Public Enterprises which published the General Conditions of contract and standard forms for civil works in Public Sector Undertakings. In 1977, the Government of India, in the Ministry of Agriculture and Irrigation, constituted a Committee of Technical Officers to examine in detail and recommend measures for improvements in contract documents and general conditions of contract, infrastructural facilities to be provided by the project authorities, economy in project costs and speedy construction. Its unanimous report along with tender documents prepared by the Committee in 1981 was approved by the Ministry of Irrigation and Power in June 1985. During this period, major projects financed by the international financial institutions such as the World Bank, its affiliate the IDA. Indian and foreign contracting firms and their joint ventures were thus free to bid for these works subject to their meeting certain pre-qualification criteria laid down for the specific project. The lending agencies had their own guidelines for tendering documentation in which efficiency, equity and fairness were the key criteria. This called for a different type of tendering much beyond the scope of the standard forms in use. The lending agencies desired to have uniform tender provisions in all for each of the projects for which the assistance was made available. It was at this stage that the Central Water Commission took the initiative in preparing a model Tender Document for execution of River Valley Projects. The document was prepared after a review of the existing documents – both national and international – on the subject and after holding discussions with state governments, public sector undertakings and private construction firms. Before finalisation, the document was discussed with the World Bank authorities and modified where necessary to conform to their requirement. This document titled “Guidelines from the CWC on procurement under World Bank Loans & IDA Credits” that was circulated contained two versions, one to be used for International Competitive Bidding (ICB) and the other for Local Competitive Bidding (LCB), so that all types of tenders in the River Valley Sector could be covered. Since then, the document has been widely used for the execution of projects in the water resources

development sector.

In 1985, certain other contract documents also came to be prepared at the national and international levels. The National Institute of Construction Management and Research (NICMAR) prepared a Model Tender Document. The Institution of Engineers (India) prepared “Unified Contract Documents for Civil Engineering Contracts”. In the same year, the World Bank also published their “Sample Bidding” as guidelines for preparation of tender documents for works to be executed under ICB Procedure. This essentially depicted the FIDIC document for the general conditions with some amendments and additions. In July, 1987, Builders Association of India brought out a “Standard Contract Document” for adoption in the country.

In the meanwhile, a Study Team appointed by the Department of Personnel and Administrative Reforms recommended that the contract forms used in the Central PWD may be revised with a view to remove the areas of doubt and ambiguity and putting the relationship between the Contractor and the Government on a basis which will provide proper balance between their mutual rights.

This review was particularly to provide for a fool-proof agreement for recording facts, such as physical measurement, provision for increase in prices of material due to statutory changes, alterations in specifications etc. This recommendation was accepted by the Ministry of Works and Housing and a Committee was constituted by the Director General of Works, CPWD to prepare a tender document. The Committee finalized its work and submitted the new tender document in January, 1987. This document was approved by all concerned Ministries. The Builders Association of India also appreciated the new formulation as the revised form has taken into account most of their suggestions.

Since the issue of the “Sample Bidding Document”, the World Bank started insisting on individual projects to adopt the bidding document through the Model Document. The Government of India favoured a uniform approach in this regard for all projects. It did not welcome individual negotiations by the World Bank authorities with the project authorities to finalise contract documents of each project. This was also found to be time consuming resulting in avoidable delays in the execution of projects. In November 1986, the Finance Ministry decided to constitute a high power committee with members from all concerned Central and State Government Departments to draw up a model tender document for all types of civil works under ICB contracts to be financed by the World Bank. The document so prepared was to be used by all concerned with necessary modifications to suit sectoral needs. The Committee under the Chairmanship of Shri M.G. Padhye, Ex-Secretary, Ministry of Water Resources was set up by the Department of Economic Affairs in February, 1987 with representatives from Central and State Ministries and Departments and the Municipal Corporation of Greater Bombay. The Committee finalised the draft tender document in October, 1987. In the report accompanying the document, it was stated that the same document with some minor modifications can be used for local competitive bidding for large projects as well as for lump sum tenders.

While the efforts of the Padhye Committee were on, the construction industry represented to the Government the difficulties being experienced by it in the execution of major projects which were

located in far-off places without any civic amenities and requesting that certain basic infrastructural facilities be provided by the Government at such sites before commencement of the main construction activity on project structures. Further, the construction industry demanded that changes in the General Conditions of Contract be made to make them fair and equitable to both the contractor and the client.

Based on the representation, the Government of India appointed in 1987 another committee under the Chairmanship of Mr. V.A.Prakash to prepare contract documents for “All types of construction, erection etc., works including the system of sub-contracting”. This Committee examined in detail the existing documentation available in all sectors of development and also reviewed the record of proceedings of the Padhye Committee and its report.

The Committee recommended that the basic civic and social amenities have to be provided at project sites, stipulation to this effect be incorporated in all tender documents for major works. As with other Special Conditions, these stipulations would vary from project to project and project management should ensure that these were suitably incorporated. The Committee also felt that there were certain issues which could neither be covered by General Conditions nor by Special Conditions of Contract, but should be brought to the notice of project authorities. These need to be covered in the form of guidelines for efficient execution of the projects. Thus, broadly a Tender Document should cover:

- i. Information and Instructions to Tenderers
- ii. General Conditions of Contract
- iii. Tender Papers
- iv. Non-omnibus Clauses
- v. Civil and Social Infrastructure Stipulations
- vi. Guidelines on Specific Aspects

Needless to say that simply writing the best contract is no panacea. Intelligent and fair interpretation of contract is just as crucial. Nevertheless, a good starting point is to devise fair and reasonable contracts bearing in mind that what is not written in the contract often becomes more important than what is written and mutual goodwill remains the only bedrock for founding good construction. Certain additions/modifications in the existing clauses of the General Conditions of a Contract would also be called for to achieve the objectives indicated below:

- i. An equitable document fair to both the parties to a contract.
- ii. Timely completion of the projects by incorporating specific and clear provisions.
- iii. Rationalisation of the use of discretionary powers vested in the Engineer-in-Charge.
- iv. Containing arbitration/litigation to the extent possible, and
- v. Contract clauses aiming at procedures designed to reduce the scope of motivated action on

the part of the owner.

