

Contract Maintenance in the United Kingdom

BRIAN E. COX

ABSTRACT

In the United Kingdom legislation currently requires all local authority public works organizations to operate on a trading basis as contractors to their client authorities. Each public works organization is separately accountable and must tender in open competition with private contractors for a specified proportion of its work; for all its activities it must submit prices to its client authority, and it is paid those prices regardless of the actual cost. A stipulated minimum profit is expressed as a rate of return that must be earned on the capital used. Public works organizations must publicly report their achievements each year, and unsatisfactory performance can be penalized by closure or restricting operations. In accordance with a Code of Practice, all public works will eventually be carried out on a bills of quantities and schedules of rates basis. The Legislation has encouraged the development of computer-based management information systems for the production of priced and unpriced bills of quantities and schedules of rates and the monitoring of performance and profitability. It has also promoted improvements in the cost-effectiveness of work-study-based bonus incentive schemes. The Legislation has affected the organization of highway authorities and the attitudes of its employees. A survey revealed that the involvement of private contractors in routine maintenance was minimal, but that the production of schedules of rates for routine maintenance activities was widespread. It is concluded that the introduction of the competitive element into the local government public works organizations in the United Kingdom has produced a substantial improvement in their operational efficiency and cost-effectiveness, and it has encouraged the development of user-friendly management information and control systems.

All highway maintenance in the United Kingdom is currently carried out by contract, but only a proportion is executed by private contractors. This apparently contradictory statement is resolved because the publicly employed forces (direct labor organizations (DLOs)) carrying out highway maintenance are now required to operate on a trading basis as contractors to their client public authority.

This departure from the traditional noncommercial public service practice arises from nearly a decade of concern about the value for money provided for the taxpayer by public works undertakings (1-5). The common theme of a number of reports has been that management and accountability should be improved, and that DLOs should predominantly operate in direct competition with private contractors and on a trading basis. These proposals were finally put into effect by the legislation contained in Part III (Direct Labour Organisations) of the Local Gov-

ernment Planning and Land Act of 1980, which was implemented in England and Wales on April 1, 1981, and in Scotland on April 1, 1982 (the Act is colloquially known as the DLO Legislation).

DLO LEGISLATION

In accordance with the Legislation, the DLOs of the county council highways departments in England and Wales and those of the regional councils in Scotland must now be operated effectively as contractors to their client authority.

Legislative Provisions

The principal legislative provisions are as follows: accounting rules, tendering rules, prescribed rates of return on capital, provisions and publications of reports, and power of the Secretary of State to close down DLOs. The Legislation covers all highway improvement and maintenance works, including winter maintenance.

Accounting Rules

The works carried out by a highways department DLO must be accounted for in a separate revenue account, which constitutes a statement of income and expenditure and presents a true and fair view of the financial result at the end of the financial year. The revenue account must include a statement that shows whether a statutorily prescribed rate of return has been achieved. The amounts credited to the DLO revenue account for work carried out (i.e., the DLO's income must be based on previously submitted and accepted bids, quotations, or statements of charge); thus the DLO income does not reflect the actual cost of work incurred. Actual cost will be recorded as expenditure.

This is a prime change in circumstances. There is no longer a guaranteed predictable source of income as provided for in the highways budget, and no longer is actual cost credited. As for a private contractor, the DLO must stay within its prices to survive and must live in an unpredictable world, subject to tendering success or failure.

Tendering Rules

For all work carried out for a county council highways department, its DLO must submit prices and is required to compete with private contractors for a substantial volume of work. The Legislation allows the Minister of Transport to stipulate limits above which work must be subject to competitive tender; these limits have been successively applied as follows:

- As from April 1, 1981--competitive tendering required for all jobs estimated to cost more than £100,000;
- As from April 1, 1982--competitive tendering required for all jobs estimated to cost more than £50,000; and
- As from October 1, 1983--30 percent by value of highway work below the threshold of £50,000 to be also subject to competitive tender.

Thus the current situation is that the only work not subject to competitive tender comprises 70 percent of the total value of all jobs estimated to individually cost less than £50,000, but nevertheless, for this work the DLO must submit a price and will only be paid that price, regardless of the actual cost to the organization.

