Bulletin

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File: Job Management

Team Management in Construction

THE TEAM ORGANIZATION

The "team concept" for building a project has, in the past, been a "design and build" concept. The team, as a unit, works together and accomplishes the design and construction of the project. However, the mechanical contractor's involvement in the project may not be as a design firm, but rather as the constructor furnishing input as a contractor regarding costs and construction considerations.

The usual team will minimally consist of the owner or developer, architect, engineer, general contractor, mechanical contractor, and electrical contractor which will cover all of the specializations necessary to design and build the job. Note that the owner of the job is considered a member of the team, a very important element for efficient and rapid resolution of any matters requiring the owner's decision.

There may be additional organizations in the team that contribute their expertise in a certain specialization, depending on the magnitude and importance of that work to the design/development effort. For instance, the structural engineer, and possibly a structural firm, may be involved. Another member may be a fire protection contractor since fire protection systems must be considered for particular types of buildings. The early involvement of the fire protection contractor in the team for those kinds of projects is essential.

HOW TEAMS ARE FORMED

It is preferable to be with a selected group for the development of a large building or factory, but this is unusual and, most likely, many contractors have not gone through a team job from start to finish.

Most often, the mechanical contractor is one of several companies invited to present their qualifications and be interviewed. The mechanical contractor may respond on an individual basis to an invitation from a general contractor who may have already been selected, or he may be part of a team of contractors making the sales pitch.

Either way, the invitation usually requests certain specific information about the mechanical contractor's company including general information, basic organization, annual income, list of projects under construction, backlog in dollar volume, financial statement, references, and the names of employees planned for the job.

Other questions may relate to how the contractor would organize the job, how he would work with the designers, his approach to handling the construction,

his cost control and labor monitoring control systems, his approach to scheduling and his familiarity with CPM or PERT systems.

While the mechanical contractor might be involved in a team through any one of a number of circumstances, he might form a team for a particular project or he might be picked along with other contractors by the owner. Most frequently, the opportunity happens because a general contractor knows or is acquainted with the mechanical contractor or because the GC needs a firm with the mechanical contractor's qualifications.

TEAM QUALIFICATIONS

The following four qualifications must be met for a team to handle the mechanical contracting responsibilities of a project:

1. Estimating capability
2. Engineering capability
3. Experiences with the team concept
4. Construction capability.

These are not necessarily discussed in order of importance.

Estimating capability is extremely important to determining the various costs necessary to test various design approaches and arriving quickly at the right numbers for comparison. The contractor members of the team must have extensive background in pricing buildings of all types and, most important, must have cost records from past work and project bids.

It is often helpful to be able to provide a fairly realistic opinion of possible cost or cost differences or, at least, which choices would be the most expensive, and the magnitude of differences between them. In some team jobs, the estimating requirements begin with a budget derived from the sketchiest of information and this estimate is refined several times as more information and actual layouts become available. The process continues until the time when drawings and specifications are fairly complete and definitive, and the information is available for a conventional estimate of the project.

In other cases, the final price of the job must be set from only a plot plan and/or representative floor plans and all contractual information is available for a conventional estimate of the project. In other cases, the final price of the job must be set from only a plot plan and/or representative floor plans and all contractual information must be established, including a firm price or maximum price, before any other information is available. As indicated, estimating is one of the most difficult, but also one of the most important, capabilities that a mechanical contractor must provide to the team.

Engineering capability is also essential to the design of HVAC and plumbing systems. Understanding system options, code requirements, and the practical considerations of the various types of plants or systems that might be mentioned above constitutes the engineering approach to estimating the cost and degree of difficulty from a mechanical contracting standpoint. It is an important capability for the team.

Experience with the team concept is helpful, but not necessary, to being a team member. If the contractor has worked successfully with other individual team members on previous projects, that experience can substitute for experience with the team concept. It is more important that the contractor have the essential estimating and engineering capabilities.

The team concept is not an inflexible, arbitrary way of doing things. However, the job requirements and the leading

team members will most likely establish the program to be followed. Therefore, it is important for the contractor to understand the program, schedule of meetings and requirements as they pertain to the mechanical contractor's responsibilities to the project and the team. The main thing, then, is for the contractor to work seriously and diligently on the information he is to have available and to be well prepared with the assigned work and any other information or concepts he wants to propose. The best team members and the ones most appreciated are those who have done their homework well, and not necessarily those who can boast of extensive experience.

Construction capability is also absolutely essential. After all the other preparatory work is completed, top performance is what will cap off the effort for a successful project.

THE OPERATION OF THE TEAM

1. Establish Preliminary Design and Criteria

The purpose is to define the type of structure and probably the type of construction needed. For instance, will the building need a steel frame or poured concrete? What are the building's dimensions; the number of square feet, number of floors, height information, etc. Where will the building be located and on what specific piece of property? Once the building site is determined, an investigation of the area must be conducted for utility structures.

The schedule for the project, from the beginning of conceptual planning and estimating through completion of working drawings and construction, should be established. Decisions on design criteria governing HVAC systems and plumbing must be made, at least on a preliminary basis. The location of equipment rooms and central plants and information on any special usage areas, such as computer rooms, cafeterias, etc., must be established. The arrangement of lease areas must be determined and it will help considerably to obtain a copy of the proposed lease agreement between the owner and his tenants.