SPECIFIC ISSUES

As mentioned earlier, precise, complete, clear and equitable provisions in the tender documents, capable of unambiguous interpretation and which facilitate the decision to automatically flow within the contract agreement, place both the owner and the contractor on an equal footing. The contract document should also give detailed information in respect of soil and other technical data and on levy of additional taxes / duties during the execution of the works. These are of crucial importance for obtaining a competitive and economical offer from contractors. Such a document will go a long way in reducing disputes between the owner and the contractor.

The subject had been a matter of debate at various seminars and conferences organized by NICMAR, Planning Commission, CPWD, Institution of Engineers, Builders' Association of India etc. The main issues that crystallized during debates are stated hereunder:

Possession of Site: General conditions of contract followed in our country generally do not provide for reimbursement of the expenses incurred due to failure on the part of owner to give possession of site in time, and only extension of time is granted. In order to make this provision equitable, the contractor should be compensated appropriately for the expenses incurred due to delay in handing over the site as provided in the general conditions and followed for projects financed by the World Bank. Each location of site must be handed over at least one month before the actual start of the work on that location to enable the contractor to install his equipment and other temporary construction.

Information Data

A contractor needs to be suitably compensated for the extra work involved on account of change in the data from that originally supplied by the owner. If change results in specific reduction of any item of work, the payment in respect thereof may have to be appropriately reduced taking into consideration the expenditure which the contractor has already incurred and the likely savings he may make.

DISCREPANCIES IN THE CONTRACT AGREEMENT:

In the event of discrepancy within any one of the above documents, the decision of the Engineer-in-charge is taken to be final and binding and the contractors regard this as a one - sided and unfair provision in the agreement which leads to avoidable disputes. In this context, It would be desirable to give due consideration to the view points of contractors and a final decision should only be arrived at after mutual consultation. The following cardinal principles are suggested in this connection.

- a) Structural drawings should take precedence over architectural drawings
- b) Main drawings should take precedence over the typical drawings
- c) Clauses of respective trades should take precedence over the general clauses.
- d) Any incidental details left out in description of items / or in the drawings but necessary for the

execution of works, should be taken care of by the contractor without any extra payment.

Quality Control: Two clauses have contributed to many disputes mainly because of possible misinterpretation. One relates to the final and binding decision of the Engineer-in-charge relating to the quality of the material as well as works and the other for making good at the cost of the contractor, defective work / material inadvertently passed for payment.

In order to overcome the above difficulty, following suggestions are made:

Material bearing ISI certification or obtained from selected reputed manufacturers along with their catalogue number be used.

Where the above is not possible, samples of the materials should be got approved by the Engineer-in-charge.

Later on, in the event of defects being detected in the materials should be got approved by the Engineer-in-charge.

Later on, in the event of defects being detected in the materials which were obtained from a specific manufacturer, it is for the owner to take up the matter with the supplier for replacement and the contractor need not be questioned.

Payments: Delays in payment seriously affect the cash flow of contractor and in many cases may even delay the progress of work. It is, therefore, necessary that some compensation should be made to the contractor for delay in payments which would also make the engineer-in-charge of measurements and payments, more alert. In the case of delays of final payment by more than 6 months from the date of completion of work or the the date of making the claim, whichever is later, interest at the market rate should be paid.

ADVANCE FOR MOBILISING PLANT & MACHINERY:

P&M advance may also be extended to a contractor whose P&M is covered by a Bank Guarantee for an equivalent amount, provided, it is not removed from the site by the contractor, except with the prior approval of the Engineer-in-charge. The advance may be paid in stages to conform to the receipt of P&M at site. Repayment of mobilization advance may be allowed to be made in stages to conform to the mobilization at different stages.

The contractor may be given secured advance on non-perishable materials brought to site at the rate of 75 per cent of the total value of such materials, provided the quantum of materials brought to site is as per the approved Annual Construction Programme. For evaluating the total cost of such material, the market rate prevailing at the time and applicable for the specific area (either CPWD Schedule of Rates or local PWD Schedule of Rates) may be taken into account.

When materials on account of which a secured advance has been paid are incorporated in the

work, the amount of such advance may be allowed to be deducted from the next payment made under any of the clauses of the contract.

Additions, Omissions and Variations: Changes in the scope of contract due to:

Inadequate formulation of the feasibility report based on insufficient technical data.

Adverse repercussion of (i) detailed project report.

Unexpected and unforeseen circumstances.

Reduction / changes in specifications and design of structures at a later date resulting in excess / reduced quantity of work.

In the agreement signed by the contractor, since there is a clause which provides that the contractor shall carry out excess quantity of work over and above the agreed quantity, if so directed by the Engineer-in-charge, he is bound to carry out the excess quantities. This is considered as a “one sided” condition. The quantum of work involved in such a case cannot be anticipated in advance and the contractor may find himself in a tight position to mobilize additional resources at short notice. Even if the contractor is comfortably disposed with adequate resources at his command to undertake the job but has no inclination to adhere to the directions given by the Engineer-in-charge, he may refuse to carry out the excess work even though a suitable clause exists in the agreement compelling him to do the work. This is viewed by the client as a serious obstruction to the progress of the work and penalty clauses are invoked on the contractor which force him to go to a court of law. The court, in one such case, made the following observations:

“Any agreement stipulating that the contractor shall carry out the excess quantity of the work over and above the agreed quantity shall be considered as vague, because through this clause, the contract awarding authority presumes that the contractor is bound to carry out any quantum of the excess works as directed by that authority. The contractor, by this clause, however, is not legally bound to carry out any amount of the excess work. The contract awarding authority must specify, in such cases, a percentage of this excess quantity over and above the agreed quantity. A maximum of 25 percent can be considered as reasonable”.

The legal point brought out by the court is that the agreement should not be left vague as it tends to make the agreement a one sided document. The contractor is legally bound to comply only with the clauses specifying the percentage of limit which need not necessarily be 25 percent in all cases.