A drawback in a legislative approach to maintenance by contract is the complexity of and confusion caused by legal definitions. Thus originally job was interpreted as an activity that had clearly defined parameters (such as length of overlay); therefore, the competitive tendering requirements were not deemed to apply to routine maintenance, although the total value of each separate routine maintenance activity would exceed the £100,000 limit.

The current definition of a job is that it is all work that can reasonably be carried out most economically and efficiently under one arrangement. Research has revealed that currently, for the first time, competitive tenders are being sought for such routine maintenance activities as pothole patching and sign cleaning.

Both winter maintenance and emergency work are exempt from the competition requirements, but for emergency work the DLO is given 21 days grace from the beginning of the emergency before submitting prices.

The incremental reduction in the tendering limits has enabled DLOs to be acclimatized to competition and to effect the necessary changes in organizational structures and management systems.

Prescribed Rate of Return on Capital

The Legislation requires that the DLO must achieve a positive return on the capital used on a current cost-accounting basis. It follows that the prices submitted by the DLO, whether in competition or not, must include an on-cost to allow for the rate of return, which is currently stipulated by the Ministry of Transport as 5 percent.

The rate of return on capital used for a financial year equates to

$$\frac{(\text{Current cost operating surplus for year})}{(\text{Net operating assets at end of year})}$$

This is expressed in full as follows:

$$(\text{Gross trading income}) - (\text{Cost of wages, materials, and overhead expenses}) - (\text{Allowance for annual depreciation of capital assets at replacement cost}) - (\text{Allowance for stock appreciation}).$$

(Note that total capital used with land and other assets is valued at current market value after being written down to reflect physical depreciation.)

The government originally proposed that the total capital used should include working capital, but it proved impossible to produce a legal definition because the DLO is an integral part of its parent authority and does not possess a separate legal entity. Central government has stated that the objective in calculating the rate of return is to help authorities identify the true economic cost of the DLOs in the interest of improved financial management and better use of resources. As such, the rate prescribed in the directions is not intended to represent the current rate of return that is obtained by industry at any particular point in time, but rather it represents the opportunity cost of capital over a period of time (6).

The requirement to earn a rate of return has forced management to reappraise its organization and operations. From examination of the formula, it

will be appreciated that to maximize the rate of return the DLO management must seek to minimize all those items that served to diminish the gross trading income and must ensure that the total capital used is only that which is essential to the cost-effective operation of the DLO.

The attitude to work has to be profit orientated so that an acceptable rate of return (or profit) is earned by each maintenance activity; if that is not a constant conscious aim, then losses will occur that will diminish the overall rate of return achieved.

Items that Diminish Gross Trading Income

Cost of labor. Wage costs are a major part of the cost of most maintenance activities. The legislation has forced a reexamination of all the constituent elements of labor costs:

1. Bonus incentive schemes (both the administration costs and bonus payment) have been redesigned to minimize the administrative effort required and to improve the relationship between bonus payment and work output; and

2. Other elements such as traveling costs, overtime, and various restrictive practices that have accrued over the years have had to be considered, as well as the personnel required for the various maintenance operations.

In the United Kingdom wage rates are negotiated and agreed on nationally, but there are signs that the national wage and conditions of the service-negotiating machinery are breaking down as local authority DLO managements, motivated by the need to survive, seek and achieve local cost-reducing agreements. It has been widely reported that there is a greater sense of realism in negotiations with trade unions at local level.

Cost of materials. The purchase of materials by local authorities has traditionally been governed by rules designed to meet the needs of public image and accountability. Such regulations have multiplied with time so as to constrain managers from taking advantage of market opportunities. In the commercial environment imposed by the Legislation, DLO managers must seek to dispose of and acquire materials at the most favorable terms obtainable. Research indicates that authorities have amended their purchasing and disposal procedures to permit their DLO managers to exercise individual initiative.

The profit-orientated environment has made management aware of the need to control both the ordering and delivery of materials to (a) ensure that the right quantity is delivered to the right place at the right time, (b) more strictly guard against loss, and (c) minimize handling costs.

Cost of plant. Highways departments have traditionally operated substantial plant fleets that have been maintained by their own workshops. Alternatively, some authorities have a central transport organization with its own workshops and in which all the county council plant and vehicles are vested. The need of the commercially orientated DLO manager to obtain the most suitable plant at the lowest price for a specific period may well conflict with the authority's desire to optimize the use of its holding. The Legislation has thus prompted a reconsideration of both plant management and plant holdings.

