Maintenance by Contract—A State of the Art Review

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ABSTRACT

Widespread discussion of the maintenance-by-contract concepts originated in 1977 at the annual American Public Works Congress Program. Few in the audience were convinced that the concepts were workable. However, during the last 6 years several maintenance organizations have demonstrated that the concept has great economic potential when properly implemented. The reasons for the growing interest by maintenance managers in contracting for maintenance is outlined and an approach is recommended for identifying the savings potential of the concept. Common implementation problems are discussed and guidelines are provided for establishing maintenance by contract.

Highway maintenance expenditures represent a growing share of the total highway dollars. Between 1970 and 1980 expenditures for maintenance in the United States increased by 127 percent; in the same period, expenditures for construction increased by 51 percent (1). If this trend continues, as appears likely, maintenance expenditures will surpass construction expenditures by 1990. Unfortunately, increased expenditures for maintenance have been more than offset by inflation. During the same period some highway cost indexes have risen by almost 180 percent (2).

It now appears that inflation is slowing. However, slowing of inflation does not solve all highway maintenance funding problems. Existing sources of highway revenues also appear to be less dependable than in the past. Fuel-efficient automobiles, potential interruptions in fuel supplies alternating with market glut, and undecided national highway funding policies have all destabilized the highway revenue picture. Coupled with the changing revenue picture, truck weight increases and traffic volume increases have also expanded the need for maintenance. Cost-effective ways of providing highway maintenance help offset these trends. Contracting for maintenance has proven to be cost effective when properly planned and managed (3).

Contracting for maintenance is not new. Periodic maintenance activities, such as seal coating, have long been performed by contractors, and other specialized maintenance activities, such as tree trimming, have been contracted to take advantage of private sector equipment and expertise. Several northeastern states have routinely contracted for snow removal. These maintenance activities were usually contracted in response to a specific management problem or a legislative directive. Maintenance managers are beginning to view contracting for maintenance as a viable management alternative and to evaluate the cost effectiveness of the approach as a routine part of their management responsibility.

GROWING INTEREST IN CONTRACTING FOR MAINTENANCE

There is a growing interest in contracting for maintenance both in the United States and in developing countries (4). Many factors have contributed to this interest. These factors can be categorized in five broad areas.

Personnel-Related Factors

Fueled by taxpayer dissatisfaction with rising taxes, executive and legislative policies to reduce government forces have resulted in highway maintenance agencies reducing staff to below the level desired. Some maintenance agencies have had difficulty maintaining their planned staffing in certain geographic areas. Staffing problems usually occur in remote areas with few public facilities or in areas where demand for workers by private heavy-construction operations deplete the local work force.

Unwieldy personnel rules and regulations often cause untenable delays in filling vacant positions and in removing unsatisfactory workers. In addition, as government labor forces have improved their salaries and benefit packages, labor costs have increased to levels equal to or above the levels in the private sector. Contracting for maintenance has provided alternative solutions to these personnel-related problems by shifting the responsibility of personnel management to the private sector. Government managers are then free to perform their other management functions of planning and directing maintenance work programs.

Equipment-Related Factors

Services of specialized equipment that has a high capital cost and limited job applications have traditionally been obtained by contracting. Maintenance managers at all levels of government have experienced difficulty in obtaining sufficient capital outlay funds to replace outdated and overaged equipment. Often maintenance managers are faced with the choice of major expenditures for repair of an obsolete equipment unit or retiring the equipment unit and contracting for the maintenance work. Maintenance of equipment fleets also presents challenges to managers. Quality mechanics are often difficult to attract and retain. Obtaining necessary funding to provide adequate repair facilities and tools are major constraints within many maintenance agencies.

Contracting for maintenance eliminates the necessity for the maintenance manager to obtain funding earmarked for equipment and relieves the maintenance agency of the burden of maintaining large equipment fleets, which, again, allows maintenance managers additional freedom to concentrate on other more important aspects of their jobs.

Job-Related Factors

Maintenance work is seasonal. Work skills and equipment vary depending on the seasons. Productivity rates are significantly reduced in northern climates during cold weather.

Highway maintenance work loads generally peak in summer and winter seasons. Many maintenance agencies set staffing levels based on snow and ice con-

trol needs. This staff cannot be fully productive during the remainder of the year. Contracting is attractive here because maintenance managers are not saddled with fixed staffs and do not have to attempt to identify logical work with which to fill off-peak periods.