EXCESS / DEFICIT OVER TENDERED QUANTITY:

The principles underlying the payment for excess over the tendered quantity may be the following:

- i. Excess quantity of work or any portion thereof executed by the contractor which falls within the prescribed percentage as stipulated in the agreement, should be paid after allowing appropriate escalation in accordance with the general clauses on “price” adjustment over and above the tendered rate.
- ii. If the quantity for any particular item exceeds 25 percent or such percentage as stipulated in the agreement as the upper limit, the rate for this excess quantity should be as per “Extra

Items” which follow.

This principle, is equally applicable in deficit over tendered quantity. As such, it will be fair both to the owner as well as to the contractor to make the payment for deficit over tendered quantity utilizing the same yardstick as before.

Reduced quantity of work or any portion thereof executed by the contractor which falls within the prescribed percentage as stipulated in the agreement should be paid for after allowing for the appropriate escalation in accordance with the general clause on “Price adjustment” over his tendered rate.

If the reduced quantity executed by the contractor for the work or any portion of work is less by 25 percent or the stipulated percentage as the lower limit, the rate of payment is as per “Extra Items” which follow.

Major civil works involving installation of equipment auxiliaries and appurtenant structures etc.

For major works, viz. hydro power plants, gates, structures, large industrial complexes like thermal power stations, fertilizer plants, oil refineries it is generally seen that the layout and the vendor’s design data required to assemble various equipment and auxiliaries are not available at the time of the award of contract. Usually, the equipment is ordered after the project approval, and may take a couple of years. The construction work on civil and structural components is entirely dependent upon the availability of working drawings which are based on the design parameters to be provided by the equipment manufacturers. In addition to the above, the long period of execution required for such large works entails substantial escalation which has also to be catered to. The contract period calls for a dynamic coordination with the equipment suppliers and the design organisation for timely availability of working drawings to the various contractors in conformity with technical requirements. It, therefore, calls for frequent updating of networks to ensure proper implementation of the contract.

As stated above, normally, all the working drawings are not made available at the commencement of the contract work. Therefore the scope of various items cannot be realistically assessed at the time of award of work. As such, imposition of ceiling only on the quantity of individual items of the contract may pose serious problems to the contractor in the prevailing fluctuating market, if abnormal variation in the quantity of a particular item occurs. The variation in terms of the total value of the contract wherein the contractor is required to hold his rates within 15 to 20 percent variation in the total value of the work allotted to him, therefore, appears to present a more realistic proposition.

In the interest of both the owner and the contractor, restriction both on total value of the contract and on the item wise quantities stipulated therein would be desirable.

Extra Items: The rates for any additional work or extra items may be determined in accordance with the market rate analysis plus 20 percent towards contractor’s overheads and profit. The rates for additional work and extra items should normally be settled within 30 days of the date of submission of analysis by the contractor. In case, the rate is not settled within the said period, 90 percent of the analysed prime cost exclusive of overheads and profit may be paid to the contractor for such additional work or extra items, till such time the rate is finally settled.

Any claim may be settled by mutual discussions within 2 months of the claim being raised. In case, the same could not be settled within 2 months, the same shall automatically be referred to arbitration. This will avoid unilateral decisions to fix the rate for any additional / extra items by the Engineer-in-charge in the event of failing to arrive at a mutually agreed rate with the Contractor.

Extension of Period: For reasons beyond the control of a contractor, the general conditions of every contract provide for extension of time. Briefly, these are:

- a) Delay in supply of drawings and materials
- b) Changed orders
- c) Unforeseen events

In this context, it may be mentioned that where as a reasonable delay may be deemed to be covered by a contract, for unreasonable delay, the contractor needs to be suitably compensated including losses suffered by him in addition to grant of extension of time. However, to minimize the contract losses during such extended period of delay, he should be contractually free to utilize his labour and T&P etc. in other activities wherever possible.

The following suggestions are made:

- i. Specific extension of time needs to be granted to a contractor in cases where the delay is not attributable to him rather than “an appropriate” extension.
- ii. The Engineer-in-charge should give his decision on such requests within 3 months of the date of receipt of such individual requests.
- iii. In the event of any deviations being ordered resulting in additional costs over the contract sum, the same shall be in proportion to the original contract sum plus a reasonable additional time upto 25 percent of such time.
- iv. A hindrance register should be maintained at the site in which both the parties faithfully record various hindrances including the date of start and date of ending of each hindrance.

The above additions to the relevant clause will go a long way in streamlining the work and avoiding disputes.

Escalation: Whereas the contract agreements provide that a contractor be reimbursed for increase in cost of materials on the basis of wholesale price index and for increase in labour wages arising out of statutory rules or orders, the contractor should also be reimbursed in respect of material and fuel on the basis of building price indices evolved trade-wise and periodically updated to make this provision realistic and equitable.

PERIOD OF COMPLETION:

Should there be any delay in handing over the site beyond the date stipulated in the relevant sub-clause or should there be any delay in payment of mobilization advance beyond 15 days after completion of all formalities and after receipt of the appropriate bank guarantee, such delays shall entitle the contractor for corresponding extension of time. However, where distinct completion dates

have been stipulated for any portions of the project, such delays in handing over the site, if any, shall entitle extension only for that portion of the work.

Liquidated Damages: The maximum limit of liquidated damages should be relevant to the value of contract and not just a fixed percentage irrespective of the contract value. Thus, a slab system for liquidated damages would be more realistic.

Similarly, instead of specifying unjustified delay in terms of “days” as cause for termination of contract, it is preferable to specify the delay in terms of percentage of the stipulated period.

Measurements: In order to streamline the system of measurements, so that timely payments to a contractor are ensured, enabling him to maintain a healthy cash flow, it is suggested that:

- i. Within one month of signing of contract, the Engineer-in-charge and the contractor should mutually agree on the date of the month by which monthly measurements would be taken. A suitable procedure and time schedule should also be fixed for taking measurements of steel reinforcement before concreting work is taken up. If either party is not present for taking measurements on the appointed day and time, the measurements should be taken by the party present and it should be made binding on the other party for purposes of interim payment only. The payment of the bill need not be delayed on this account.
- ii. If, for any reason the contractor or his authorized representative is not available and the Engineer-in-charge has to suspend the work in order to avoid recording of measurements in the absence of the contractor or his representative, the owner may not entertain any claim from the contractor for any loss incurred on this account.