Cost of overheads. Legislation requires the DLO manager to act as a contractor by making a profit or else go out of business. Traditionally, an authority's costs for such central services as legal, financial, personnel, and computer have been dis-

tributed across the board, so that at any time the overhead rate will not reflect the amount of service tendered. This device is a simple and convenient way of internally recovering costs.

Under the DLO Legislation overheads are defined as "administration and management expenses and any other expenses incurred in, and incidental to, the undertaking of construction and maintenance work." The accompanying accounting code of practice (7) states that overheads must be fair and reasonable and must reflect the use made by the DLO of the service given to the DLO by the authority.

It follows that the DLO manager must query all overheads to ensure that they are not arbitrary, that they directly refer to the service given, and that they are commercially viable. Although it is doubtful whether any DLO manager would be allowed to look for competitive services on the open market, there is pressure to establish the viability of such services in terms of cost, quantity, and quality. Of course, this reflects on the cost of central services to other county council departments.

Capital depreciation and stock appreciation. As shown, gross trading income is diminished by allowances for depreciation of capital assets at replacement cost and an allowance for stock appreciation. Thus there is an incentive to ensure that capital assets and stock holdings are only those essential for cost-effective operation.

Total Capital Used

It is clear from the formula that to maximize the rate of return, the DLO manager must seek to minimize the value of capital assets used (i.e., the minimum provision of depots, vehicles, plant, materials, stockpile dumps). It is arguable that in the past land has been acquired for storage and sub-depots because it might be useful. This is no longer the case, and many authorities have rationalized their capital holdings.

Gross Trading Income

To retain profitability the DLO manager must seek to optimize the gross trading income. At the same time, excessive income will be counterproductive to the authority, whose aim must be to achieve the optimum benefit on-the-road from its budget. The profit achieved and accumulated by the DLO during the financial year is a sum provided out of the highways budget that is retained in the DLO revenue account during that year, although it can be reallocated to highways expenditure in the succeeding financial year. Nevertheless, excess profit can result in a substantial reduction in the amount of work carried out as opposed to that budgeted for the year.

Provision and Publication of Reports

The Legislation stipulates that an authority must produce a report on the work undertaken by the DLO in a financial year within 6 months of the end of that year. The report must be freely available for examination by any member of the public and must be purchasable at a reasonable price. There is a mandatory requirement that the report must incorporate specific financial information, including a revenue account with a statement of the rate of return achieved, details of the estimated and actual cost of all the work carried out, and details of the estimated and actual cost of work carried out with and without open competition, so that the performance of the DLO can be assessed.

Clearly, the annual report exposes a DLO to public scrutiny, including that of its private con-

tractor competitors. A much greater degree of openness is required than hitherto, but the report provides an opportunity for an authority to publicly justify its actions.

Power of the Secretary of State to Close Down DLOs

Should a DLO fail to achieve the rate of return in any given year, the authority must produce a report on the circumstances for the Minister of Transport. The Minister can also call for a special report on any area of work undertaken in the preceeding 3 years.

Having directed an authority to provide a report, the Minister, whether or not he has received the report, may direct that all or part of a DLO's operations must be closed down either for a specific period or until certain conditions are met, with or without qualification. The Minister may allow the DLO to start up again, but he may impose such provisions as he sees fit.

It could be said that this imposes the same discipline on the DLO as the prospect of bankruptcy does to the private contractor. If the DLO does not perform profitably, it goes out of business; it is arguable whether such an ultimate sanction is necessary to achieve a complete sense of commercial realism.

Chartered Institute of Public Finance and Accountancy Code of Practice

As previously stated, the DLO must submit prices to its client authority for all work to be carried out, whether as a bid in competition with private contractors or as its charge for work not subject to open competition. The Chartered Institute of Public Finance and Accountancy (CIPFA), the professional institution for public service accountancy, has produced an Accounting Code of Practice for Direct Labour Organisations (7). The Code of Practice has been accepted and commended by the Minister as the basis for compliance with the provisions of the Act, and therefore it can be regarded as complementary to the Legislation.