2. Preliminary Budget

At this point, it may be appropriate to establish a committed price on the project. There are two approaches to setting budgets that are generally used. First, the owner and his consultants establish a budget for the entire project which, at that cost, makes the it financially feasible. Then, the budget is divided into the various items it covers with an allowance for each element: the land and associated costs; architect's fees; engineering fees; general construction; and mechanical and electrical. If each part of the overall project is within its allocation of funds, the project is feasible. In this approach, the cost of the project is the beginning, and design and planning to fit that cost are the functions of the team.

Another approach is for each of the team embers to propose a budget for the portion of the project under his responsibility by either following criteria for the job or initiating criteria in the explanation of the budget proposed for each phase. The total budget is then compiled and tested by the owner and his financial people to determine if the project is feasible. If the budget is determined to be an acceptable (understanding that this budget is actually developed prior to design), the team then works with the designers to design/ develop the project to the established budget. During this process, factors may come up that would substantially increase the project costs, requiring that the team either postpone or abandon the project, or repeat the process.

3. Feasibility Analysis

The first factor involved in the feasibility analysis is the pro forma. This is the developed estimate of the owner's total costs, as compared to the revenue he anticipates making for determining whether or not the proposed project will produce acceptable profit. The feasibility analysis also considers the availability of financing, which is closely linked interlocked with pro forma.

It is normally not the duty of the mechanical contractor to work the pro forma, but he might be involved in some of the estimates of tenant finish or unit cost for various tenant work or possibly in maintenance and operating costs.

4. Construction Start Before Completion of Working Drawings

Usually a job on the team basis will start as soon as the owner is satisfied that his project is feasible and that the costs are correct. The final commitment on financing and availability of funds is also a determining factor. Construction can be started as soon as foundation drawings are being prepared. This will result in the building being completed and producing income well ahead of a project which is contracted under the bid system.

5. Working Drawing Preparation

Team members work in close cooperation to control the costs as the construction documents are being prepared.

6. Final Price and Contract

Except in the case where a firm price is negotiated on the first preliminary drawings, the final firm price is estimated from the completed working drawings to determine that the job is designed within the budget originally established or possibly to see if savings have been generated. It is desirable at that point to receive a fixed price contract for the job. This will also provide the owner with a guaranteed cost.

There are also jobs where the guaranteed maximum is established with a fixed fee and usually with a share of savings. The optimum team work occurs when an "incentive type" contract is used where the owner shares any savings that might be generated.

7. Schedule

Jobs run on a team basis should be carefully scheduled under the supervision of the general contractor for the best results.

8. Construction

The team spirit can prevail throughout the entire project and all of the team members benefit from the maximum cooperation.

ADVANTAGES OF THE TEAM APPROACH

1. Before the expensive detail work is undertaken, the team checks out the job for a realistic balance between the technical considerations and the necessary economical considerations. Thus, the owner or developer can determine whether his project is feasible on a cost-to-income basis.

2. Financing can be arranged based on a firm committed price instead of budget figures that might ultimately prove to be inaccurate.

3. Early project completion is possible because construction can begin and material can be procured while final construction documents are being completed.

4. The contracting side of the team will

have a voice in controlling construction details and techniques to produce more building for less money in less time. There are many examples where choice of materials or choice of job configuration or other changes which arise in the design/ development process substantially reduce job costs. It can be shown that the team concept and an "incentive type" construction contract afford the owner many benefits in these areas over bidding of jobs.

5. Under the "team" system of construction, all possible advantages are extended to the client to the end that the lowest possible project cost can be achieved. It can be readily shown that this program and an "incentive type" construction contract afford the client the *maximum* benefit of competitive buying, the *maximum* control of the equipment and materials to be used in his building, the *maximum* assurance of on-time and on-budget delivery, and the best possible conditions for top efficiency and performance of all individuals and firms involved in the project.

DISADVANTAGES OF THE TEAM APPROACH

1. To participate fully in the team, the mechanical contractor must have a staff of highly competent people that are immediately available to the project. Many times the quality of the mechanical contractor is judged by his proposal and his representatives.

2. If the mechanical contractor attempts to participate in every project that he hears about, he will soon find that many of these are "blue sky" and that he has spent a lot of time, money, and travel expense for nothing. Be selective!

3. If other team members are based in other cities, many out-of-town trips may be necessary. If all pre-contract expenses are not reimbursable, the mechanical contractor may end up with a low profit job, even though he is part of a successful team.

4. The paper work on a large cost-plus project of this type is staggering. Unless all of the accounting and billing time is reimbursable, the mechanical contractor could have a large hidden expense. This applies to your controller's time when audits are required.

5. Many owners and general contractors feel that a negotiated job should carry a low fee. This is not reasonable because of the expertise required of the mechanical contractor, as outlined above, and the fact that the contractor must supply his best project engineers and supervision to the job because of the team relationship. If the mechanical contractor cannot get a reasonable return from the job, he may be better off pursuing other types of contracts.

6. On large projects, the changes may come so fast that the mechanical engineer cannot handle them. At this point, the mechanical contractor may have to get involved in drafting and layout to keep the job moving. Make sure that you have these personnel available and that their costs are reimbursable.

7. When the project is going to be fixed price or cost-plus with a maximum, the contractor has to use great skill when pricing the job, especially when using less-than-complete working drawings. If he is too conservative, the job will not go. If he is too low, he will have a problem later.

SUMMARY

The team concept has been used for many years in several of its various forms and names. In this bulletin, the term “team concept” refers to the projects where all team members are involved from the start, and especially before any working plans and specifications are developed. Contractors can provide input into the design, the one largest advantage to the owner.

Many projects have been completed on a team concept basis and the mechanical contractor can look forward to this method of construction being a part of our business in the future.