INTERNATIONAL COMPETITIVE BIDDING (ICB)

It has been discussed earlier in this chapter that the World Bank and other multinational funding agencies, who were financing construction of some of the major infrastructure projects require each project to use the Standard Bidding Documents (SBD) designed by it. They were also insisting that some of the large works above Rs.20 crores be put to ICB. Besides, ICB involves payments in foreign currency for a part of the cost of works and hence specific provisions have to be made in the contract documents for such payments. Related issues were: the mode of payments, repatriation of earnings, deployment of foreign personnel – their fees and taxes to be deducted, import of capital goods and rate of import duty applicable etc. The foreign companies who might win projects through ICB required clear cut provisions on the above and related matters.

In May 1993, the World Bank made the use of Standard Bidding Documents (SBD) mandatory for projects aided by it. Following discussions between the World Bank and Government of India, it was decided to do appropriate indigenisation of SBD and evolve a mutually satisfactory set of indigenized SBDs. For the purpose, the Ministry of Finance constituted a high power, interministerial Task Force in May, 1993 which was approved by both the Government and the World Bank.

Consequently, all multilaterally funded projects in India valued Rs.20 crores and above are contracted out to pre-qualified bidders and are governed by the SBDs of the Ministry of Finance. These SBDs are in three volumes as given below:

- i. SBD for Procurement of Works
- ii. SBD for Procurement of Goods

iii. SBD for Procurement of Major Equipment and Industrial Installations

LOCAL COMPETITIVE BIDDING (LCB)

LCB is resorted to in respect of works of lower magnitude which are generally labour intensive. It has been stated earlier that the initial document of standard conditions of contract for building and civil works projects was formulated by the Central Public Works Department (CPWD). Other ministries, departments, local bodies and public sector undertakings modified this document to suit the specific requirements of particular projects. Thus, multiplicity of documents took place and has continued over the decades. In 1992, in response to various demands made on it by industry associations and recommendations of several conferences as well as findings of internal reviews, the CPWD constituted a committee to review its existing document. Various concerned ministries of the Central Government, MES, departments of state governments, industry associations, representatives of contracting bodies and expert agencies like NICMAR were members of this Committee. The Committee submitted its revised draft document in early 1995 which was approved by the Government and notified for implementation. Thus, all CPWD and State PWD works and projects of various development authorities like housing boards use the CPWD General Conditions of Contract, 1995 for Central PWD Works.

However, multiplicity of contract conditions, documents continues as also the view that the existing documents were inequitable, one-sided, loaded with vast arbitrary discretion clauses, and counter productive.

The Construction Industry Development Council (CIDC) came into existence in March 1996. One of the first tasks undertaken by it, has been to evolve a Standard Contract Conditions Document that is in tune with the requirements of modern technologies and methodologies of construction, is fair and equitable to both parties and seeks to reduce administrative discretions to the minimum possible. This work is in progress.

In conclusion, it may be stated that the construction contracts in India are more than 90 years old. It started with the CPWD document around 1906, and continued to be used with some modifications till the independence of the country in 1947. Thereafter, it underwent a major revision. With the advent of a large volume of longer duration development projects, which were handled by different ministries, multiplicity of contract conditions, documents came into use. International competitive bidding was introduced at the insistence of the World Bank, and the SBD of the later came on the scene: these were indigenized.

Currently, all ICB contracts use the SBD of 1993 of the Ministry of Finance as approved by the World Bank; all LCB is done by using CPWD document or its variants developed by different project authorities. The CIDC is trying to evolve a common SBD for LCB projects in India.

Construction Contracts

Introduction

The construction Industry is almost unique amongst commercial endeavours where the “Project is sold before it is made”. Instead, it can be said that each individual contract in the construction industry

contains a degree of distinctiveness even though the contracts may be on standardized forms. The reasons are not far to seek. First, construction industry embraces a wide variety of types of construction, ranging from pure building work to pure engineering with combinations of building and engineering to various degrees. Second, a majority of work is executed on open sites subject to vagaries of nature. Third, no construction project of a sizeable scope is or can be fully designed. Lastly, the time span of a large project depends on so many uncertainties, that it is at best a rational assessment, and, at worst, a wild guesstimate. So much depends on so many variables, that each project – even amongst those serving the same end-purpose – is rightly regarded as a one-off activity, similar in parts, but dissimilar as a whole.

The Contract

The contract document for a major project is voluminous and typically contains the Notice Inviting Tender, Information and Instructions to Tenderer, General Conditions of Contract, Special Conditions of Contract, Schedule of Quantities and Cost, Drawings, Specifications for works, forms for Bank Guarantee in respect of Earnest Money, Performance Guarantee, Mobilization Advance etc., Hypothecation deeds for construction equipment and for purposes of payment of advances. Tender related correspondence and the Letter of Award / Acceptance. While the provisions existing in various clauses of the different sections of the document have their own independent intent, meaning and interpretation, a proper management of the contract involves interpretation of individual clauses in harmony with others so that it is in the interest of efficient and timely execution of the work. This is applicable to both the owner and the contractor.

It is true that the engineers who prepares the contract papers ought to have the owners' interests at heart but it should not be their purpose to take undue advantage of the contractor. The contract should be fair to both sides and the engineer should realize that a contractor cannot remain in business unless he can make some profit. It is also not correct to assume that all contractors are constantly striving to take advantage of the owner. However, the engineer has to protect himself against any contractor who may unintentionally or unwittingly, do something that is not fair to the owner. The provisions of the contract, should be able to prevent any unscrupulous party from profiteering at the expense of others and from failing to produce proper results.