As well as providing the accounting framework for DLO accounts and balance sheets, the Code provides for five types of estimates or tenders:

1. Lump sum, in which the work is described in bills of quantities and specifications;
2. Schedules of rates;
3. Target hours based on incentive bonus systems, where the amount charged is based on the productive hour content;
4. Day work, where the price is an hourly charge based on actual attendance hours or clock hours worked; and
5. Bulk estimates on types of work where the DLO's charge is the amount for a complete job or range of jobs.

Authorities have the freedom to decide which methods to adopt, but the Code of Practice recommends that authorities should move toward types 1 and 2 because there is virtually no other way in which they can provide satisfactory estimates for competition. Research indicates that authorities are moving in that direction, so that in the future all works of highway improvement or maintenance will be carried out either on the basis of bills of quantities or schedules of rates as appropriate, whether they are executed by direct labor or by a private contractor. Of course, it follows that even where open competition is not mandatory by law, the framework of a schedule of rates will enable an authority

to test the cost-effectiveness of its DLO by inviting tenders from private contractors.

IMPLEMENTATING THE LEGISLATION

As previously stated, the requirements of the Legislation have forced management to reappraise its organization and operation. The Legislation has been perceived as a challenge to the engineers managing DLOs to prove that they are as efficient and competitive as private contractors. The response can be gauged from published comments. "I feel that the Direct Labour Organisation regulations have been in many respects, and will continue to be a recipe for control and one which those of us involved in the Organisation heartily welcome" (8). "There is a constant request for better ways of doing things, for better methods, better equipment, for increased productivity and efficiency and for lower unit costs. The advent of the Direct Labour Organisation Legislation has highlighted all these aims and has made it essential for Local Authorities to continue to re-examine some of their proceedings.... The Direct Labour Organisation is therefore both profitable and competitive all of which is a real boost to the morale of the workforce and supervisory staff alike" (9). This comment concludes, "This is one ship that won't sink without a fight."

Examples of the better ways of doing things that have been developed and adopted to preserve DLOs are given in the following subsections.

Improved Work-Study-Based Bonus Incentive Schemes

To retain profitability, productive output must be maximized and nonproductive activities minimized. The claimed or payment by results work-study-based bonus incentive schemes for labor forces that are universally operated by highway authorities in the United Kingdom have been described in detail elsewhere (10). Such schemes have undoubtedly produced substantial improvements in productivity.

Essentially, the calculation of performance, and hence of the bonus payable, depends on the weekly claims submitted by a maintenance crew or by an individual operator. Thus there is an administrative work load in completion and calculation. There is a tendency to favor high bonus-earning capability activities, and bonuses can be earned by nonproductive activities such as moving materials about a site. Consequently, the measured performance and bonus earned are not directly related to productive output; without rigorous and costly maintenance, cost-effectiveness deteriorates with time.

Nevertheless, more than a decade of operation bonus incentive schemes have provided the U.K. highway authorities with a wealth of data on the times required to carry out maintenance activities at specific performance or rates of working in accordance with specific work-study-based personnel levels, methods, plant, and materials. This information is currently being used as the basis for simplified pretargeted or preevaluated bonus incentive schemes and for computerized management information and control systems.

Although they have been under consideration by authorities for some time, research indicates that the DLO Legislation has prompted the rapid introduction of pretargeted bonus incentive schemes.

The bases of pretargeted bonus incentive schemes are as follows.

1. Work study data are used to produce standard times for units of operation, which correspond to items in a schedule of rates.
2. The work is allocated by management in terms

of the operation and specified quantities so that the target for a particular specified amount of work will be the time ascribed to an operation multiplied by a specified quantity.

3. The performance on which bonus is paid is proportionate to that payable for completing the work in the target time; that is, Pay performance = Actual time/Target time.

4. The work-study data provide the information for the allocation of resources and estimations.

A typical job card that illustrates how the system is operated is shown in Figure 1. Considerable advantages have been realized by pretargeted bonus incentive schemes:

1. Work is carried out as specified by management on the job card, and only that work is paid for;
2. The labor force knows exactly what is required;
3. Management and personnel know how long the job should take, which aids both planning and identification of variations;
4. Quantities and cost allocations are predetermined;
5. Setting targets encourages high performance, which reduces unit costs; and
6. Paper work by labor is reduced.

It also follows that

1. If work is carried out to a different method that requires additional resources, additional payment cannot be made;
2. If the work is unsatisfactorily organized, which results in excessive nonproductive time, additional payment cannot be claimed; and
3. If work not specified is carried out, no payment is made.