Contractor Interest

Contractors who have traditionally been involved in new construction are demonstrating increased interest in performance maintenance work. This interest has resulted from (a) a depressed construction market; (b) the realization that maintenance work is of a continuing nature and can be used to level their work loads; and (c) realization that carefully planned maintenance work can be profitable.

Contractor groups are encouraging legislative action that will speed the shift to contracting for maintenance. If contracting is truly cost effective, maintenance managers should view these efforts as positive.

Budget and Management Factors

Maintenance managers have found that contracting for maintenance can assist in controlling expenditures. The total price of each maintenance job is fixed when the contract is signed. If poor quality work has to be redone, the expenditure is borne by the contractor.

Money allocated for maintenance can be more surely directed to the appropriate maintenance work when a contractor is used. Contracts are executed early in the budget year and those funds are dedicated to maintenance. Expenditures are also generally easier to track when they are paid through a contract procedure rather than through several different accounts such as personnel, equipment, and inventory.

WHY IS CONTRACTING ECONOMICAL?

The economics of contracting have been demonstrated both in the United States and in other countries. Several inherent characteristics of maintenance by contract contribute to its economy. These characteristics are described as follows:

- Seasonal variations in maintenance work load are not a problem. Contractors are only engaged when there is work to be done.
- Maintenance work programs can be rapidly expanded, reduced, or eliminated as needed. Newest machines and methods can be tested and discarded or continued based on performance.
- Quality control and enforcement procedures such as redoing maintenance work does not increase unit costs.
- Private-sector management incentive is focused on maintenance operations. Improved performance usually means direct financial rewards.
- Each contractor is in a position in which he has to continue to improve his operation to stay ahead of competing companies. This private sector competitiveness eliminates the need for government forces to remain in place to compete with contractors.

ALTERNATIVE APPROACH TO INCREASE SAVINGS

The entire maintenance budget should be considered and the alternative of performing the entire maintenance work program by contract should be evaluated. The evaluation may lead to the government agency maintaining a greatly reduced staff to perform a minor portion of the work.

This approach forces managers to examine the total cost of performing maintenance work and provides the framework to reconsider management thinking for all planned maintenance work. This approach eliminates the need to plan work solely for the purpose of keeping fixed staffs occupied and it forces managers to consider the interrelationship between maintenance work activities. For example, if the mowing operation was contracted out and in-house maintenance staffing levels were based on winter snow control needs, the in-house staff might not have productive work to perform during the mowing season. In that case, the maintenance budget would be burdened with both in-house staff costs and contractor payments. The manager would need to closely examine how winter snow control might be contracted to achieve the most cost-effective approach to maintenance.

COMMON PROBLEMS IN MAINTENANCE BY CONTRACT

Some experiments with contract maintenance have not been successful. In examining these cases, several problems appear to have contributed to the lack of success. The most common problems are described as follows:

- Only a few maintenance work activities were considered for contracting. In some cases, this further unbalanced the remaining force account work loads.
- Maintenance work programs were not defined in a realistic manner. Managers did not have a clear picture of the amount of maintenance work involved.
- Maintenance work methods were not clearly understood by the contractor. Contractors bid conservatively in anticipation of difficulties in satisfying agency desires for work performance.
- Contract documents did not recognize differences beween construction and maintenance.
- Procurement procedures were designed to accommodate large projects with fixed time limits for completion and final payment. Large capital investments, to become prequalified, excluded smaller potential bidders.
- Attitudes of the maintenance managers and contractors were confrontational rather than conciliatory.
- Contractors were not encouraged to participate in the procurement process. Many potential contractors were unwilling to participate without this encouragement.
- Scheduling procedures did not include practical maintenance considerations. Unnecessary delays and inspection expenditures occurred.
- Existing management systems did not allow effective comparison of force account and contract maintenance. Managers simply could not ascertain true costs of force account work.

The problems mentioned are not impossible to solve. The solution to each of these problems is straightforward and should be addressed as a routine part of good maintenance management practices. Most unsuccessful contract maintenance experiments failed because of inadequate preparation by the agency before proceeding with maintenance by contract.

GUIDELINES FOR ESTABLISHING MAINTENANCE BY CONTRACT

Potential economies of maintenance by contract are

dependent on such conditions as efficiency of existing operations, existing procurement regulations, and skill of maintenance managers. Because these conditions vary from area to area, each highway maintenance agency needs to establish a demonstration of contracting. The following is a brief, step-by-step guideline for establishing such a demonstration. Each step is discussed briefly in the following paragraphs.