A number of projects in all sectors of development, either completed or ongoing have suffered from time and cost overruns. A major reason, among others, contributing to such a state of affairs, is poor management of the contract resulting in disputes for various reasons leading to intermittent stoppages of work or slow progress or even abandonment of work involving fresh call for tenders to engage a new agency for the execution. A rational interpretation and display of accommodative spirit by both parties to a contract could pave the way for a smooth and timely execution of the work. However, this assumes that the contract drawn up is fair and equitable and takes into account requirements of owner and possible difficulties that may be experienced by the contractor in his operations.

Types of Construction Contracts

Depending on the magnitude and nature of the work, its special design needs, annual requirement of funds, complexities of the job and owner's own preference, different types of contracts are entered

into. Some of the common types of contracts are the following:

- a) Lumpsum Contracts
- b) Item-Rate Contracts
- c) Cost Plus Percentage Contracts
- d) Cost Plus Fixed Fee Contracts
- e) Maximum Price Contracts
- f) Incentive Contracts
- g) Turnkey Contracts

Lumpsum Contracts : As the name implies, in this type of contract, the contractor agrees to do a certain job for a fixed remuneration. For getting this compensation, he is to fulfill all his obligations under the contract, even though the actual cost incurred by him may be higher or lower than the sum agreed to. The payment could, however, be released periodically as the work progresses rather than a single settlement after acceptance of the work.

From contractor's point of view, a lumpsum contract may be preferable as whatever a contractor can gain by excellent planning and efficient management is his own and will add to his legitimate profit. For the owner, it relieves a lot of tedium of detailing, measurements and conventional billing practices.

The question whether a specific contract is a "lumpsum contract" or not forms the basis of many disputes. In construing a contract, it must be considered both on its merits and individually. All documents forming part of the contract must be construed together. In a lumpsum contract, the contractor undertakes to carry out the specified work to completion, supplying equipment, labour and material for a specified lump sum, or for a specified lump sum subject to adjustments for extras, variations and omissions ordered in accordance with the terms of contract. A lump sum contract is usually an entire contract and when it is so, no payment can be recovered from the contractor for work done or materials provided under such a contract until the whole of the work is completed, unless special provision is made in the contract for payments on account of interim certificates during the progress of work.

In the lump sum contract, the employer cannot refuse to pay the contractor merely because there are a few defects and omissions. If there is substantial completion, the employer must pay the contract price subject to a deduction by way of set-off or counter claim for defects. If a contractor fails to complete either substantially in the ordinary sense or in every detail in the special case, he is not entitled to anything unless he can show either.

- a) A contractual right to unpaid installment;
- b) Prevention of completion by employer;
- c) Implied promise to pay for work done by way of waiver or acceptance;

d) Impossibility due to frustration;

Where bills of quantities form a part of the contract, the bills constitute the exact measure of work undertaken by the builder for the contract price. The bills usually serve as the basis for evaluation of variations and also serve as a common basis for comparison and analysis of competing tenders. Bills should be comprehensive and should describe the specification of labour and materials and in interpretation, a preference is given to bill description over particular specification; usually bills following a laid down standard method of measurement should be meticulously drawn. Omissions to describe items as per standard method, would open the doors for claims on such omissions.

Contingencies arise as regards carrying out of work indispensably necessary but not expressly included in the bill or technical specification or other parts of the contract document. It is a cardinal principle that, unless otherwise stated in the contract documents, an obligation to execute an item of work imposes an obligation to do all necessary for safety precautions whether described or not, which are needed to produce the described work. For example, an obligation to construct fair faced concrete imposes an obligation to carry out all necessary form work to achieve the result.

When unexpected difficulties are encountered in engineering contracts, it may mean that the accepted method of work may have to be changed and, in rare cases, execution and completion of work in accordance with original design may not be possible. In addition, damage to existing works while under construction may also occur due to unforeseen contingencies and it may need rectification, repair and reinstatement.

To deal with such contingencies, express provisions in the contract make such risks the responsibilities of the contractors. However, the contractor may be paid for additional work due to certain matters which could not have been reasonably foreseen by an experienced contractor. A few points might be emphasized. In most contracts, even in the absence of a clause making the contractor to include for the risks in his tender, an employer who uses a professional adviser, does not warrant that completion according to his adviser's design or plan is practicable. The contractor has to take the risk of protecting the works against unforeseen risks even in the absence of express provisions in this regard, or otherwise he would be liable to the employer for damages. Even here, the contractor is liable to carry out extra work provided the nature of the work is similar to what he has contractually agreed to execute. But a contractor is not bound to do extra work which radically changes the scope of work or the place of work. If a contractor executes such work quite different from what he had undertaken without protest, then he would be prevented from claiming extra at a later date.

Item-Rate Contracts: In this contract, payment for work done is made on the basis of the quantities of work actually executed and measured, materials supplied and used by the contractor on the project, each such quantity being multiplied by the contractor's corresponding unit rate given in his tender for that unit. In this type of contract, reasonable variations in the tendered quantities of the works do not make any substantial difference to the contractor as he gets payments for the actual work at rates specified in the tender.

For a contractor to submit an item rate tender, it will be necessary to provide him with general

specification, designs and drawings together with estimates of quantities so as to enable him assess the magnitude, character and difficulty of the work and the probable cost at which he can execute it. The contractor would be entitled to claim an adjustment in his compensation if the actual work proves to be considerably different in specifications, quality and quantity from the data presented to him at the time of invitation to tender. The main satisfaction is that he gets unit rates for the quantities actually executed.

The only uncertainty to the employer in such contract is that he will not be in a position to know the total cost of the job till its completion. But he has the advantage of an earlier start of the work pending complete detailing of entire work, along with the progress of construction. At the same time, both the employer and the contractor will have to keep detailed accounts of materials, equipment and work for purposes of making interim payments, and for the employer to watch the progress of expenditure. Even in item rate tenders, all items are not priced such as those for site clearance, dewatering, shoring, grading and clearing of site after completion of foundation, etc.

Cost Plus Percentage Contracts : When there is an emergency or any other condition that requires constructing a facility in a hurry without time to develop plans for it, neither the employer nor the contractor is sure about the cost of construction, a cost plus percentage contract is generally used. There is no incentive to contractor to perform the contract in time. At the same time, there is no risk involved. Since profits of the contractor are linked with cost of materials, labour and equipment, a high cost gives the contractor a higher amount of profit. This results in waste, inefficiency and extravagance by contractors. A good contractor will, however, try to do the work efficiently.