Although a pretargeted scheme is simpler and therefore more cost effective to administer, it also places on field management the discipline of quantitatively predetermining maintenance operations.

Improved Definition of Works

There is no doubt that in the past there has been little prequantification of maintenance activities, particularly for routine maintenance. Control has been predominantly by budgetary allocation of maintenance funds to broad activity heads, which have therefore predetermined spending patterns, although reallocation between heads has occurred during a financial year according to circumstance.

It is true that there has been the gradual movement toward the determination of resource requirements through the collation of road inventories and the application of quantitative standards, but in many cases the effort required has not been deemed worthwhile. Legislation has forced a change to the quantitative definition of all maintenance requirements. As shown in Table 1, six of seven highway authorities were prequantifying routine maintenance activities by adopting schedules of rates and bills of quantities to describe their requirements in the first operative year of the Legislation. There is evidence that the specification of routine maintenance requirements through a schedule of rates and bills of quantities is becoming widespread. It follows that the need for maintenance is being predetermined and that the subsequent works required are described and quantified.

Improved Management Information and Control Systems

The need to predetermine maintenance requirements in

9. Comprehensive priced lists of materials and plant (owned and hired) as required for comparison in cost-benefit analysis of treatment options, and so forth.

Space does not permit a proper operational description. Suffice it to say that an up-to-date priced schedule of rates or bills of quantities can be readily produced at any time for use as an estimate or as a DLO price. By virtue of their design, these systems are consistent and reliable so that the risks of pricing work manually are eliminated.

In the case where the DLO is submitting a competitive bid, the productivity levels for the various constituent operations can be varied in line with that known to be attainable by specific operators or crews. Thus the bid is submitted with the foreknowledge of the productivity that must be achieved to meet the price, and the necessary amounts and type of plant, labor, and materials required to carry out the operations are also known.

As stated, these systems are now available, and they are mounted on microcomputers so that they can be operated locally at divisional or district engineers offices.

In addition to providing the data for pretargeted bonus incentive schemes, the systems have been enhanced to encompass management information and control systems that will provide a continuous monitoring of productivity and the level of profitability in terms of income and expenditure achieved by a DLO. Systems provide feedback at all management levels, from the individual operative and crew to the entire county highways department DLO.

Improved Organization

As a result of the Legislation, the DLOs of highway authorities must operate on a trading basis as contractors to their client highways department, and work (if required) in competition with private contractors. The engineer, who has overall managerial responsibility for highway maintenance as the client, is ultimately responsible for controlling the

budget for road maintenance; for specifying the work to be carried out, including standards; for quality control; and for generally ensuring that the authority obtains value for money from its maintenance expenditure. At the same time, as the principal contractor, he must ensure that his DLO is not merely commercially competitive but claims every cent it can from the client. Furthermore, under the traditional maintenance organization with district or divisional engineers and their staff, this schizophrenic client-contractor concept will persist all the way through to field supervision.

The initial response of most authorities was that such a two-hatted arrangement was inevitable and that to split the maintenance organization into client and contractor functions would create duplication of effort, require extra staff, and thus generate additional overheads.

A few authorities argued that the two-hatted organizational concept, however professionally managed, was insupportable because no one could be reasonably expected to be two people at the same time, and that there would always be the suspicion that the client was favoring the DLO contractor. This latter viewpoint is gaining ground, and generally it appears that authorities are now dividing their maintenance organizations into client and contractor components under the general management of their chief maintenance engineer.

Although there is no such thing as a common format, Figure 2 typifies the organizational structure that is being adopted (note that these data are from the Wiltshire County Council Highways DLO report and accounts for 1981-1982). It is suggested that this type of structure promotes an improvement in the operational effectiveness of the entire maintenance organization because there is a clear definition of and concentration on objectives.

