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Iterative estimating - July 22 & 24, 1987

RALPH J. STEPHENSON, P.E., P.C.
CONSULTING ENGINEER
15064 WARWICK ROAD
DETROIT, MICHIGAN 48223

Project delivery demands often require that a project be started in the field before full contract documents are complete and a full and accurate cost estimate can be prepared. On projects of this type a method of early commmiting to a cost structure must be adopted. The iterative technique is such a method that often is used, both consciously and intuitively by contractors and managers of construction.

The iterative system consists of preparing a set of cost estimates, progressively refined as the construction documents are brought to completion. The up front requirements for an effective iterative system include:

1. Early assignment of both the contractor and the architect/engineer to the project
2. A closely controlled and mutually cooperative effort by the client, the architect/engineer and the contractor.
3. Clearly defined authority and responsibilities among the project team
4. Mutual respect among the parties involved
5. A clearly defined project team leader

Once the team is selected and the goals & objectives to be met for success arespelled out actual project work can begin. Meeting certain front end conditions can often help assure a good project launch. Some of these include:

1. The client should have a carefully prepared proforma properly adjusted to reflect amounts commited to various elements of the project. The important need for the proforma is that it allows all parties involved to reasonably budget their work.

2. All restrictions on design & construction of the project should be made known to the client's project managment team.

3. A plan of the work process should be prepared and made available for the guidance of the project team

4. The program for the project should have been prepared at as early a date as possible. It may prove best to assemble the project team first and then have them write the program as a collaborative effort.

5. Adequate funding should be allocated to properly accomplish this very important front end work. It is in the front end preparation that the funds for the project are really commited.

As project work approaches the point where the design & construction team can with some certainty identify major features of the facility, a line item description of cost elements should be tabulated (without costs) providing space for insertion of all material, labor, equipment, overhead, general requirements, general conditions, profit, and other costs applicable. Into this format target costs should be inserted in a form that will allow progressive refinement of the item cost definition as design proceeds.

When the design is to a point where a actual first blush estimate can be prepared using the design as a basis , the contractor, the architect/ engineer and the client jointly prepare a base estimate by major line item. This estimate may only contain 50 to 75 line items; or it may be more exhaustive if possible and desired. The detail level of the base estimate depends to a great extent on the extent of acceptable early selection of materials, equipmemt and systems to be used in the construction.

The base estimate is often prepared after the architect/engineer has completed early design development studies, and can intelligently answer questions about the components of the project needed to best meet the client's needs.

Some guidelines are appropriate in preparing the base estimate:

1. The documents used should be clearly identified and dated

2. The estimates prepared should be clearly identified and dated

3. The line item breakdown should be based on a component system acceptable to the client, the architect/engineer and the contractor. One system frequently used is the UCI 16 code basic breakdown. This can be elaborated upon to almost any degree as the iterative estimating proceeds.

4. Regular points in time should be established at which to further refine the previous estimate and publish the succeeeding estimate for review, critique & approval.

5. A sign off procedure must be established for both design documents and corresponding estimate packages so that a clear understanding is had of the current status of approvals, particularly design concepts and major component cost.

The base estimate along with the earlier pro forma allocation now provides the fundamental tools with which the project team works to both design the project and to control estimated construction costs of the job.

Once the base estimate is prepared it is reviewed & evaluated against the desired target as set by the pro forma, and the project team headed by the contracting force agrees on revisions to the line items, one by one, to bring current base estimated project costs in line with pro forma targets.

These review & analyses may test the true mettle of the project team and truly demonstate how competent they are individually and collectively to engage in such an exercise.

Of critical importance to the success of such a venture is for the project team to maintain an absolutely open mind to the point where a decision has to be made as to design direction to be followed as a result of the base estimate review. In the base estimate review several points should be kept in mind. These include:

1. Those elements of cost that produce overuns compared to the initial proforma must be examined to deterimine how their cost can be reduced or the item eliminated.

2. Care should be taken to early identify that are on the client's <u>need</u>, <u>want & wish</u> list.

The items <u>needed</u> are those that if reduced in quality or quantity make the project less usable than is truly needed. They should generally be kept intact so far as quality and quantity is concerned. However good value engineering may produce cost savings in alternative systems.

The items of <u>want</u> are usually those that are desired by the client but are not essential to achieving his fundamental need. The want items can usually be considered to provide a return on investment adequate to justify their inclusion. Such a want item might be coffee room space

that improves employee productivity and satisfaction by giving needed rest time away from the desk. The cost here can be justified by the increased value of the employee to the firm.

Wish items are those the client dreams he would like and is willing to pay for, even if there a zero or a negative return on the investment. Wish items are more easily removed in the early stages of budgeting, estimating and designing, than later when everyone's heart has been set on having them in the job.

Pay especially careful attention to wish items.

3. As the line item - by line item cost analysis of the design development work is discussed, adjustments are made to the design documents to reflect changes needed to bring the next line item estimate (line item estimate #1 - the 1st was the base estimate) again into conformance with the proforma desires and financial capabilities of the client.

4. After the base estimate review is completed and approved by those involved, the design team proceeds to further refine the design development package to reflect changes deemed necessary. During this period certain parts of the design may actually be moved into schematics, preliminaries or even final construction documents.

5. In the next predetermined line item review further cost analyses are made of the design work to date and line item estimate #2 is prepared. By now the line item estimate is being rounded into a fairly comprehensive statement of the actual costs that can be expected to be incurred. The design revision and refinement process is now repeated to result in a document package for line item estimate #3. By this time most of the design work should have proceeded into preliminaries or final construction documents. In fact it may be that some of the design has proceeded to a point where actual construction contracts with specialty contractors have been executed and early procurement and field work has started.

6. The cycle desribed above is repeated until the entire project team is satisfied the designed project can actually be constructed for the cost set out in the beginning (and possibly adjusted by the client as the iterative process has proceeded).

7. At this point the client, the contractor or both may desire to enter into a guaranteed maximum price for the work as contained in the

design documents as defined in line extimate #?. Such an agreement then shifts the responsibility and the liability for meeting such costs entirely on the contractor provided the design documents are produced in accordance with the line item estimate forming the basis of the GMP.

This generally ends the iterative estimating process and the GMP negotiation period. However the details of subsequent actions, along with the proper packaging of the construction documents is an essential ingredient to the success of the iterative technique.

(To be continued)