A cost plus percentage contract may also be very useful in situations which are not always emergencies. A dam was washed out due to floods in the Naugatuck River Valley in the USA. The work of replacement of the dam was awarded in 1955 to a contractor on a cost plus percentage fee because no one could anticipate the problems that would arise in the course of reconstruction and decisions could be taken only as the work progressed.

A normal condition attached to this type of contracts is that the contractor has to produce his books of accounts for the employer's inspection as and when required. To make a contract in an emergency, the employer may call in several contractors, find out who can and will tackle the job and make an agreement regarding the percentage to be paid to the contractor.

This contract is also known as "time and lime" (i.e. labour and material) contract. It was in use in the United Kingdom and the United States. But in the United Kingdom, it was condemned by the Public Accounts Committee of the Parliament and Treasury and hence is not much in use in that country. In the United States also, it was prohibited as early as 1940. It was, however, in frequent use during and before the first World War.

Cost Plus Fixed Fee Contracts: In the cost plus fixed fee contract, the contractor is reimbursed the actual cost incurred by him on materials and services and a fixed amount of money as his fee. It is an improved version of the "Cost plus percentage" contract, as in this type of contract, the profit of the contractor is not linked with the cost. The contractor receives only the stipulated sum for his part in overseeing and running the job, no matter what the cost of the project may be. The contractor will, therefore, try to complete the job as fast as possible so that his men can be available for

another contract elsewhere enabling him to make additional profit therefrom.

Under this form of contract, the employer can select a reliable contractor to execute the work. The parties can work in harmony and accomplish achieve fine results.

Maximum Price Contracts: This type of contract is not in vogue in India but was used extensively in the United Kingdom and United States during the World War I & II. Sometimes, they are used even now. This is employed when the availability of raw material and labour is uncertain and market conditions are fluctuating. In this, the maximum price of the work is fixed after taking into account the actual cost of production and reasonable profit of the contractor. The contractor gets his profit of the cost of the work below the maximum limit fixed under the contract. More the cost of labour and materials, less is the profit of the contractor. If the cost exceeds the maximum, the contractor suffers a loss. The contractor has, therefore, to strive to keep the cost low through better planning and efficient execution. In the United States, this is further subject to the re-determination of price. The maximum price is adjusted upwards or downwards as may be appropriate in the light of the contractor's actual cost experience.

Incentive Contracts: This type of contract was also used in the UK and the USA during the World Wars but is not used in India. This is an improved version of the guaranteed maximum price contract. In this type of contract, the target price of the work / finished product is fixed some what below the maximum price. The contractor is allowed a certain percentage of savings between the maximum price and the target price. This works as his incentive. This type of contract has very often been recommended in cases where the price is to be determined.

Turnkey Contracts: Some organisations specialise in designing and constructing projects. Employer signs an agreement with such organisations for planning, design and construction of the project. This is called a turnkey type of contract. Such a contract may be made on the basis of the cost plus a fixed fee or cost plus a percentage of the cost or whatever arrangement is satisfactory to the parties. Such combined contracts have been advantageously used in industrial projects when there are specialists in the particular field of endeavour. In some cases, they even assist in getting the plant into operation in order to see that everything functions properly. Under this type of contract, a manufacturer may also undertake to develop the designs of any piece of equipment and then manufacture it.

The work can be greatly expedited under such contracts as extensive plans and specifications need not be prepared by the employer. Further, there is no division of responsibility.

The contractor prepares the plan and builds the structure. If handled by a skillful, reputed concern, such methods may be efficient.

In these contracts, the essential feature is that the employer does not employ professional staff to produce the design of the building or project which he requires. Either by negotiation, or by outline specification to tendering contractors, the employer makes known his requirements and the contractor produces the design, in the form of drawings, specifications and sometimes schedule of rates to cover possible variations. Bills are not usually used in such contracts.

Package-deal contracts: In some cases, the project is of a "mixed package-deal" character, with

external works and foundations under the design control of the employer in the usual way, possibly with bills of quantities, and the superstructure provided under an “industrialized building” design of the contractors.

The justification for this system advanced by its advocates is, that it avoids duplication and the expense of design staff, and enables the contractor, with specialized knowledge of his own techniques, to design so as to produce maximum economy, and therefore a leaner price, in a way that an architect or engineer without knowledge of these techniques would not be able to produce.

Essential requirements of a package-deal contract are:

- I. A warranty of suitability, absolute and independent of fault, expressed to be available for a substantial period of time, but expecting normal replacement and maintenance of parts of the building which might reasonably expected to have a limited life.
- II. The bonding of this obligation by a substantial surety.
- III. A right of the contractor to object, after giving due notice, to any variation ordered by the employer which might prejudice his suitability / obligation, but subject to safeguards to prevent frivolous objections.
- IV. Where “mixed package-deal” contracts are involved, a warranty by the contractor extending to the employer’s work as well as the contractor’s work, subject to safeguards enabling the contractor to object at the time to the design of suitability of the employer’s work.
- V. In the case of industrial buildings, a totally different system of interim payment is used, since valuation of work done and materials on site which is the normal basis in traditional contracts cannot be applied as much of the work done is off the site and a suitable method of checking costs is not available.
- VI. The right of a contractor to be permitted to vary the work, if necessary, for purposes of suitability and safety, subject to financial and other safeguards for the employer.
- VII. A list of any parts of the work intended to be excepted from the contractor’s suitability obligation, including any work or material of nominated suppliers or sub-contractors which it is thought appropriate to exclude from it.
- VIII. A definition of the precise status and rights of the employer’s architect (if any), engaged in supervising the work and in regard to the remedying of defects.

Lengthy negotiations may take place and contract work may be commenced even before the formal contract has been signed. A contract may be partly oral and partly in writing or it may be concluded by separate documents or statements indicating offer and acceptance. The course of negotiations may produce agreement on successive terms until ultimately a point of time is reached at which the contract is finally concluded. Such an agreement may be concluded notwithstanding that the parties’ intention from the beginning was to enter into a formal contract and that no such document was ever signed at all. It is, therefore, perfectly possible at some time prior to the final conclusion of the contract, to agree on some of its terms either orally or in written documents or letters, and these

other agreements will form part of contract and supplement the remainder of the contract documents.