Reported Progress

Progress in implementing the Legislation can be gauged from the published annual reports of highway

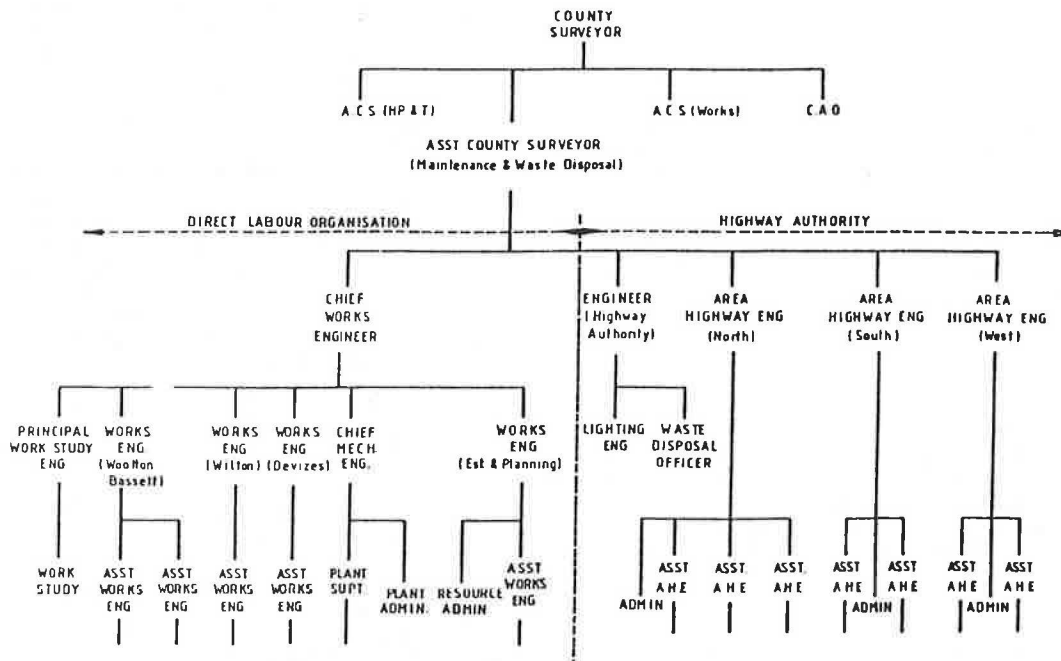


FIGURE 2 Maintenance and Waste Disposal Division structure for the Highways Department of the Wiltshire County Council.

authorities. That of authority B in Tables 1-3 for 1981 to 1982 states that the future developments for 1982 to 1983 are to

1. Complete the segregation of the DLO and client authority functions and responsibilities;
2. Establish the DLO as a contractor and to work accordingly;
3. Fully implement the RATE estimating system;
4. Specify all work required to be undertaken by the DLO in the same form as that on which any contractor would tender;
5. Test the DLO estimates against other contractors and monitor performance;
6. Arrange for all jobs that cost more than £50,000 to be subject to competitive tendering from October 1, 1982;
7. Prepare for the advance notice given by the Secretary of State that he is considering the introduction (April 1, 1983) of a further requirement for a proportion of highways work for all jobs that cost less than £50,000 to be submitted to competitive tender;
8. Pursue alterations to the incentive bonus scheme for its simplification and possible changes from a postevaluation to a preevaluation of productivity-based bonus earning;
9. Complete the inventories of highways maintenance responsibilities; and
10. Continue the review of accounting, costing, and management control systems.

It will be perceived that this authority is following the changes to systems and its organization that have been outlined.

A survey of annual reports revealed that in the first year of implementation of the Legislation there was little competition between DLOs and private contractors (11), and for routine maintenance this was borne out by a sample survey of seven highway authorities. As the data in Table 2 indicate,

TABLE 2 Competition Between DLO and Private Contractor

	Competition Between DLO and Private Contractor by Highway Authority						
	A	B	C	D	E	F	G
Patching (flexible)	No	No	No	No	No	No	No
Patching (concrete)	No	No	No	No	No	-	-
Drainage systems	No	No	No	No	No	Yes	No
Footways and cycle tracks	No	No	No	No	No	Yes	No
Safety fence and barriers	No	No	No	No	No	Yes	No
Boundary fences	No	No	No	No	No	Yes	No
Verge maintenance	No	No	No	No	No	No	No
Sweeping	No	No	No	No	No	No	No
Gully emptying	No	No	No	No	No	No	No
Signals, signs, and crossings	No	No	No	No	No	Yes	No
Other road markings	No	No	No	No	No	Yes	No
Winter maintenance	No	No	No	No	No	No	Yes
Street lighting	No	No	No	No	No	No	No

only in authority F was there competition between the DLO and private contractors for routine maintenance work. The data in Table 3 give the proportion by value of routine maintenance carried out by private contractors for the seven authorities sampled.