Step 1: Evaluate existing maintenance situation
Step 2: Establish contract demonstration area
Step 3: Develop maintenance management elements
Step 4: Develop contractor procurement procedures
Step 5: Solicit potential contractors
Step 6: Implement maintenance by contract demonstration
Step 7: Evaluate demonstration

Step 1: Evaluate existing maintenance situation. A review of existing maintenance management practices should be conducted before contracting is implemented. Contracting cannot be properly undertaken without certain management procedures being routinely applied to the planning, organizing, directing, and controlling of maintenance.

Rules, regulations, and procedures that could affect contracting should be examined. Potential obstacles to contracting should be identified and an approach to overcome each obstacle should be developed at this point in the process. Regulations that might prevent contracting out existing government force work may need to be modified as well as regulations that might prevent transfer of line items in the budgets.

Step 2: Establish contract demonstration area. The agency should select an area within its jurisdiction for the demonstration. The area will be easier to control and monitor if it corresponds with an existing district or region boundary. The demonstration area should contain at least 150 to 200 roadway miles. Other characteristics of an area may make it desirable for demonstrating contracting. For example, if a district or region has been traditionally understaffed, contracting might be easier to implement, because the problem of what to do with displaced government employees is eliminated.

Step 3: Develop maintenance management elements. Implementation of maintenance by contract must be a carefully planned process. Elements of planning, organizing, directing, and controlling work must exist. If not previously developed, these management elements must be accomplished as a part of this step in contract implementation.

A realistic annual work plan must be used as the basis for contracting. The annual work program must be composed of well-defined work activities, each of which must have reasonable work methods, accurate material needs, adequate safety requirements, and practicable quantity of work measures.

Managers must have a clear definition of the number of miles of highway and other attendant features for which they are responsible. The amount of work planned for each activity must be based on levels of service that account for the conditions of the roadways. These levels of service must result in reasonable amounts of maintenance work being planned. Based on the work program, a performance budget that reflects reasonable contract prices must be developed. Along with the planning elements, the agency must develop both scheduling and monitoring procedures for the contract work.

Lack of attention to these basic management elements will result in an unsatisfactory contracting experience. Obviously, agencies that have successfully implemented maintenance management systems to plan, organize, direct, and control their work have a head start in implementing contract maintenance.

Step 4: Develop contractor procurement procedures. Procedures for developing contract documents and accepting contractor price proposals should be reexamined based on the characteristics of contract maintenance as opposed to the characteristics of construction. Some of the characteristics that need to be examined are: smaller contract size; longer term continuing work commitment; special capital outlays necessary to begin work (e.g., need to purchase snow plows and spreaders); and less precise inspection and control procedures (e.g., grading shoulders using operation judgment for grade control).

Step 5: Solicit potential contractors. Because contractors in the area may not have maintenance experience, it may be necessary to encourage those contractors to seek maintenance contracts. Often a survey of capable contractors is necessary to identify potential contractors. Maintenance managers may then have to review and discuss work methods, management procedures, and administrative procedures with the contractors to ensure adequate contractor participation.

Step 6: Implement maintenance by contract demonstration. After the preparation described in the preceding five steps has been accomplished, implementation of contracting can take place. Price proposals must be accepted and selection of contractors is made. In-house field forces must be reassigned outside the demonstration area.

Step 7: Evaluate demonstration. Maintenance managers should compare the effectiveness of contracted maintenance work with in-house maintenance work after sufficient demonstration experience. Ideally, the comparison should be between the demonstration area and a control area of similar highway mileage, terrain, traffic conditions, and weather conditions. In making the comparisons the total cost of maintaining the highway system in the two areas should be examined. Quality of maintenance work should also be compared. Measurement of quality may include visual observation, citizen complaints, and accident records.

The evaluation process should also define for the agency the future role of maintenance by contract. As part of this step, approaches to expanding the use of contractors to other geographical areas should be spelled out along with implementation timetables.

CONCLUSION

Maintenance by contract has the potential for significant cost savings. Because of this potential, maintenance managers should investigate contracting in their organizations. The investigations should include an examination of the entire maintenance work program and the most cost-effective mix of contracting and force account work should be developed.

Adequate preparation before contracting maintenance will ensure success and provide the basis for increasing the use of contracting.

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