The principle stated briefly is “where a preliminary contract of any description, whether verbal or written, is intended to be superseded by one of a superior character then the latter contract prevails, and the stipulations in earlier one can no longer be relied upon”. The party putting forward an earlier collateral agreement, therefore, undertakes a heavy responsibility to prove because it is presumed that the parties will take normally more logical course for suitably amending their main agreement rather than rely on relatively less formal collateral agreements.

Government Contracts: The Central and the State Governments are engaged in the construction of the buildings, roads, irrigation and power projects. Most of the projects are carried out by contractors. Under Indian Constitutional provisions, certain legal formalities are required to be complied with by Government Officers entering into Government Contracts.

Power to enter into Contract: Under the Constitution of India, the power to enter into a contract is conferred under Article 298, as amended in 1956, which reads as under:

ART:298: The executive power of the Union and of each state shall extend to the carrying on of any trade or business and to the acquisition, holding and disposal of property and the making of contracts for any purpose: provided that

- a) the said executive power of the Union shall, in so far as trade or business or such purpose is not one with respect to which parliament may make laws, be subject in each case to legislation by the State; and
- b) the said executive power of each State shall, in so far as trade or business or such purpose is not one with respect to which state legislature may make laws, be subject to legislation by Parliament.

Art. 298 gives power to the Union and the States to enter into contracts for any purpose.

The procedure and the form in which government contracts are to be made is laid down in Art. 299 of the Constituion of India.

ART. 299: Contracts (1) All contracts made in the exercise of the executive power of the Union or of a State shall be expressed to be made by the President, or by the Governor of the State, as the case may be, and all such contracts and all assurances of propriety made in the exercise of that power shall be executed on behalf of the President or the Governor by such persons and in such manner as he may direct or authorize.

- i. Two prerequisites are required to be satisfied for a contract to be valid.
- ii. Contract must be executed i.e. shall be in writing in his / her behalf can execute a contract. The authorization is notified by the Government from time to time.

Terms and Conditions of contracts relate to the performance of the contract whereas the above mentioned procedural requirements are to be fulfilled for the validity of a contract.

Tenders

A contract comprises a series of transactions, such as :

- a) Invitation of tenders
- b) Submission of tenders by the contractors
- c) Acceptance by the Government etc.

The executive powers of the Union and the States extend to covering all these transactions.

In government work, it is generally required to select a contractor on the basis of competitive tendering. Further, to assure adequate competition, at least three tenders need to be received for a project to make the selection.

The notice inviting tenders need not be a part of the contract document, whereas the legal implication of the instructions to tenderer is that they are referred to by the courts in the interpretation of contract clauses.

Pre-qualification of Bidders : Pre-qualification of bidders helps to eliminate the possibility of having to reject lowest tenders and also bar bidders who do not satisfy the stipulated criteria and it is suggested that this practice should be accepted to avoid any controversy.

Acceptance / Rejection of Tenders : Acceptance of tender is defined in Section 2(b) of the Indian Contract Act., 1872, as follows:

“When the person, to whom the proposal is made, signifies his assent thereto, the proposal is said to be accepted. A proposal, when accepted, becomes a promise”.

According to Section 4 of the Indian Contract Act, 1872, the moment an acceptance of tender is posted (by the Government), it is complete as against the tenderer and a valid and binding contract comes into existence.

The acceptance of tender by the Government must be in writing and can be communicated either by a letter or by a telegram but must comply with the requirements of Art. 299 of the Constitution. Regarding the time limit for acceptance of tenders by the government, Section 6 of the Indian Contract Act, 1872 implies that the proposer is not bound to keep his proposal open indefinitely. A tender cannot be accepted beyond the expiry time for which the offer was open for acceptance. A letter of acceptance must, therefore, be issued before the stipulated period or such extended period as may be agreed to by the contractor.

As, in principle, no person has a right, fundamental or otherwise, to compel the government to enter into a contract with him, the Contracting Officer can exercise his discretion to reject all or any of the tenders received by him without assigning any reason. However, rejection of any tender must not be malafide or arbitrary. The Calcutta High Court has held that though the contractor is not entitled, as of the legal right, to challenge that his tender should be accepted, the government being a public body dealing with public funds, cannot act arbitrarily or whimsically.

Construction Contracts – An International Perspective : It is, however, necessary to emphasize that while the Indian contracting system is based on the common English law, the largeness of the

country has resulted in its similarity to USA in several respects. The preferred system of contracting is the 'Bill of Quantities' or 'Unit Price' with no ceiling or limit and the final costs are often substantially higher than the original contract value. The lump sum contracts are adopted only by some government agencies like Military Engineering Service. The cost plus fee contracts are rare. The terms and conditions differ from agency to agency and amendments to conditions are frequent. The rigidity of the system leads to innumerable disputes, right from the start, and considerable time is devoted to administration of contracts, resulting in delays and extra costs. Basically in USA, there are three types of contracts – lumpsum, unit price and cost plus contracts, with various combinations and variants, such as, unit price with lump sum items and cost plus provision for some part of the work, lumpsum contract with unit price adjustment for some work such as work below ground, or external services. A cost plus contract may be based on a fixed fee, percentage fee with or without a ceiling. A somewhat unusual type of contract (unusual in India and UK) adopted is that of 'Guaranteed Maximum' wherein, the excess beyond a ceiling is to his account.