The con-competitive state of affairs was doubtless because of the initial cost threshold below which competition was not required. However, as indicated by the data in Table 1 and previously discussed, the adoption of schedules of rates has been almost universal, so that authorities are equipped to invite competition, and the indications are that the lowering of the estimated cost threshold is

TABLE 3 Percentage of Routine Maintenance by Private Contractor

	Routine Maintenance (%) by Private Contractor by Highway Authority						
	A	B	C	D	E	F	G
Patching (flexible)	34	0	10	2	20	2	15
Patching (concrete)	50	0	0	0	0	-	-
Drainage systems	10	0	10	1.5	5	10	0
Footways and cycle tracks	12	0	0	0	5	1	0
Safety fence and barriers	10	0	0	2	0	0	20
Boundary fences	95	100	0	0	0	0	0
Verge maintenance	10	0	0	6	0	65	0
Sweeping	20	0	0	0	0	35	0
Gully emptying	20	0	0	0	3	0	0
Signals, signs, and crossings	30	80	50	0	70	75	75
Other road markings	85	0	100	10	100	30	10
Winter maintenance	5	0	0	0	5	1	30
Street lighting	49	100	100	0	100	100	10

forcing authorities to seek competitive tenders for a range of routine maintenance activities.

It is too soon to judge the effect of this on the survival of DLOs.

CONCLUSIONS

It can be concluded that in the United Kingdom the implementation of Legislation requiring highway authority DLOs to operate on a trading basis in competition with private contractors has had the following effects.

Rationalization

1. Revisions of employment practices and bonus incentive schemes led to increased productive working time and productivity.
2. Revisions of purchasing practices and control of materials led to reductions in product price and economies in use.
3. Revisions of plant management practices and holdings led to reductions in operating costs.
4. Reappraisal of capital assets (such as depots and material storage areas) and of stock holdings of materials led to reductions in overheads.
5. Revision of organizational structures that provide clearer definition of roles and objectives led to improved operational effectiveness.

Environmental

1. The requirement to secure work in open competition with private contractors reduces the traditional security of public service employment.
2. Management must be aware of and achieve the cash flow requirements necessary to sustain their organizations.
3. Management must engender a competitive capability in pricing and an aggressive attitude to charge for work done.
4. Control systems must provide a continuous check on work performance and profitability.
5. The public may scrutinize in detail the performance of an organization, including its financial record.
6. Unsatisfactory performance can produce the closure of an organization.

Working Practices

1. There is now a quantitative definition of maintenance requirements.
2. Standardized description of maintenance requirements are included in schedules of rates and bills of quantities.

3. Locally operable microcomputer-mounted work-study-based management information systems incorporate the production of schedules of rates and bills of quantities with up-to-date prices and physical resource requirements, and they continuously monitor productivity, expenditure, income received, and the ongoing level of profitability.

Rate of Change

Although many of the rationalizations and changes in working practices listed in the previous subsections were being debated before the introduction of the Legislation, its implementation has undoubtedly accelerated the rate of change, and many of those items that were previously regarded as desirable are now deemed necessary for survival.

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APPENDIX: U.K. TERMINOLOGY AND PRACTICES RELEVANT TO THE PAPER

Highway Authority

In England and Wales there are only two types of public bodies statutorily responsible for the maintenance of public highways: central government is responsible for trunk roads and motorways, and county councils are responsible for all other roads. The situation in Scotland is similar, except that there are regional councils instead of county councils. In Northern Ireland central government is directly responsible for all roads.

Execution of Highway Maintenance

The county councils and Scottish regional councils maintain trunk roads and motorways on behalf of and at the expense of the central government. All other roads are either directly maintained by the county councils, or in urban areas on their behalf, and at their expense by district councils. In Scotland the regional councils directly maintain all other roads.

Direct Labor Organization

In the United Kingdom the labor force directly employed by a local authority (county council, regional council, district council) is comprehensively termed a direct labor organization; this equates to the U.S. term state force or force account. Thus the labor employed by a county council on highway maintenance is known as the highways department DLO.

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The author accepts sole responsibility for the accuracy of the facts and data in this paper.