As the projects have become larger and more complicated, a new method of executing these projects through 'Construction Management' contracts have come into vogue. In its ideal form, the Construction Management Contractor, (also known as Construction Manager), acts essentially as an agent of the owner, interacting with the designers and government agencies on one hand, arranging general specialist contractors on the other, and supervising their work on behalf of the owner. A standard form for construction management contract was evolved by the American Institute of Architects and the Associated General Contractors of America in 1975. However, the Construction Management contracting firms themselves offer a variety of additional services such as design, specialist works, etc. This often leads to conflict of interest. The view is that dual service contracts are detrimental and it is necessary to include sufficient checks and balances to regulate the conflict of interests by entering into separate contracts for different services and retain the 'synergistic structures of the team' by having different representatives perform different services, even if belonging to the same organisation. In other words, different roles should not be combined under the same person, or carried out in a manner that distorts the decision making process to the disadvantage of the owner.

In contrast, Japanese public construction contracts are prepared on one standard 'public works modified contract agreement'. But its application is flexible and largely based on mutual trust. The three distinguishing features of the Japanese contracts are : (a) the sovereign power of the government agencies as owner, (b) the custom of mutual trust, and (c) the long term nature of business relationship between the owners and the contractors. In Japan, a contractor must be 'designated' by the owner for a bid to participate in Japanese public works bidding. To be designated for a bid, the contractor has to submit a request to the agency for nominations. The listing is done independently by each agency's vendor list. A Japanese major contractor usually submits approximately 9000 requests for nomination every year. Once a contractor is listed, the public agency evaluates his ranking with reference to his past experience, resources, performance, financial standing, labour welfare performance and designate him for a particular project as appropriate. The designation by a Public agency is usually valid for one fiscal year, but both the owner and the contractor know that it shall normally be renewed over the year. The designated bidder participates in the public project's design

and engineering phases, prior to the bidding.

In Japan, a project commences by awarding a contract by comparative tendering. The designated bidding system in effect works to avoid an unequal distribution of contracts amongst general contractors. Due to pre-bid assistance to owners by general contractors, the result of bidding becomes somewhat predictable. A contractor losing the bid must look for better ways to interact with the owner in the pre-bid stages on future projects to better compete in the market. Unlike the practice in India, UK or USA, drastic change orders or excessive additional works are rarely handled within the initial contract and are usually executed through separate contracts or design change orders. Often, other works in the vicinity are entrusted to the same contractor by negotiation.

The second important aspect of the Japanese public construction is related to the problem of 'dango'. Japanese contractors tend to arrange, between themselves, the priority of access to public projects to avoid extreme competition. This arrangement does not amount to 'cartel' as the participating contractors are not forced to bid at a designated price. Each contractor is to decide the reduction in the bid on his own. The purpose is to maintain a stable labour supply by maintaining competition amongst large sized contractors and preventing large contractors from bidding on small contracts.

Managing Machinery and Manpower : Machinery utilization cannot be achieved in isolation as it is vitally linked with the entire construction activity. A 'systems approach' is therefore required to be adopted in which machinery is just one of the important factors.

It has to be ensured that each cycle / operation / trip / batch gives the rated output by maintaining the machinery in prime condition and further that the machinery does not remain idle for want of work. Idleness or off road state of the main machinery will affect the other machines. The construction activity is, therefore, required to be planned so that the available machinery is deployed for one job after another. In this manner, there is ample scope to reduce the operating costs by efficient management.

Monitoring: It is common practice to monitor the usage of machinery in terms of hours / kilometers rather than on daily / monthly / annual basis whereas the output in terms of cu.m. of earth moved, compacted or concreting done is not so common. Working out the cost per cu.m. is rather rare. Monitoring and maintaining meticulous record is not only a pre-requisite to achieve the targeted output but also helps to generate useful data for further reference on projects. Monitoring reports should invariably be made available to the site engineer without any loss of time so that timely corrective action can be initiated.,

Preventive Maintenance : A satisfactory schedule of preventive maintenance for each and every machine is required to be drawn up and strictly adhered to and no excuses, such as need to achieve daily and monthly targets should be entertained as "prevention is better than cure". If we can ensure regular preventive maintenance, the project and profits will be automatically taken care of.

Repair Organisation : The size of such an organisation depends on the quantum / nature of plant and machinery, remoteness of the project and access to market, repair facilities etc. There are no guidelines available on the scales. In the absence of quantum and variety required in this context, either in the Construction plant / Machinery Committee reports or in any other books, it is difficult to

visualize the staff requirement. The Army and Border Roads Organisation in India have devised a practice for estimating the strength of such organisation and it may be worth while to follow their practice in principle. In the practice followed by the Army and Border Road Organisation, the repair content of different types of plant and machinery is assessed by comparing it with a common piece of machinery viz. a jeep or a road roller and then expressed in units for repair work. Repair capability of a mechanic is assessed in terms of these repair units and we can straight away get their required strength.

Economic and Expected Life: In proactive contracts a time comes when it is no more economical to repair and keep using a machine and this represents its economic life. The depreciation of a machine is worked out from this economic life and it is customary in foreign countries to depreciate a machine in three to five years and we in India more or less follow this practice.

Operating Manpower: The number of operating persons required should be arrived at depending on the number of shifts planned, equipment and reserve, leave entitlement, pattern of absenteeism etc. In this context, the important points which need to be kept in view are: (i) it is better to have a situation when an operator is idle for want of machine rather than the situation where a machine is idle for want of an operator, and (ii) all out effort should be made to devise a broad based grouping of operators to enable the same operator to operate different machines. This was what Sri. Satnarayan Singh did as M.D., APSCC Ltd.,- recruiting 'Operators' in 'grades' operator in a particular grade was required to operate a particular 'group' of machines, e.g.: Mixers/Pumpsets etc., In case we designate an operator, say, a pump driver, more often than not he would refuse to operate a mixer. This happens in the Departments of Government and P.S.U.s.

Additional manpower requirement for associated works like record keeping, supervision etc. is required to be made depending on the methodology adopted and the work conditions.

In conclusion, in modern construction activity there is a qualitative change in technology which calls for an inter-disciplinary approach. The plant and machinery requires elaborate operation, maintenance and repair organisation and since it is highly capital intensive, unless it is properly managed, we will not get the optimum output, and in addition, the quality is likely to suffer. It is, therefore imperative that P&M is intensively used to achieve optimum results. In order to succeed, a construction engineer must know fully his plant and machinery, their high cost and capability. He must devise ways and means to make the machines work at their optimum.